OTR

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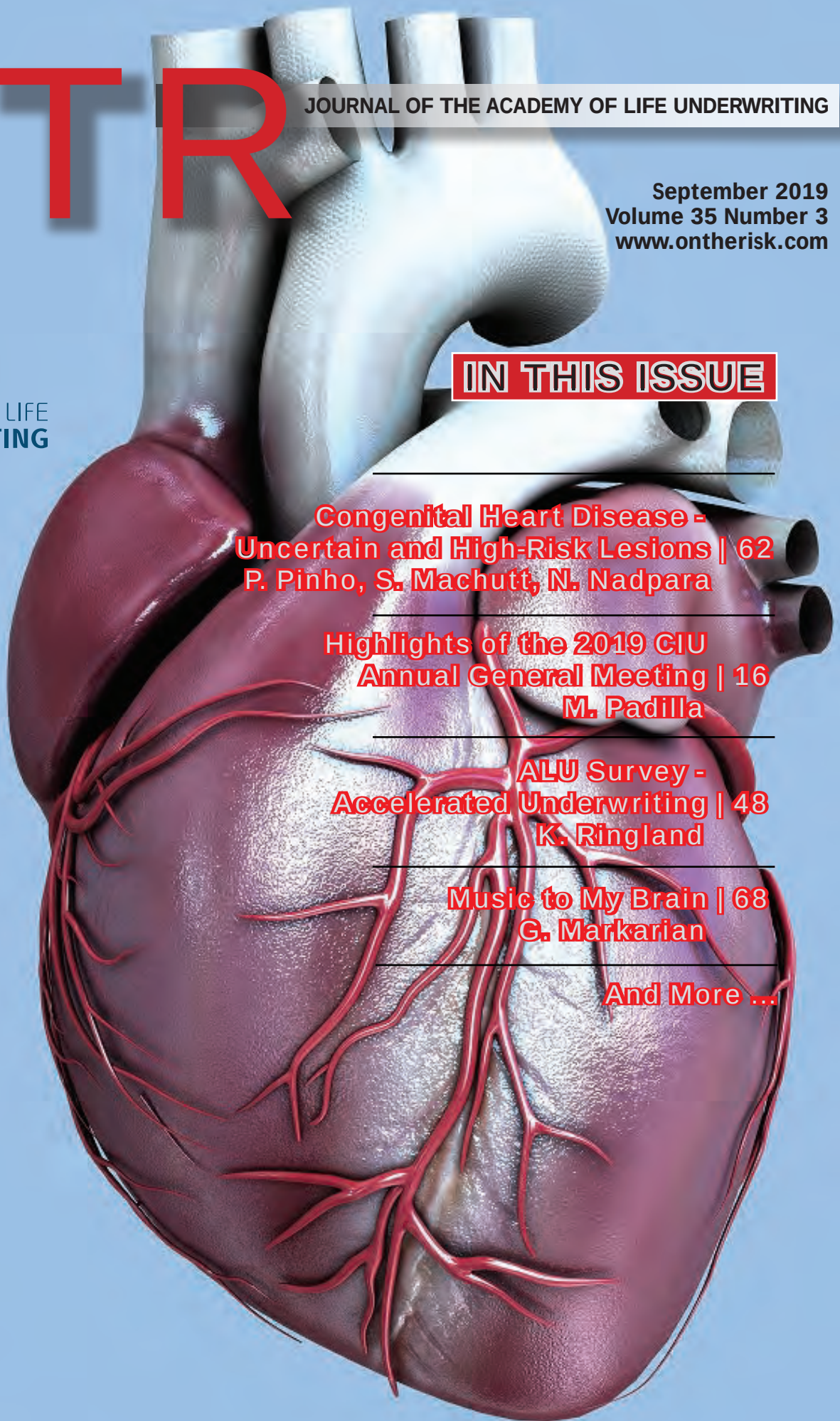

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THE UNDERWRITING QUIZ

FALU Club of RGA

Executive Summary *ON THE RISK is known for its scholarly articles on insurance topics. In keeping with this, the FALU Club of RGA offers a fun and challenging addition to OTR in the form of the underwriting quiz. This regular feature is meant to challenge the underwriting knowledge of you, the reader, encourage ALU class enrollment and promote ongoing professional education in general. If you would like to submit quiz questions of your own, or if you have any comments, suggestions or questions, please contact the FALU Club of RGA at RGAFALUClub@rgare.com. We look forward to hearing from you.*

So now we invite you to test your wits on this quiz. Are you smarter than a FALU?

1. Which type of leukemia accounts for approximately 80% of childhood leukemias?
a) AML
b) ALL
c) CML
d) CLL

2. A proposed insured is rehabilitating from a traumatic head injury and is lethargic since being placed on phenobarbital. What is the primary purpose of the medication used in this situation?
a) Decrease agitation
b) Prevent seizures
c) Reduce insomnia symptoms
d) Limit arrhythmias

3. Which of the following bacteria is responsible for Lyme disease?
a) Escherichia coli
b) Clostridium difficile
c) Helicobacter pylori
d) Borrelia burgdorferi

4. Breast cancer markers such as CA 15-3, CA 27-29 and CEA are more helpful to monitor for recurrence rather than initial detection.
a) True
b) False

5. Ventricular septal defect with left to right shunting can lead to which of the following?
1) Right-sided heart enlargement
2) Pulmonary hypertension
3) Bacterial endocarditis

a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) All of the above

Answers on page 77

The Academy of Life Underwriting will offer four ALU examinations on April 21, 2020.

ALU 101 ALU 201
ALU 202 ALU 301

The registration period for all ALU examinations opened September 1, 2019. Exam registrations are accepted through March 1, 2020; registration forms received February 2 – March 1, 2020, require payment of a late registration fee in addition to the regular exam fee.

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CALENDAR OF COMING EVENTS

2019

October 2-4 TWUC (Texas Wide Underwriting Conference) at the Inn on Barons Creek, Fredericksburg, TX. For more information visit www.twuc.org.

October 3 UAW (Underwriters Accociation of Winnipeg) Annual Conference at the Canad Inns Destination Centre Polo Park, Winnipeg, MB. For more information contact marisa.cantafio@gwl.ca.

October 9 Canadian Living Benefits Annual Seminar at RBC Meadowvale Conference Centre, Mississauga, ON. For more information visit www.living-benefits.ca.

October 11 NEHOUA (Northeast Home Office Underwriters Association) Annual Conference at the Sheraton Portsmouth Harborside Hotel, Portsmouth, NH. For more information visit www.nehoua.org.

October 23 SWOUC (Southwestern Ontario Underwriters Club) Meeting at the Golf's Steakhouse and Seafood, Kitchener, ON. For more information contact Dan Olden at daniel.olden@sunlife.com.

November 12 ALU Webinar on Mood Disorders with Nico van Zyl, MD. For more information visit www.alu-web.com.

2020

January 13-14 CIU Winter Education Seminar at Vantage Venues, Toronto, ON. For more information and to register visit www.ciu.ca.

January 26-29 MUD (Metropolitan Underwriting Discussion Group) 50th Annual Conference at the InterContinental Hotel, New York, NY. For more information visit www.mudgroup.com.

March 1-4 ACLI ReFocus Conference at the Bellagio Hotel & Casino, Las Vegas, NV. For more information visit www.acli.com.

April 6-7 ALU Chief Underwriter Forum at the Hyatt Regency O'Hare, Rosemont, IL. For more information visit www.alu-web.com.

April 14 ALU Annual Examination. For more information visit www.alu-web.com.

May 3-6 AHOU Annual Conference at the Marriott Copley Place, Boston, MA. For more information visit www.ahou.org.

May 6 FHOUA (Fraternal Home Office Underwriters Association) Annual Meeting at the Marriott Copley Place, Boston, MA. For more information visit www.fhoua.org.

May 6 XVIIth IUSG (International Study Group) at the Marriott Copley Place, Boston, MA. For more information contact Rafael Shabetai at rshabetai@palig.com.

May 31-June 2 CIU Annual General Meeting at the Sheraton Centre Totonto Hotel, Toronto, ON. For more information visit www.ciu.ca.

June 17-19 SEHOUA (Southeastern Home Office Underwriters Association) 48th Annual Conference at the Ritz-Carlton Sarasota, Sarasota, FL. For more information visit www.sehoua.com.

Regional, national and international underwriting association meetings and non-profit educational events of direct interest to underwriters can be promoted in *OTR*'s Calendar of Coming Events and at the ALU website - www.alu-web.com. Notify *OTR* of your meeting details by email to otr@ontherisk.com.

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LOCAL, REGIONAL AND INTERNATIONAL ASSOCIATIONS NEWS: INTERNATIONAL UNDERWRITING STUDY GROUP HOLDS ITS 16TH ANNUAL MEETING

Rafael Shabetai
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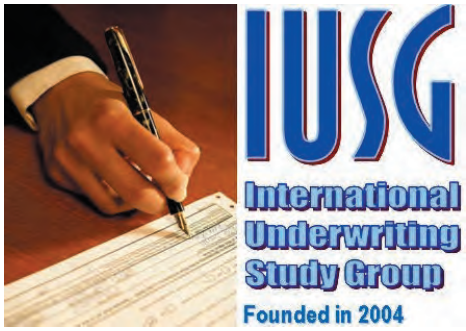

Executive Summary *The 16th annual International Underwriting Study Group (IUSG) meeting took place in New Orleans in connection with the AHOU Annual Conference. Over 30 members attended the meeting. Among them were chief and senior underwriters and medical directors of direct and reinsurance companies. A number of topics were discussed over the 4 1/2 hour roundtable. The IUSG focuses on underwriting issues and challenges presented in non-US or Canadian markets, and offers an open forum for discussion to underwriters whose companies do business internationally.*

The 16th annual IUSG meeting was attended by over 30 participants from several companies, many of whom came from overseas to attend. Some of the main topics discussed are outlined in this article.

Financial Underwriting

Which countries in Latin America have equivalents to the US tax returns? Members indicated there are several countries, i.e., Argentina, Chile, Colombia, Guatemala and El Salvador, that have tax returns similar to the ones in the US. The challenge is not everyone declares exactly what they have or own. However, large companies usually present accurate results. In certain countries, like Chile, the internal revenue is very stringent.

Drugs

There has been an increase in opioid usage in Latin America. None of the members have seen any uptick or issues like are being seen in the US.

International Risks

The discussion focused on countries of current concern. In general, there was a consensus that the economic and socio-political crisis in Venezuela has affected underwriting. Carriers consider the country as "high risk" at this time. Countries that have accepted immigrants from Venezuela are concerned for possible health issues. This includes individuals who have been left with long-term minimal or no proper medical care or even medications. Others may bring with them infectious or transmissible diseases that were not known previously to a certain country.

The group also discussed the law passed by the Panamanian government in 2018, which prohibited insurance companies domiciled in Venezuela from testing for HIV and STDs and obtaining information by electronic means. It leaves companies and reinsurers with a high degree of exposure to these types of cases. Panama has a higher incidence of HIV-positive findings compared to other countries in the region.

Translation of APSs was another topic. Unless the company has underwriters who can read the foreign language, the usual practice is to request the agent have it translated. However, there is a trend to have the translation done by professional translation providers duly accredited by the American Translation Association.

Homicides in Central America was discussed. Companies have experienced that many times the perpetrators are never found. Sometimes it makes the decisions difficult for the underwriters who review the contestable claims because they cannot determine if the beneficiary could have been involved. This has been an ongoing challenge, especially in countries where gangs such as the MS18 operate.

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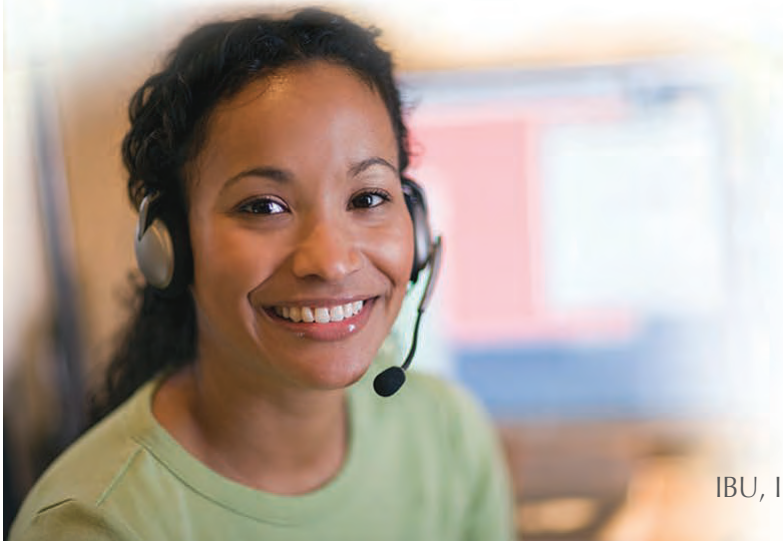

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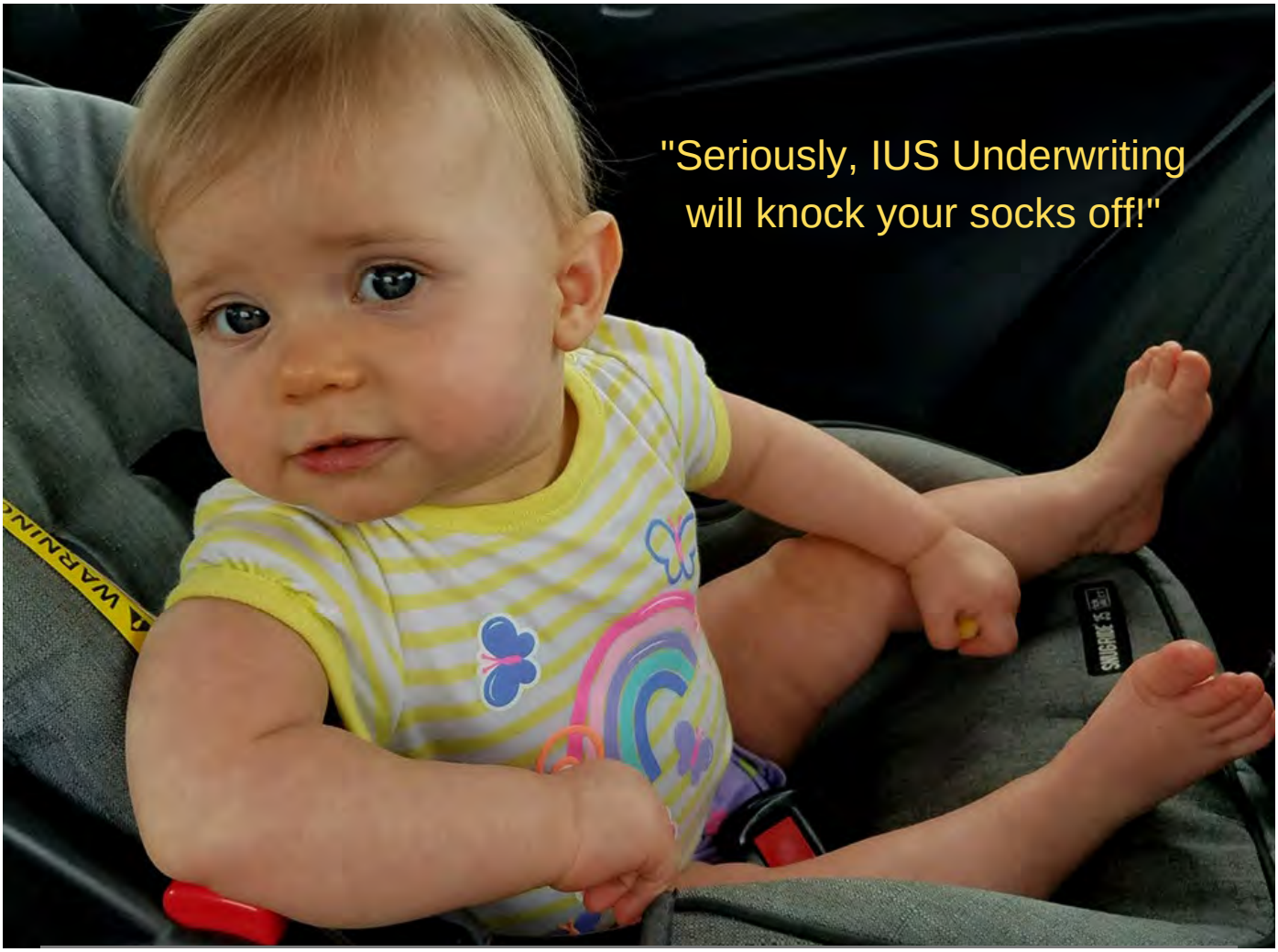
Each year the IUSG elects, among the attendees and according to eligibility rules, a Chairperson and a Vice Chairperson to lead the next meeting. 2019 Vice Chair Joel Jones from Mutual Trust Life/Pan-American Life was elected as the 2020 Chair, and Sandra Prado from American Fidelity was elected as the Vice Chair. Bill Tilford will be the Immediate Past Chair. Those three, plus the Executive Director, will be the Executive Team for 2020.

The Executive Team selects the breakfast sponsor and menu selection, and compiles the topics for discussion that are sought during the year from past attendees. The next meeting will take place in Boston, MA, at the Boston Marriott Copley Place, on Sunday morning before the opening of the 17th annual AHOU Conference.

The IUSG Executive Team thanks ExamOne for its continued sponsorship of the breakfast, and the AHOU for providing the meeting room at the hotel where the conference takes place.

From the 2019 IUSG Meeting: Joel Jones, MTL/PALIG (right) receives the Chairperson gavel from Bill Tilford (left) Tilford Consulting, Immediate Past Chair.

From the 2019 IUSG Meeting (left to right): front row: Dee Santiago, Hannover Re; Terry Feeney, Scor Global; Dr. Keiko Imuro , RGA; Sandra Prado, American Fidelity; Jacquelin Galonska, Gen Re; Dr. Marcela Buenrostro, RGA; Cindy Davis, NFP; Kimberly Zver, Sun Life; Rafael Shabetai, Pan-American Life; middle row: Bill Tilford, Tilford Consulting; Tammy Marlotte, Lombard Intl.; Dr. Alma Vera, RGA; Kim Quant, AXA; Norm Leblond, Swiss Re; Lianne Heppenstrijdt, Sun Life; Joanne Lackenbauer, Sun Life; Jennifer Dahl, Scor Re; Jeanne Hollinger, Mass Mutual; Betsy Sears, ExamOne; back row: Joel Jones, Mutual Trust Life/Pan-American Life; Al Klein, Milliman; Chris Reggione, Sammons Financial; Cliff Toplis, MIB; Frea Errignton, Sun Life; Dr. Ken Smith, American Fidelity; Dr. Ana Villanueva, Mapfre Re; José Luis Carcedo-Cueto, Mapfre Re; Oana Telfer, Sun Life; Carla Wiseman, ExamOne; Georgina Howes, Transamerica Bermuda; Jorge Hernández, American Fidelity; Dr. Eduardo Mora, On The Right Thing.



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HIGHLIGHTS OF THE CIU 2019 ANNUAL GENERAL MEETING, "STAYING ALIVE"

Marcel Padilla, MBA, FALU, FLMI
Director, Underwriting & New Business
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With the theme "Staying Alive!" the 2019 CIU Annual General Meeting was successfully held June 3-5 at the Marriott Bloor-Yorkville Hotel in Toronto, Canada. This year's conference showcased another exciting lineup of speakers who provided insights on how we as individuals, and our industry as a whole, will thrive and succeed in a rapidly changing Canadian insurance market.

Brigitte Mallozzi, 2018-2019 Chair of the Canadian Institute of Underwriters, gave the welcoming remarks on behalf of the entire CIU Executive Committee, followed by the awarding ceremony for new Canadian FALUs by Jennifer Johnson of RGA Reinsurance, President of the Academy of Life Underwriting.

Reaching the Top: Finding Your Life's Purpose
Elia Saikaly, award-winning adventure filmmaker

Imagine yourself at 28,000 feet above sea level, very close to the summit of Mount Everest, in an area notoriously known as the "Death Zone" – so aptly named because it is where the body literally begins to die. Oxygen levels are thin and weather conditions are both harsh and treacherous. "Why would anyone want to do this?" asked Saikaly.

Kicked out of school, a rebel in many ways, the young Saikaly was a punk-rock kid who wanted to live life with his own rules. He was always in trouble with the law and lived on the streets – Saikaly was essentially a lost kid who was destined to live a life without purpose, or so it seemed.

Then he met Gino Dupuis, a tall, 350-pound man known at the time as the strongest man in the world. Dupuis taught Saikaly the power of visualization - he learned to believe in himself again because his life had earlier been written off. "If your spirit can believe it and your body can conceive it, then you can achieve it," said Saikaly.

And so Saikaly became a Much Music DJ and a highly sought-after model and actor. He seemed to have achieved success and fame at the age of 23. Somehow, Saikaly began to feel that he was living someone else's dream. He felt he was not being his authentic self with these "cool" gigs.

In 2005, he met Dr. Sean Egan, a former athlete and University of Ottawa professor. To prove that anything was possible despite one's age, Egan was determined to become the oldest Canadian to reach the summit of Mt. Everest. Egan's life mission was to inspire people. He wanted people to live healthier, happier and more meaningful lives. It was Egan who urged Saikaly to climb Everest. At this point, Saikaly began asking himself, "What if this is really something I want to do?" All of a sudden, however, Egan died in April 2005 of heart failure, aged 63, never having reached the Everest summit.

With his friend's passing, Saikaly continued asking himself many questions, among those being, what if he could climb Everest as a legacy project, as a tribute to Egan's life of helping people in their journey to find meaning? Saikaly experienced culture shock by realizing life was bigger than anything he could imagine. Armed with a determination to realize Egan's own dreams, Saikaly attempted to climb Everest and brought Egan's ashes with him. Seven weeks into the climb, at 28,700 feet above sea level, just 500 feet shy of the summit, he and the sherpas suddenly encountered changing weather patterns. Faced with the dilemma of whether to continue climbing with

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an almost certain risk of dying on the descent, or the option of turning back to safety, Saikaly chose the option which he believed Egan would have preferred, which was to turn back. It saved his life, but he had failed to spread Egan's ashes at the summit. Saikaly felt he failed his friend.

Saikaly then created *FindingLife* Expeditions, a legacy project to honour Egan by connecting young students worldwide to adventurers around the world. It is a portal for children to follow their expeditions as they happen. He was able to show young souls, for example, the dangers of navigating fortresses of ice, traversing large open crevices and climbing the steep mountain slopes thousands of feet above. He felt incredible being able to share with kids his expeditions as a way of teaching them the value of teamwork, empathy, cooperation and determination. Saikaly added, "Always aim high, reach for the stars, break the unseemingly unbreakable." In every single one of his climbs, when faced with adversity, his motto is to take five breaths for every step taken. Focus on every single thing that could go right and not be fearful of everything that could go wrong.

Finally, in 2010, he reached the summit for the first time and connected with the kids via radio. He spread Egan's ashes as he thought about why he was there in the first place: Dr. Sean Egan. It was then that he discovered his life's calling: to climb mountains and link his adventures to philanthropic causes.

Google contacted him to embark on an expedition to do a streetview of Mt. Everest. Saikaly led the Google expedition to a successful conclusion. He used this endeavour to tell the story of the sherpas, the true heroes of the climbers as they elevate the climbers, expedition after expedition.

His life took a sudden turn after a serious paragliding accident. He had lost control of the glider, yet miraculously, it got hooked to a roof of a house as it landed. Landing just 2 feet above the ground spared his life, but he suffered a broken spine and lacerated liver. He refused drugs as he wanted to experience the gravity of his condition. His suffering affected himself and everyone around him, both at an emotional and psychological level. Everyone believed his climbing career was over.

Saikaly took matters into his own hands and assembled his own holistic team of an acupuncturist, sports psychologist, physiotherapist and other health professionals. His recovery was miraculous, as the bones in his spine had eventually fused. Yet he wondered if he could go back to his normal baseline (climbing Everest).

He began a special project, one that would take him back to Everest. Aiming to break stereotypes by promoting equality and women's rights, he set forth on a journey to help four Arab women climb and reach the summit of Everest – two Lebanese women, one from Oman and a fourth from Saudi Arabia. It was a climb which was to be the first Lebanese, Omanian and Saudi Arabian women at the top of Mount Everest!

Saikaly walked us through an extraordinarily inspiring journey in his personal quest to find his life's purpose. The journey was full of ups and downs, a huge dose of pain, accidents, disappointment and feelings of utter hopelessness, yet there were also moments of enlightened determination, meaningful collaboration and redemption along the way. In the end, he found his life purpose, but committed himself to helping others find their own. We as human beings are wired for certainty, but the unknown itself is the field of possibility. "Rich and rewarding experiences are possible if we take the risk. It is all up to us!" he says. Saikaly concluded with a challenge to the audience: seeing what his journey had been, what is our own journey of finding life?

(Note: Elia Saikaly's film *The Dream of Everest*, featuring the four Arab women, will air sometime in the fall of 2019. More information on Eliasaikaly.com.)

Medical Advances - The Unwell: Disability and Mortality Linked to Lifestyle Choices
Dr. John Lefebre, Chief Regional Medical Officer, RGA International

Dr. Lefebre looked at the impact that an aging, healthy and unhealthy population has on society and the insurance industry, as well as possible insurance opportunities that exist within this population.

He began the discussion of lifestyle choices by demonstrating the impact of lifestyle factors on health and life expectancies. One study he cited identified five low-risk lifestyle factors from among 123,000+ persons who were followed up for 34 years: never smoked, BMI of 18.5 to 24.9, did at least 30 minutes a day of moderate to vigorous physical activity, moderate alcohol intake and a high diet quality score (upper 40%). The study concluded that the projected life expectancy of those at age 50 possessing all five low-risk factors was 14 years longer in females and 12 years longer in males. When it came to diet, the Japanese diet was found to result in lower hazard ratios for cancer, heart disease and cerebrovascular

Thinking Forward

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mortality, compared to the average diet in one study of 80,000+ people over 15 years of follow-up.

Dr. Lefebre proceeded in correlating lifestyle choices and genetics by linking telomere characteristics to exercise. Telomeres are protein structures at the end of chromosomes that naturally shorten as we age. Its length is therefore considered a biomarker of cellular aging. But shortening can be hastened by factors that promote inflammation and oxidative stress. On the otherhand, telomere shortening is a modifiable process, too. In one study, it was found that people who engaged in the highest levels of physical activity had longer telomeres compared to those who are sedentary or with low physical activity. In terms of aging, the most active people have a 9-year biological aging advantage vs. sedentary individuals, proving physical activity reduces cellular aging. Another study, conducted among females, diet-scored the participants anywhere from 1 to 9, where higher diet scores meant closer resemblance to the Mediterranean diet. The results were astounding: every 1 point increase in diet score resulted in 1.5 years of biological aging advantage. The study also concluded that "individual dietary components" were not associated with telomere length. In other studies, shorter telomeres were found to be associated with obesity, smoking (which triples the annual attrition rate), Type II diabetes and low socioeconomic level (a factor affecting the quality of diet).

While there are multiple genes that contribute to the development of cardiovascular disease, several studies demonstrated that a high genetic risk for developing CV disease carried a lower relative risk (RR) of having coronary events among those with favourable lifestyles compared to those with unfavourable lifestyles. The same can be said for the effect of favourable lifestyles to atrial fibrillation, hypertension, stroke and diabetes. Despite this, however, knowing one's genetic disposition to disease does not generally change one's behavior. This is particularly true in terms of smoking cessation, diet and physical activity.

Another interesting topic that Dr. Lefebre delved into was the link between lifestyle choices and wearable technology. The question he posed was: Does knowing you have heart disease and using a wearable tech gadget change behaviour? Studies found the answer is "no." Interestingly enough, if we combine it with financial incentives, individuals tend to change their behaviour. The difference is about 100 more miles logged in a period of 6 months! The effect on behaviour is even more pronounced when there are financial disincentives, such as the threat of losing money.

Dr. Lefebre also discussed disability among the elderly. While it is everyone's wish to live long and die quick, reality paints a different picture. Improving mortality rates mean that the population is aging, but among the elderly, it is a given that many of them live with chronic conditions (i.e., living in a period of "disability"). Statistics show as much as 40% in the older than 70 age group have at least three chronic conditions. Can a healthy lifestyle compress the disabled period in older adults? A study comprising individuals with a mean age of 72 years showed healthy eating and adding increments of walking 25 blocks compressed the disabled years for women to only 4.5 years of 15 additional years, and men at 2.9 years of additional 12 years of life.

Finally, Dr. Lefebre discussed the link between smoking and genetics. He quoted epigenome-wide association studies proving that smoking was associated with the methylation of several genes. The studies show smoking-associated DNA methylation markers predict lung cancer incidence. This proves smoking affects one's genetics. In terms of linking smoking with physical activity levels and their effect on mortality, it was found that smokers have higher mortality rates regardless of activity levels. Sitting, therefore, is not the new smoking.

Dr. Lefebre concluded with the following:

1. Studies have observed that life expectancy continues to improve but is slowing since 2011. Much of the deceleration is closely tied to the reduction in improvements from cardiovascular deaths.
2. Within the aging population, there are both healthy and unhealthy individuals. Obesity – known to have a strong association to cancer, strokes and cardiovascular conditions – accounts for most of this unhealthy segment. What we then see is an increased number of survivors with chronic medical conditions.
3. The discussion of medical advances, mortality, morbidity and lifestyle choices among the elderly opens up numerous insurance opportunities, due to increased morbidity among the elderly and the ability to "genetically measure" lifestyle choices.

Critical Illness Case Studies – An Interactive Discussion

Russell Shaw, Senior Director, Individual & GSI Underwriting & New Business, RBC Insurance

This interesting CI case clinic, expertly handled by Russell Shaw, offered eye-opening insights into the challenges and opportunities of selling and underwriting CI insurance.

The first case involved a female applicant applying for $60,000 of CI, from whom a deposit was taken with the application with a signed date of June 10. She had no known medical history of significance. A week later, the underwriter received a call from the advisor, who advised of the applicant's change in health. The underwriter ordered the APS and had yet to receive routine medicals. The paramedical exam and labs were received on June 25. The paramedical exam reported that the client was on a cocktail of BP-lowering drugs and also went to the ER on June 11 with chest pain, was diagnosed with an MI and treated with a single stent. The APS confirmed the chronology of events on the paramedical exam. Was the claim paid? Under a typical temporary insurance agreement (TIA), there was no misdeclaration on the client's part and she was therefore eligible for the TIA benefits.

The above case, Shaw pointed out, is but one of many examples why insurers find critical illness insurance a challenging product to handle. He pointed out three challenges posed by CI:

1. CI insurance is a product that drives sales growth in most insurers. Growth in business for such a complex product requires greater care in handling and attention.
2. There is rapid change in early detection and screening, resulting in higher claims and therefore higher premiums.
3. Contract language has become a lot more technical, making it much more difficult to explain to the average customer. Claims have become more contentious, as well.

With challenges also come opportunities:

1. There is an opportunity to simplify for the consumer.
2. Focus on the impact and not the cause. For example, what is the financial impact of being diagnosed of a serious illness to the family, and what benefits may CI coverage help bring in case of diagnosis?
3. There is substantial opportunity to de-feature the product to make it simpler for clients to understand and decide to buy.

The second case introduced a female financial analyst earning $150,000 who applied for life, CI and disability insurance. The application indicated three episodes of hand tingling lasting a few days between 2017 and 2018 with no obvious cause, a normal brain MRI, no impact on activities or work, and no treatment required. An APS was ordered which showed she initially consulted the physician in 2016 due to hand tingling lasting 12 weeks, which resolved spontaneously. Then in August 2018 she reported ongoing intermittent tingling in hands and now the feet. In February 2019 she also reportedly consulted a neurologist with essentially a normal neurological exam, normal nerve conduction study and normal brain MRI, but the spinal MRI showed discs bulging in areas of the C-spine. The medical doctor was consulted and came back having the opinion that the degenerative disc disease of the C-spine would not account for the client's symptoms. Being symptomatic with no established diagnosis, the client's life application was approved, but was declined for CI and DI coverage.

Another case involved a real estate firm executive earning $250,000 yearly who applied for $1 million in CI. She declared being in good health with routine executive medical exams with normal results. She also underwent regular mammography due to a family history of breast cancer. Her mother was diagnosed with breast cancer at age 55, maternal grandmother died at age 50 of unknown cause, and sister was well at age 48.

Shaw posed several important questions insurers must consider in underwriting such cases:

1. Do we accept executive medical testing results? Often, insurers encounter large-case clients who regularly undergo executive medical testing and are averse to repeat testing that is routinely required by insurers.
2. Is the case a standard risk? Is the applicant rated or subject to a cancer exclusion? What if her sister also had breast cancer at a young age?
3. What if the client underwent a genetic test result and the results were favourable? Should the insurer accept a favourable genetic test result?
4. What if she had undergone prophylactic surgery due to a marked increased risk? If the surgery was successful, can we accept at standard?

Insurers are also faced with several challenges typical of this kind of case:

1. There are varying degrees of understanding among consumers regarding what is covered by health care (or not).
2. CI definitions stay mostly static, but advancements in health care technology tend to impact how CI conditions are diagnosed.
3. The regulatory environment can dictate the way certain information is handled. Genetic test results in Canada, for example, cannot be used to underwrite.

On the other hand, there are opportunities:

1. As an industry, we still have a sizable market opportunity with this product line.
2. In a world where transparency is expected by regulators and consumers, insurers need to figure out how to demystify the product, particularly the definitions. In their current form, one needs a medical degree to understand the product and definitions when insurers pay the claim.

Shaw also discussed a few other cases involving foreign travel and the risks posed to CI. Finally, while certain occupations tend to be high risk for living benefits (head injuries for professional athletes and serious accidents for explosive handlers), he believes we should not stretch the value of occupation too much.

Immediate Finance Arrangements

Ian Taylor, Director of Advanced Sales, Manulife Financial
David Mayer, Senior Underwriting Consultant, Manulife Financial

Arguably the most popular insurance sales strategy, immediate finance arrangements (IFA) are marketed to affluent clients and business owners in Canada. It is a financial planning strategy to meet the wealthy client's need for life insurance protection today and in the future, and provides access to cash for investment purposes. It is a life insurance-based leverage investment strategy that provides tax benefits designed to improve the client's cash flow. Both individuals and corporations can borrow to fund the insurance policy. It is not premium financing and low-cost insurance.

The IFA process is as follows: A client buys life insurance. Once issued, the policy is collaterally assigned to a bank, which then provides the applicant a loan. Cash values in the policy are then used by the applicant to invest or fund a business. The ideal client for an IFA is:

- A Canadian resident – whether individual or corporate.
- In good health, as maximum benefits of the IFA accrue at standard rates. Ratings make it difficult to sell, but solutions can be found to still make the IFA attractive.
- One who sees permanent life insurance as an effective way to provide capital at death.
- Motivated by continuous investing.
- One whose steady cash flow exceeds lifestyle or business needs.
- One who pays tax at the highest rate – today and in the future. IFAs work best in a high tax environment, because this is where the greatest tax savings accrue.
- One who can commit to a long-term strategy and is not averse to debt. IFA is like continuous investing – the bank loan is used to continue growing capital.
- One who has additional assets to help secure debt, if needed.

IFAs are known to have the following benefits:

- They provide life insurance protection and preserve cash flows for investment.
- If structured properly, loan interest and insurance premiums are tax deductible.
- Borrowed funds are received tax-free; however, there are potential taxable benefit issues with shareholder borrowing.
- The timing and amount borrowed are flexible.
- The tax-free death benefit repays the loan. A clear advantage with IFAs is that banks do not require loan repayment until the client dies.
- If corporate, insurance proceeds generate credit to the capital dividend account (CDA).

The two most popular IFA solutions are:

1. Borrowing an amount equal to the annual premium paid (100% leverage). The client pays after-tax loan interest expenses or borrows the after-tax interest expense back at the end of each year (as a zero cash flow solution). In this solution, additional collateral may be required.
2. Borrowing the maximum amount each year secured by the cash value only. In this solution, no additional collateral is required.

The IFA is generally a worthwhile strategy if the internal rate of return (IRR) generated is at least 6%. In the case of a corporate-owned policy, the corporation benefits with a CDA credit at the death of the insured.

Taylor also discussed several issues that can impact the sale. First is interest deductibility. The policy owner should know which vehicles to invest the money in to qualify for tax deductions on interest. The second is collateral insurance deduction. He listed a number of requirements to meet the deductibility requirement, among which the policy must be assigned to the lender. The lender must be a restricted financial institution (bank, trust company, credit union), the assignment must be required by the lender as collateral for the debt, and the loan interest may be deductible. The third are income-related issues. For the IFA to have maximum benefit, corporate or personal income must be taxed at the highest rates. For personal income, the items taxed at the highest

rates are salary, rental income, interest and pension/RRIF income.

From the underwriting perspective, Mayer began by discussing the potential issues that underwriters are faced with when dealing with IFAs.

First, IFA solutions may exceed the insurer's financial underwriting guidelines due to the large death benefit, and the policy structure of an IFA is anything but typical. Large premiums and quick pay options are a concern, because they can drive up the death benefit even higher. The good news is that IFA solutions can be modified. That is, premiums, premium durations and face amounts can be modified so that the solution fits traditional underwriting guidelines.

Second, who is the lender? The underwriter has to make sure it is a trusted lending institution. The borrower needs to maintain ownership of the policy with all the rights and privileges it entails. It is also prudent for the underwriter to ask for the term sheet, which provides the details of the loan and ensures that the client is dealing with a reputable institution.

Third, medical non-disclosure is a concern considering two factors: (1) rated policies normally don't sell, and (2) the target market consists of affluent individuals who are usually older. Older high-worth individuals are more likely to have certain medical conditions with a risk for hazardous avocations. With investment-type products like an IFA, there may be greater risk for medical non-disclosure. Multiple needs of an IFA (loan objectives, tax savings opportunities) may be a "distraction" from the fact we are dealing with a life insurance contract where full disclosure is imperative.

And fourth, how does the underwriter identify an IFA? Without specifically being identified by the client and advisor as an IFA, it could very well be that and masked by the volume of information and financial statements provided. Thus, underwriters must ask the advisor for a cover letter and complete the application section on the purpose for the insurance.

What, then, should the underwriter ask for? In addition to the usual age and amount requirements, these are:

- Term sheet showing details of the loan.
- Corporate financial statements.
- Net operating assets (NOA).
- The attending physician's statement (APS).
- Cover letter – can be invaluable to understand the "basics."

The benefits of an IFA can be far-reaching for the sophisticated high net worth client, but with prudent underwriting and a flexible client, a viable solution can often be agreed upon.

The State of the Industry

Helene Chatelain, Vice President and Chief Underwriter, ivari

How does a middle market, mid-sized insurance company stay alive in today's fast-paced and ever-changing Canadian market? Chatelain asserted that it is innovation, speed and efficiency. She walked us through the exciting innovations at ivari and how these have changed the perception of underwriting within the company.

Acquired by Wilton Re in 2015, ivari today provides a full range of insurance products specifically designed to help Canadians and their families make the right choice for their protection needs. Its overall strategy is to provide financial peace of mind to the Canadian middle market through simple, authentic and personable customer experiences and innovative products. As a mid-sized Canadian insurer, most of its products are fully underwritten with traditional age and amount (AA) requirements. Approximately 550 people work in its Toronto head office. It does not have a huge research or innovation department, which means that every business unit is responsible for its own innovation.

How does ivari survive then? Before Chatelain answered this question, she first took us through the changes happening in our industry, the most important of which are:

- Understanding that a faster and easier life underwriting process is imperative, and as part of this, processes and age/amount requirements need innovation.
- Believing a better buying experience would produce more sales.
- Assessing risk without paramedical exams, labs or medical records.
- Using non-medical e-data and predictive analytics.
- Needing to assess the mortality impact and redistribution of risk among classes with implications on product pricing.

Chatelain stated that innovating without disrupting productivity was essential in the quest for continued survival. Ivari has two main teams – a Risk Assessment Team (RAT), which handles the day-to-day production underwriting, and a Research Team (RT), which handles mostly research and innovation work.

The relationship between the two teams is both fluid and dynamic. Frequent movements occur to help each other out and provide expertise for projects.

Ivari also set out to replace its old underwriting system, since it did not meet the current needs of the environment it was in. Apart from being used solely as an underwriting notepad, its outdated software restricted the number of people who could use it, did not accommodate workflow and a growing number of underwriting rules, and did not allow integration to its internal systems. In 2011, ivari began the move to a new underwriting system called LifeSuite. With the objective of being more agile, LifeSuite was destined to be the opposite of its old system. Viewing the imaged documents in LifeSuite was a big change. Also, its unmatched mail queue was created to receive all mail, thereby allowing all the mail to be both auto-matched (over 70%) and manually matched. LifeSuite also provided for clean case underwriting for its e-apps and paper applications. It also allowed lab data and images to be auto-reviewed by LifeSuite most of the time. Sixty percent of labs are auto-assessed. Moreover, it furnished the underwriter with clients' previous file information needed to fully underwrite the current app. There were many implementation accomplishments, among others:

- Answers to health questions in e-app were moved automatically into LifeSuite.
- Decisioned files were not reopened, but instead LifeSuite created post-issue requirements outside of the decision file.
- The system created greater flexibility in creating monitoring reports and SLA reporting.
- It rationalized work distribution based on team structure and underwriting authority.
- Since LifeSuite conducted the initial underwriting review of the file, it provided a file review summary in a structured format with full data capture display for the underwriter.

And that's just the first version of LifeSuite. Upgrade to the next version of LifeSuite is ongoing, which would allow the system to import from e-para and telephone interviews, then run underwriting rules on the imported data. It will also automate requirement ordering from LifeSuite to vendors, and in general, allow more underwriting rules and greater automation capabilities.

What else has ivari accomplished?

- In the area of handling not-in-good-order (NIGO) and underwriting NIGO (or UNIGO), the challenge lay in creating a requirement for every missing requirement. Thus, it created soft-stop and hard-stop procedures for NIGO and UNIGO.
- It has revamped its tele-underwriting process.
- It has implemented the necessary procedural changes to comply with legislation.
- It has reviewed and changed the rules for APS's, non-residents, immigrants, juveniles and face amount reductions.

Focusing on straight-through processing to ensure applications approved by underwriting no longer go to New Business for issuing policies resulted in a saving of 5 days. In order to accomplish the above-mentioned, changes needed to happen – refining the LifeSuite underwriting rules, reviewing the close-out, TIA, replacement and tele-underwriting processes.

To be more competitive, ivari is in the process of reviewing its age/amount requirements with the objective of easing medical requirements and increasing auto-approval. Volume was reviewed for various ages and amount limits, studies conducted of disclosures, fraud and placement rates, reinsurers consulted for approval then passed on to actuarial for profitability, and finally sent to its Executive Staff for final approval.

Looking ahead to the next phase of innovation means ivari needs to look at the protective value and cost-effectiveness of its requirements. It also recognizes that monitoring rescissions, misrepresentations and claims is imperative to maintaining profitability, if it is to thrive amidst all the changes.

Chatelain ended by summarizing how to proceed and succeed as a mid-sized insurer:

- Identify like-minded advisors and train them well.
- Aim for a fully completed e-app.
- Make the e-app process easy but not to the point of making the advisors lazy.
- Continually review the NIGO process.
- Aim to provide upfront communication all the time.
- Monitor rescission, contestable claims and misrepresentation.
- Monitor trends in the industry and act accordingly – in ivari's case, the head office will be ordering the AA requirements instead of allowing the advisors to do so.
- Finally, adjust!

Advances in Cancer Treatment and Screening
Dr. Nico Van Zyl, AVP and Medical Director, Hannover Re

Dr. Van Zyl gave us a deeper look at cancer genomics, cancer immunotherapy and current screening

recommendations, and the impact of these advances on life underwriting. He began with a discussion on the history of cancer immunotherapy.

First-generation immunotherapeutics prior to the 1980s were mostly non-specific immunostimulants whose mechanism of action was unknown and rarely limited tumour growth. However, these provided the impetus for the creation of biologic response modifiers. Second-generation immunotherapetics were FDA-approved, well-characterized recombinant cytokines. Examples of these are interferons and interleukin-2, which induce the activation and proliferation of T-cells and natural killer cells. On the contrary, they were associated with significant toxicities and were effective only in less than 10% of patients, but served as "proof of principle" that the immune system could produce durable cancer control if properly activated. Third-generation immunotherapeutics used humanized and human monoclonal antibodies to cell surface receptor proteins present on tumour cells. They were utilized as a vaccination strategy, which yielded only modest results.

Dr. Van Zyl also took us through some of the disadvantages of traditional cancer therapies, which are long established in the cancer treatment landscape:

- Chemotherapy: its disadvantages are that it is non-specific, it carries a risk of infection on the part of the patient, and frequent resistance to it means the effects are often short-lived.
- Radiotherapy: not only is it non-specific, it is also not so effective for metastasized cancer.
- Surgery is not effective overall in late-stage disease.

The body's immune system recognizes the cancerous tumour and works against suppressing it. This is a process known as immunosuppression. However, tumours evolve to effectively evade the immune system. Modern cancer treatment means integrating immunotherapy with conventional surgical, chemotherapeutic and radiation oncologic strategies. Chemotherapy and pathway-inhibitor drugs target intracellular mechanisms, whereas immunotherapy targets primarily extracellular interactions. This integrated approach to cancer treatment targets the complex physiologic nature of cancer cells.

According to Dr. Van Zyl, there are two modern immunotherapy approaches: immune checkpoint inhibition and immunotherapy through cellular engineering.

Immune checkpoint inhibition prevents the cancer cell from deactivating the T-cell. An example of this is nivolumab, which was found effective in late-stage squamous-cell non-small-cell lung cancer when chemotherapy fails. Because the response rate is durable in multiple tumours, the result is increased survival. However, only some patients respond well and autoimmune side effects of attacking normal tissue are possible. Another example is ipilimumab, which is approved for the treatment of previously treated metastatic (advanced) melanoma. There have also been recent FDA approvals for anti-PD1 and anti-PD-L2 agents for the treatment of kidney, urothelial, head and neck cancers and Hodgkin's disease.

The two main challenges of immune checkpoint inhibition are its high cost and the fact that only some patients respond well. A recent trend seen in this strategy is that combination approaches increase the proportion of patients who will respond. For example, the combined use of ipilimumab and nivolumab was found to significantly improve the response rate for melanoma.

In cellular engineering, immune cells – chimeric antigen receptor (CAR) T-cells, for example - are genetically engineered to make them smarter. The "dressed-up" T-cell then binds into the cancer antigen and kills the B-cell tumour in ALL/CLL blood cancers. CAR therapy in B-cell tumours is a game changer: it resulted in complete remission in 90% of patients who had relapsed, refractory ALL. The challenge of cellular engineering is how to expend the success of CAR therapy beyond blood cancers. What molecular targets will allow safe and specific targeting of tumours? Can its high cost be absorbed in current health care insurance cost structures?

A recent trend in CAR T-cell immunotherapy is the use of more sophisticated CAR targeting approaches. For example, a trend is to move away from single targets (i.e., CD-19) towards multiple CAR targets to define the tumour and tissue type, and also a trend towards targeting the tumour's support structure. Another trend is in extending the success of CAR T-cell immunotherapy across hematological tumours such as myeloma.

Besides discussing advances in immunotherapies for cancer treatment, Dr. Van Zyl also delved into recent approaches to cancer screening including colorectal and breast cancers.

The value of colorectal cancer (CRC) lies in the fact it is very common and lethal. Since 90% of CRC occurs after age 50, routine screening is recommended starting at this age. The National Cancer Institute (NCI) provides clinical tools to assess the degree of

CRC risk and several risk factors have been identified: demographics, diet and physical activity, medical history (including previous endoscopy of the large bowel and use of medications containing aspirin and NSAID), as well as immediate family history of CRC. At increased risk are those who are older, have previous history of adenomas (particularly 3+ adenomas, of a tubular nature greater than 10 mm, or adenomas of villous histology or high-grade dysplasia), have a history of inflammatory bowel disease (Crohn's and ulcerative colitis), have previous abdominal radiation for a childhood cancer, and have a personal and family history of polyps and CRC. The 2016 Canadian Task Force on Preventative Health Care recommends that adults aged 50 to 74 be screened with a fecal occult blood test (FOBT) every 2 years or undergo a flexible sigmoidoscopy every 10 years. Over the age of 75, colonoscopy is not a recommended CRC screening tool.

In talking about female breast cancer screening, Dr. Van Zyl first categorized women who have average risk, intermediate risk and high risk. Intermediate-risk women are those with immediate family history of breast cancer but not familial cancer syndromes – they require mammographic screening every 2 years from ages 50 to 74. High-risk individuals are those who possess the BRCA or other high-risk genes and have a history of chest radiation therapy. These individuals require annual mammographic screening and annual breast MRI. These should begin 10 years prior to the youngest affected family member, but not prior to age 30 (for mammogram) and not prior to age 25 (for MRI).

Cardiomyopathy: A Practical Guide to Important Clues

Dr. Monica Wilson, SVP & Chief Medical Officer, Swiss Re

Through case studies, Dr. Wilson discussed the variable presentation, common symptomatology and optimal investigative techniques for several types of cardiomyopathies.

Case #1: A 52-year-old male with a BMI of 31.9 presented with white coat hypertension, 1.8x GGT, normal ALT and AST, and declared 2-3 glasses of wine per night, occasionally more on weekends. Total cholesterol was normal, HDL was 80 mg/dl and triglycerides were elevated. The proposed insured saw a cardiologist regularly for risk factor control including echocardiograms on a regular basis. An APS was ordered. The most recent echocardiogram showed a left atrium that was mildly enlarged, dilated left ventricle with mildly depressed EF at 42% with Grade 1 diastolic dysfunction, mildly enlarged right atrium, and mild mitral and tricuspid regurgitation. He then underwent cardiac catheterization, which showed all coronary arteries without significant stenosis, but revealed a moderately diminished ventricular function with EF of 35% and global hypokinesis.

This patient was diagnosed with dilated cardiomyopathy (DC). In the absence of hypertension, valvular disease or coronary artery disease sufficient to cause global systolic impairment, the only possible diagnosis is dilated cardiomyopathy, which is characterized by ventricular dilatation and impaired systolic dysfunction of one or both ventricles. Typical EF is less than 40%. There are three types of DC: familial, acquired (cause by ischemic heart disease, chemotherapy, alcohol overuse, viruses, endocrine disorders or hemochromatosis) and idiopathic, which can be either a primary or secondary cause of heart disease.

Typical findings of DC in ECG and treadmill testing include:

- Arrythmias – PVCs, NSVT and A-fib.
- 1st degree AV block, LBBB, LAHB or IVCD.
- Low limb lead voltage on the surface ECG with pseudo-infarction pattern can suggest an infiltrative process such as amyloidosis.
- Low limb lead voltage with precordial criteria for LVH or LBBB is suggestive of idiopathic dilated cardiomyopathy.
- IVCD or heart block is suggestive of cardiac sarcoidosis.

In the echocardiogram, DC shows as ventricular dilatation and impaired systolic function with EF lower than 40% or fractional shortening.

Due to the patient's alcohol use consumption patterns and elevated GGT and triglycerides, the patient is said to have alcoholic DC. Despite improving prognosis for alcoholic DC, it still carries with it a significant mortality risk and is therefore highly substandard. Underwriters should be beware of clients who have DC but are still drinking.

Another type of cardiomyopathy is peripartum cardiomyopathy (PC). This occurs between the final month of pregnancy and the first 5 months after delivery. It is said that fetal cells sometimes escape into the bloodstream of the mother, leading to an immune reaction which causes myocarditis, which in turn may result in cardiomyopathy. PC is said to develop into heart failure toward the end of pregnancy or within 5 months following delivery. In the echocardiogram, it manifests with left ventricular end diastolic dimension (LVEDD) of more than 2.7 cm/


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m^2, fractional shortening of less than 30% and LVEF of less than 45%. In a study made with 100 women with PC who were followed for 1 year post-partum, 6% died, had transplant or LVAD. In addition, 20% remained with some degree of chronic cardiomyopathy at 1 year of follow-up. The number of deaths is higher among those who presented with EF's lower than 30%. Some predictors of persistent LV dysfunction at follow-up are:

- LVEF less than 30%.
- Fractional shortening less than 20% and an LV end-diastolic dimension > 6 cm.
- Elevated cardiac troponin T.
- African American heritage.
- Diagnosis during pregnancy.

Case #2: 24-year-old male soccer player with a height of 6'9", 203 lbs, and no significant medical history. Family history included a paternal grandfather who died of heart problems at age 47, a father with hypertension and diabetes, a mother and two younger siblings who were all well. His EKG showed LVH by voltage and inverted T-waves. A 24-hour Holter showed no arrhythmias. An exercise EKG did not indicate workload but was negative for ischemic ST changes and there was no ectopy. Echocardiogram showed LVDD 51 mm, LVPW 14 mm, LA 43 mm with normal systolic and diastolic function. The CT angiogram showed LVH but normal coronary arteries. The proposed insured was evaluated by two cardiologists with conflicting diagnoses: athletic heart vs. hypertrophic cardiomyopathy. The application was postponed. One year later, the applicant reapplied after being let go by his team. In the interim, he stopped training and started coaching. His EKG and echocardiogram findings were stable.

Dr. Wilson asked the participants: (1) Does family history play a part? (2) Are the stability of EKG and echo findings favourable? and (3) What is the likely diagnosis?

According to Maron et al., *Circulation* 206, 114: 1633-1644, "Athlete's heart is generally regarded as a benign increase in cardiac mass, with specific circulatory and cardiac morphological alterations, that represent a physiological adaptation to systemic training." This is the likely diagnosis of the applicant in the case.

Studies show the heart normally adapts to exercise. This is true for 50% of trained athletes who show some evidence of cardiac remodeling. In general, a clear history of high-level athletic training for more than 2-3 years is required to consider cardiac changes as adaptation to exercise. Weekend athletes are unlikely to cause cardiac remodeling. Furthermore, the extent of remodeling depends on gender, race, fitness level, exercise type, intensity and duration of physical activity. Generally, both endurance and strength training increase left ventricular mass but the remodeling patterns are different. Endurance training shows an eccentric increase in LV size as well as cavity dilation and wall thickening, whereas strength training shows concentric LV hypertrophy with increased wall thickness. The greatest increases in LV size are seen among endurance athletes in rowing, swimming and cycling for example.

Athletic heart EKG findings include abnormal EKG findings in 40% of trained athletes, occurring twice more in men than women. The most common changes are early repolarization, increased QRS voltage, diffuse T-wave inversions and deep Q-waves. Arrhythmias due to high vagal tone, sinus bradycardia, junctional rhythm, 1st degree AV block and Wenkenbach AV block (Mobitz Type 1) are also common. Also seen are ventricular arrhythmias including non-sustained ventricular tachycardia.

In the echocardiogram, the most common manifestations are:

- LV and diastolic dimension < 6.0 cm in 86% of athletes and < 6.2 cm in about 95%.
- LV wall thickness (maximum) of 1.3 cm in 98% of athletes.
- Left atrial dimension of < 4.5 cm in 98% of athletes.
- Hypertrophy, when present, is usually eccentric – meaning the chamber size is normal or slightly enlarged.
- Both systolic and diastolic function are normal.

Finally, Dr. Wilson also presented hypertrophic cardiomyopathy (HCM). It is the most common inherited cardiac disease affecting all races and ethnic groups, and is equal in both sexes with a prevalence of 1 in 500. It has an autosomal dominant pattern where the offspring of an affected person has a 50% chance of inheriting a mutation. Most mutations and expressions are "private," meaning unique to individual families.

It is uncommon for patients to have a normal EKG. It manifests as repolarization abnormalities (i.e., T-wave changes). The EKG also shows abnormal Q- and P-waves. In the echocardiogram, it usually shows as LV hypertrophy – typically asymmetric, any pattern, diffuse or segmental. The maximum wall thickness is usually greater than 1.5 cm or greater than 1.3 cm with known family history of HCM. The left ventricle is non-dilated and hyperdynamic. Systolic anterior motion (SAM) of the mitral valve is present. Left

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ventricular outflow tract obstruction can be found but not always. In HCM, no other cardiac disease such as hypertension or aortic stenosis can be used to explain the degree of hypertrophy.

Screening for HCM involves detailing family history, physical exam, the EKG and echocardiogram. However, screening is not recommended for children under the age of 12. Between the ages of 12 to 18, clinical evaluation should be repeated annually. Over the age of 18, people with normal ECGs and echocardiograms must be evaluated every 5 years due to the possibility of late-onset HCM.

The final case presented by Dr. Wilson involved a patient who declared hospital admission due to chest pain with a "broken heart" the day her partner died in an automobile accident. She was diagnosed with Takotsubo cardiomyopathy (TC), otherwise known as broken heart syndrome. TC mimics acute coronary syndrome but usually without significant coronary artery stenosis on the angiogram. Typical symptoms at presentation include substernal chest pain, dyspnea, syncope, arrhythmias, pulmonary edema and cardiogenic shock. ECG abnormalities include ST elevation, most commonly in the anterior leads. It may also show mildly elevated troponin levels, peaking at 24 hours, contrasting with the clinical presentations.

CIU LEADERSHIP CHANGES HANDS

From the June 2019 CIU Annual General Meeting in Toronto: (left) Past Chair Brigitte Mallozzi, Hanover Re passes the Gavel to (right) Jennifer Dahl, SCOR. Congratulations!

NEW FALUS AT THE 2019 CIU ANNUAL GENERAL MEETING IN TORONTO

New 2018 FALUs in Canada attended the 2019 CIU Annual Meeting and participated in the official FALU Ceremony. (Left to right) seated: Nicole Daniels, Ivari; Ecaterina Karina Lavric, Sun Life Financial; McKenzie Smith, Sun Life Financial; Marina Sanguinette, Sagicor Life, Inc.; standing: Kentish Rao Appadoo, Sun Life Financial; Courtney Zivku, Equitable Life of Canada; Karen McLeod, LOGiQ^3 ; Audrey Peynado, Optimum Re. Congratulations to all of you!

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HIGHLIGHTS OF THE 2019 CLIMOA ANNUAL SCIENTIFIC MEETING

Tanya Trachenko, MD, FALU, FLMI, PCS
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Executive Summary *The 2019 Annual Scientific Meeting of the Canadian Life Insurance Medical Officers Association (CLIMOA) was held May 5-7 in Toronto. Highlights from the 2019 CLIMOA meeting include a talk on current state of HIV infection; an update on long-term outcomes in children with cancers; a review of traditional and emerging cardiovascular risk factors; and a presentation on successes and challenges in adult congenital heart disease management.*

Update in HIV: Treatment, Morbidity and Mortality in the Modern Era

Isaac I. Bogoch, MD, MS, FRCPC, DTM&H, Department of Medicine, University of Toronto, Toronto, Ontario, provided an overview of the current state of HIV infection in North America.

Human immunodeficiency virus (HIV) is an RNA virus. It has a special enzyme, reverse transcriptase, that catalyzes the transcription of viral RNA into DNA. RNA viruses have very high mutation rates and are constantly producing new viral genetic variants. This presents a significant challenge for vaccines development, and while this is an active area of research, there are no commercially available HIV vaccines to date. AIDS is a zoonotic infection that has its origins spreading to humans from non-human primates in West Africa. It was first described in humans in the early 1980s. The first anti-retroviral drug, zidovudine (AZT), was approved in 1987, and the first combination therapy was introduced in the mid-1990s. Following remarkable advancements in HIV/AIDS treatment, the disease has transformed from a death sentence to a severe chronic infection that can be managed with anti-retroviral therapy.

Globally in 2017, about 37 million people were living with HIV and 940,000 died from it. There are many more people living with HIV than dying from it now that treatment programs are becoming more common in low-resource settings. Sub-Saharan Africa carries a disproportionate burden of HIV, accounting for more than two-thirds of the global burden of infection. In the last decade, there has been a lot of success in local areas of southern Africa with impressive rollout of screening and treatment programs.

In Canada, there are approximately 65,000 people living with HIV/AIDS. The HIV incidence rate is 6.5 cases per 100,000. There were 2,402 new HIV diagnoses reported in 2017. Of adult HIV in Canada, the "men who have sex with men" exposure category represents 46% of all cases, people who inject drugs account for 16% of cases, and 11% of infected people are immigrants from HIV-endemic countries.

Dr. Bogoch then discussed the following HIV risk factors, noting that these are not value judgements, but reflective of populations disproportionately affected by HIV:

- Condomless sex with high-risk individual
- Men who have sex with men
- People who inject drugs
- Blood transfusion prior to 1985 (in Canada)
- Country of origin
- Perinatal transmission with infected mom

After someone becomes infected with HIV, the virus may cause an acute "seroconversion" illness culminating in fever, night sweats and malaise. These symptoms generally appear within 3 weeks after the infection. At the end of the acute stage, a person will have chronic infection and may be asymptomatic for a long period of time. If HIV is considered as a possible diagnosis, it can be ruled in or out by HIV testing that is over 99% sensitive and specific. The testing is available at many sites including sexual health clinics, public clinics and emergency departments. Pre-test

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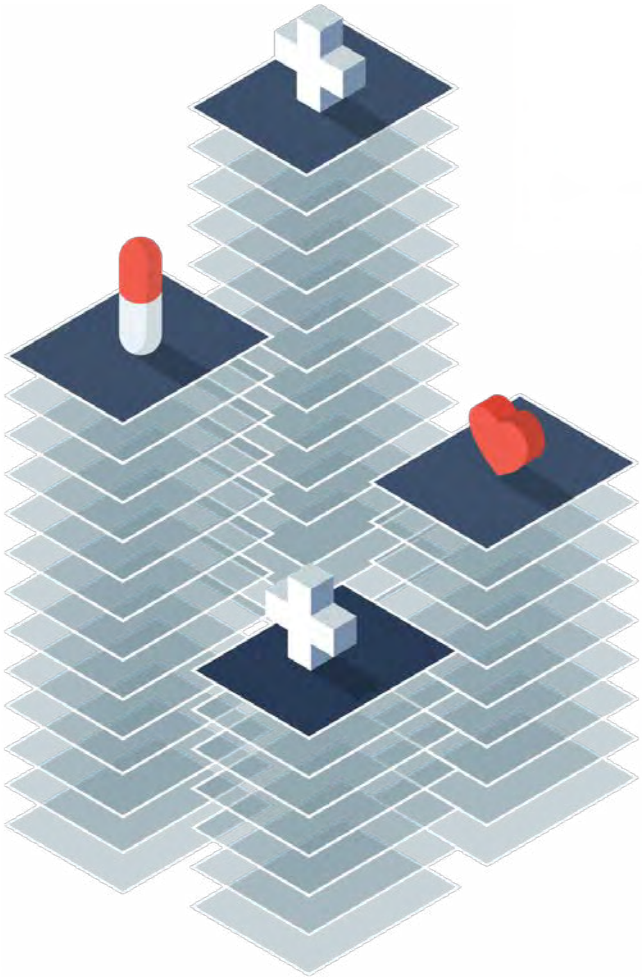

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counseling and post-test linkage to care are important parts of the HIV management.

Phenomenal scientific efforts in the last 5 years have led to development of effective and simplified HIV treatments in a form of one-pill-once-per-day tablets with fewer side effects and drug interactions. New treatments include integrase inhibitor class drugs with fewer cardiovascular side effects, and tenofovir alafenamide (TAF) offered in single-tablet regimens, providing much better long-term safety, specifically for kidney and bone health. Patients with good adherence to treatment can expect to have normal to near-normal life expectancy. A recent breakthrough discovery in a prospective study of 888 couples, where one person is HIV-positive on treatment with undetectable viral load, has confirmed that new treatment eliminates the risk of HIV transmission. This is an excellent strategy for reducing the number of new cases of HIV in a community. This data prompted the "U=U" movement, which stands for "undetectable equals untransmittable," and this is now endorsed by major public health agencies including UNAIDS and WHO.

HIV pre-exposure prophylaxis (PrEP) is an option for some people who are HIV-negative but are at a greater risk for HIV acquisition. Although it does not confer 100% protection against HIV infection, multiple studies have shown no HIV transmission in real-world clinical practice settings. PrEP is an extremely effective, proactive and safe mode of preventing HIV. While PrEP is moderately expensive, it is much more economical to prevent HIV than to treat it. Therefore, some provinces in Canada are starting to cover PrEP for qualifying individuals.

What about people living with HIV in Canada and other high-resource settings? Their morbidity and mortality have been changing in different "eras" of HIV over time. AIDS-defining malignancies sometimes referred to as "opportunistic malignancies" include Kaposi's sarcoma, non-Hodgkin's lymphoma and cervical cancer. The proportion of deaths attributed to AIDS-related cancers has dramatically reduced in the last 2 decades. People on anti-retroviral (ART) drugs are not dying from opportunistic infections or opportunistic malignancies. They live long enough to develop other cancers. Lung cancer is the most common underlying cause of death in HIV-infected adults. ART has proven to be extremely effective in lowering the risk of developing AIDS-defining cancers. ART reduces the incidence of non-AIDS-defining cancers caused by viruses including Hodgkin's lymphoma (EBV), hepatocellular carcinoma (HBV), anal or oral squamous cell carcinoma (HPV); however, the trend is much weaker compared to effects on AIDS-defining cancers. ART does not seem to reduce the incidence of non-viral-related non-AIDS-defining cancers including lung, bladder and breast cancers. Overall, HIV-infected persons show greater incidence of cancers, but the incidence is only modestly higher than in the general population.

Cardiovascular (CV) mortality and morbidity risks in HIV-positive individuals arise from pro-inflammatory effects of HIV replication, side effects of HIV medications, and reversible risk factors such as smoking. A systematic review of 80 studies from all over the world between 1990 and 2015 identified HIV risk ratio for CV disease of 2.16. HIV is associated with dyslipidemia, insulin resistance, diabetes, hypertension and myocardial infarction. High prevalence of smoking amongst HIV-infected individuals is a significant risk factor in developing CV disease. Some CVD risks may be lowered with the use of newer drugs such as integrase inhibitors. Patients need quality primary care to manage CVD risk factors. Life expectancy continues to improve in those with HIV despite CVD and cancer risk. It is already near-normal and may continue to normalize. Injection drug users and marginalized individuals who do not receive proper treatment have lower life expectancy.

Dr. Bogoch concluded his presentation with a summary of important points:

- Tremendous progress in HIV over the last decade.
- With excellent primary care, HIV-positive individuals can live a long, healthy and happy life.
- Attention to CV risk factors and aggressive management.
- Smoking cessation.
- Age-appropriate cancer screening.

Morbidity, Mortality and Long-Term Outcomes in Children with Cancer

Ronald Barr, MB, ChB, MD, FRCP (Glasg), FACP, FRCP (Lond), FRCPath, FRCPC, FRCPCH, Professor Emeritus, Departments of Pediatrics, Pathology and Medicine, McMaster University, Hamilton, Ontario, provided mortality and morbidity updates in childhood and young adult malignancies.

Considering that many countries around the world do not have registries for childhood malignancies, and the existing registries might underestimate the true incidence, a simulation-based analysis was used to estimate the total incidence of global childhood cancer. The model estimated that childhood cancers are substantially underdiagnosed, with a much higher incidence of undiagnosed childhood cancers in Southeast and South-Central Asia and Eastern

and Western Africa compared to North America and Western Europe. In Canada, the incidence rate of cancer in children (0-14 years of age) is 150-160 per million with 5-year overall survival rate of 80-85%.

In March 2018, the National Cancer Institute (NCI) published updated standardized definitions for adverse events known as the Common Terminology Criteria for Adverse Events (CTCAE), with the purpose of standardizing the reporting of adverse events and better understanding of the morbidity and severity of organ toxicity for patients receiving cancer therapy. With the NCI CTCAE, adverse events are recorded by grade of severity. Anemia is one of the common adverse events observed in cancer therapy.

Families of children newly diagnosed with cancer incur significant costs estimated as one-third of their after-tax income. The costs are associated with out-of-pocket expenses and indirect costs related to cessation or reduction of paid work. Many families increase their debt, take on a second job, obtain loans, use credit, borrow money or sell their properties to cope with these costs.

Cancer is the most common cause of disease-related death in children in Canada. It is more common than asthma, diabetes, cystic fibrosis and HIV infection combined. The overall standardized mortality rate (SMR) in childhood cancer patients diagnosed from 1970 to 1986 was 10.8. The SMR for females was higher at 18 because of the impact of carcinoma of the breast after chest radiation. Childhood cancer survivors carry a higher risk of subsequent neoplasm with a cumulative incidence of 34.6% by age 55. More than 60% of them are non-melanoma skin cancers. Female sex and therapeutic radiation are risk factors. Long-term survivors of childhood central nervous system malignancies suffer from neurocognitive impairments subsequent to radiation treatment, with the most common cause of death being a recurrent or progressive disease.

Reduction in life expectancy increases with increasing age at diagnosis, ranging from less than 12% reduction if diagnosed prior to age 4 and 21% reduction for those diagnosed ages 15 to 20. The 5-year survival rate improvement is attributable to reduced rates of cranial radiotherapy for acute lymphoblastic leukemia, abdominal radiotherapy for Wilms tumour, chest radiotherapy for Hodgkin lymphoma and anthracycline exposure.

The St. Jude Lifetime Cohort Study that followed adults treated for childhood cancers identified the following health outcomes:

- By age 50, the cumulative prevalence of adverse health outcomes was 21.6%.
- The prevalence exceeded 80% for cardiomyopathy, heart valve disorders, pulmonary dysfunction and hearing loss.
- The prevalence of any chronic health condition at age 45 was > 95% and > 80% for serious/disabling and life-threatening conditions respectively.
- Cumulative burden of grade 1-5 chronic health conditions (CHC) by age 50 was 99.9%, varied by disease.

Another study compared the physical performance of childhood cancer survivors to their siblings. It showed high rates of restriction in attending work or school due to limitations on daily activities. The physical performance was especially affected in survivors of brain tumours (26.6%) and bone tumours (26.9%).

Adult survivors of childhood cancers are at risk of frailty associated with adverse health outcomes, predisposition to developing chronic diseases, and higher mortality. The signs of the frailty phenotype include low body mass, low energy expenditure, exhaustion, slowness and weakness. According to the St. Jude Lifetime Cohort Study that evaluated almost 2000 subjects 33.6 + 8.1 years of age, the prevalence of frailty was 13% in women and 3% in men, similar to adults 65 and older. Dr. Barr noted that sadly, despite the improvements in childhood cancer treatment designed to reduce toxicity, self-reported perception of health status among survivors has not improved. Health-related quality of life (HRQL) relates to opportunities that a person's health status affords, the constraints that it places upon the person, and the value that a person places on his/her health status. HRQL utility scores have been used for evaluation of cancer treatment effectiveness and survival prediction, as in adults with brain tumours. This measure adds to prognostication by health care providers and informs decision-making by patients.

In conclusion, although cure rates continue to rise:

- Childhood cancer diagnosis and treatment are influenced by socio-economic disparities.
- Financial considerations are important for families and the healthcare system.
- They carry a burden of morbidity and premature mortality in survivors.

CV Risk Stratification - What's New: Non-Traditional Risk Factors

Beth L. Abramson, MD, MSc, FRCPC, FACC, Associate Professor of Medicine, University of Toronto, Director, Cardiac Prevention and Rehabilitation

Centre and Women's Cardiovascular Health, Division of Cardiology, St. Michael's Hospital, Toronto, Ontario, author of *Heart Health for Canadians*, reviewed traditional and emerging non-traditional cardiovascular risk factors.

Cardiovascular (CV) disease is a major cause of morbidity and mortality in both men and women. Considering that sudden heart attacks while manifesting as sudden events take many years to develop, predicting and managing CV risk factors remain an important focus in CV risk management. Thanks to preventative strategies in North America in the last few decades, the overall CV mortality trends are lowering. At the same time, the incidence of myocardial infarctions (MI) in women aged 35-54 is increasing. The CV risk in women increases after menopause. Persons with poor socioeconomic status are in the higher incidence category, perhaps due to difficulty navigating the health system.

Traditional CV risk factors include age, sex, blood pressure, cholesterol, visceral obesity, family and smoking history. Managing CV risk factors with the use of medications and lifestyle therapies, such as reduction of dietary sodium, weight loss, alcohol reduction and exercise, are important preventative measures in developing heart disease. Quitting smoking is the most effective CV risk intervention in clinical practice. The use of the Framingham scale that considers the traditional risk factors underestimates the CV risk in peri-menopausal women.

Dr. Abramson then discussed new emerging non-traditional risk factors. The carotid intima-media thickness test (CIMT) measures the thickness of the inner two layers of the carotid artery, and is used to diagnose the extent of carotid atherosclerotic vascular disease. When a thickening is found in an asymptomatic patient, early lifestyle and medication intervention has the greatest impact on prevention.

Another recent discovery is the risk-predicting role of TMAO testing that measures a metabolite derived from the gut bacteria. TMAO levels are higher in individuals consuming a lot of red meat, egg yolks and dairy products.

Pregnancy is an emerging CV risk factor, specifically with a history of high blood pressure (pre-eclampsia) that correlates with future development of hypertension and heart disease. History of gestational diabetes is indicative of underlying metabolic conditions and increases future CV risk. A better understanding of traditional and emerging non-traditional risk factors is an important step in improving the cardiovascular health of underestimated risk group categories that includes younger women. Therefore, they require a more aggressive management of their risk factors. One of the important ways to mitigate risks is post-pregnancy weight loss.

The goal of HOPE-3 (Heart Outcomes Prevention Evaluation-3), a primary prevention study, was to evaluate the efficacy and safety of cholesterol lowering and blood pressure lowering, or both in patients without known cardiovascular disease and in those with intermediate risk of major CV events. The trial results were presented in 2016 and indicated that individuals on low-dose statin therapy showed lower risk of CV death, MI and stroke compared to a placebo group in an intermediate risk population. The use of blood pressure lowering medication, while lowering the systolic and diastolic measurements, was not superior to a placebo in reducing CV events. The important conclusion of this trial is the risk-lowering effect of the use of low-dose statin therapy that is now being considered in primary prevention settings.

Adult Congenital Heart Disease: Successes and Challenges

Erwin Oechslin, MD, FRCPC, FESC, Director, Adult Congenital Heart Disease Program, Peter Munk Cardiac Centre, Past-President, International Society for Adult Congenital Heart Disease, Toronto, Ontario, discussed demographics, management and life expectancy in patients with congenital heart disease.

Congenital heart disease (CHD) is the most common congenital defect with a prevalence of 1%: 1 per 100 babies are born with a congenital heart defect! Many CHD patients require an intervention during the first weeks or months of their lives to survive. The increase in prevalence over the last century is mainly explained by the increased survival as a result of great advances in medicine, as well as reported prevalence that is due to a better recording and improved screening. Increased recurrence risk in children of parents with CHD, increased maternal age and environmental exposures are other factors for increased prevalence.

Dr. Maude Abbott (1869-1940), a Canadian physician and pathologist at McGill University, and a prolific writer with a major interest in congenital heart disease, made major contributions to the understanding of the anatomy of congenital heart defects. Her publication, *Atlas of Congenital Heart Disease*, published in 1936, was a landmark publication of a new classification system for congenital heart defects. It improved the understanding of the underlying anatomy of the different congenital heart defects and laid the foundation for congenital heart disease

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surgery. The first operation for CHD was a ligation of a patent ductus arteriosus (PDA) performed by Dr. Gross in Boston in 1938. This was followed by a correction of aortic coarctation in 1944 by Dr. Crafoord. In the same year, Dr. Taussig, in collaboration with Dr. Blalock and his research assistant and technician Vivian Thomas, introduced a shunt operation for tetralogy of Fallot: the Blalock-Taussig-Thomas shunt, a shunt between the subclavian artery and the pulmonary artery to improve pulmonary blood flow and oxygenation. The use of the first heart-lung machine in 1953 made it possible to do an open-heart surgery. Surgical concepts, procedures, technics and imaging capabilities have advanced over the years and continue to evolve and improve. Since 1940 to present, the survival rate in CHD improved remarkably from 20% to over 90%.

Prevalence of adult CHD is 6.12 per 1,000 adults. Between 2000 and 2010, CHD prevalence in adults in Canada increased by 57%. Two out of three Canadians with CHD are adults, many of them living with a complex disease. The number of adults almost doubled between 2008 and 2016. The public in general is not aware of the rapidly growing prevalence and complexity of care for CHD. CHD is a chronic multisystem disease affecting not only the heart but also other major organs including the liver, kidneys and brain. CHD patients over the age of 60 have a significantly higher utilization rate of health care resources compared to younger CHD patients. Older patients with CHD tend to have more hospitalizations, longer hospitalization durations, more outpatient visits and interventions impacting health care resources.

With growing evidence of late complications and multisystem effects of CHD, there is a question of whether CHD could be completely cured with surgery. Surgery is considered corrective if it results in normal ventricular function and normal life expectancy with no need for therapeutic measures during follow-up. In the majority of CHD patients, however, the above definitions are not met. In addition, there is a significant care gap between pediatric care and adult care. Many adults are missing from care and come back with acute conditions and even life-threatening complications. Predictors of lack of cardiology follow-up in adults include male sex, non-severe CHD and history of follow-up outside of a university hospital setting. Many patients believe that they have received curative surgery and therefore are not seeking follow-up in adult years. Lapses in care result in non-adherence to medication treatment, high-risk of late complications and increased risk of urgent interventions.

The mortality in CHD has changed over the years. Surgical repairs save lives of infants and children who survive, but often develop postoperative complications as adults. Therefore, CHD mortality has shifted from infant to adult years. The surgical repair is not a cure. It results in persisting structural, functional and electrical heart abnormalities and scars. Post-CHD repair patients have arrhythmias, conduit/valve complications, pulmonary hypertension, endocarditis, heart failure and psychological issues. Many of them require re-interventions. These patients present with increased mortality and morbidity.

One of the unique challenges associated with CHD management is patients' misperception of their health. They believe they have been cured. However, they have high mortality rates compared to the general population. For example, 5-year mortality risk of a 20-year-old with a history of Fontan procedure is comparable to a 5-year mortality of a 64-year-old healthy individual! Another challenge in CHD management is a disconnect between health care providers and patients in end-of-life (EOL) discussions. Most patients want EOL discussions, but health care providers are hesitant to initiate these important conversations. Family planning is another challenge. Considering that most congenital heart defects have a genetic basis, with the increased survival rates in CHD, the risk is passed down to their children. These risks need to be discussed before pregnancy. Patients with CHD face insurance barriers resulting in difficulty obtaining insurance or being charged higher rates.

Long-term survival in CHD is concerned with growing numbers of patients requiring comprehensive care that includes a dedicated multidisciplinary team of specialists with a holistic approach to patient care. Adults with heart surgery during childhood or adulthood and a scar in their chest require life-long specialized care by an expert in adult congenital heart disease, now a recognized subspecialty in cardiology. Dr. Oechslin concluded his presentation by stating that politicians, leaders at academic centres and the community have the ethical responsibility to address the increasing disconnect between patient demand and resources available to provide adequate care for those facing a handicap from the very first day of their lives.

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AN *OTR* SPECIAL REPORT: HIGHLIGHTS OF THE 2019 CANADIAN REINSURANCE CONFERENCE

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Blake Hill, 2019 Canadian Reinsurance Conference (CRC) Chairman, welcomed everyone to the CRC by introducing the committee members and the theme of this year's conference: "Platform Revolution." He couldn't be more right in stressing that "platforms are key to the evolution and revolution of our industry." But to define our platform, we must first ask ourselves the overriding question…what business are we really in? Reinsurers are in the business of life and health, not issuing policies. However, fostering partnerships is what drives success in platform revolution. Only by working together can we better serve the customer. This thought aptly introduced the topic of the role of partnerships in platform revolution.

Senior Leadership Panel – Partnerships and Platform Revolution

Panel:

- Peter Ohnemus, Founder, Chairman and President, dacadoo
- Igal Mayer, CEO, Kanetix, Ltd.
- Drazen Lalovic, VP of Digital Health, Sun Life

Moderator: Simon Chan, Head of Corporate Innovation, Thought Leadership Communitech

The panelists began with the thesis that building an ecosystem and partnership mindset cultivates the next wave of corporate innovation and growth. It is observed that most innovative organizations are adaptable. Best-in-class organizations are not only connected to world-class technology ecosystems, they also systematize innovation for repeatable results. What is a healthy ecosystem? It is one where partners work together for the customers; where all parties work together to co-create with customers. Among the potential benefits of partnering to create a health ecosystem are:

- Learning about emerging trends, especially with partners who had the benefit of experience.
- Adapting to the methodology and mindset of InsurTechs and start-ups.
- Understanding the future of work to attract and retain talent.
- Learning from others within a broader ecosystem.

The panel believes partnerships are moving towards a digital marketplace. Whereas current corporate innovation focuses on digital transformation and existing business models, future innovation will be focused on the emergence of new business models in an already digitized marketplace. An example of a current business model is a single platform offering ways to save money on insurance. On the other hand, using a "comparison" platform that provides consumers with many choices and options for saving money is an example of a new business model. Only by partnering can an ecosystem create a marketplace which is populated by products from many providers. This is the experience of Kanetix, Ltd., which created a customer platform providing over one million insurance quotes through the creation of a marketplace built by partnerships. Such partnerships allow for numerous price comparisons.

Another example highlighting the importance of partnerships involved the creation of the Digital Health unit at Sun Life Financial. The strategy involved:

- Creating the opportunity to redefine client engagement.
- Building a strong position in the health ecosystem.
- Starting the Digital Health Solutions Team as a separate business entity within the company.
- Building the largest network of health service providers in Canada that links consumers and health service providers – this team was allowed to develop its own customer base, going beyond the company's traditional insurance base.

- Creating an app called Lumino Health with the aim of helping all Canadians live healthier lives – this app integrates the fitness, wellness and mental health components of an individual's well-being.

By connecting Canadian clients with Canadian innovators to create innovative solutions, the team was able to develop an ecosystem that allowed consumers access to savings. More importantly, they created platform value where everyone wins.

The experience of dacadoo is quite different but highlights the success of innovation in its platform revolution journey. Its overriding business philosophy is to enable better lives by connecting, scoring and engaging clients. The very idea of creating a health score for an individual is something clients themselves can relate to, but more importantly, it provides a holistic view of one's life through biometrics, a mental health rating and other "scored" health factors. Moreover, it enables insurers to digitize and evolve their businesses into a consumer-centred digital environment, where the client experiences his or her own health journey on a real-time basis. This means engaging the client in a dynamic fashion by merging the insurer's data tables with digital science.

In the insurance industry, Mr. Ohnemus asserted that innovation and partnerships will happen. The only question is who will form partnerships and with whom. He also proposed that innovation does not happen with pilots. Identify the core of your market and start there. Risk aversion is very evident in using pilots to innovate. Risk aversion itself is a road block to changing a risk barrier.

At Sun Life, no one can do it alone. With current digital trends, no one is big enough to be a life insurer on ones own. Thus, building an ecosystem composed of partnerships is important to maintain relevance, as well as create value and fun for the consumer.

The panel was also asked what they believe to be the sources of competitive risk in the next 3 to 5 years. Here is a list of what these might be:

- An enormous amount of data from everywhere.
- The pressure to provide seamless customer experiences.
- Resources.
- The need to constantly redefine what business you are in.

The panelists were further asked how they might deal with such pressures. Again, we received a few bold ideas:

- Strong willingness and solid direction must come from the top.
- Get rid of the pilot project. Be dynamic instead and go directly to your core customers.
- Actuaries should go beyond working on life tables by working directly with data scientists.
- Get serious with chronic diseases. Sell products actually relevant to people's lives.

Finally, they were asked to name a few things or actions that are either overestimated or underestimated.

Overestimated are:

- Digital garages like Fitbits
- Ventures incubated in companies
- Emphasis on risk management

Among the underestimated are:

- Internet of Things (IoT)
- The power of artificial intelligence (AI), particularly social AI (what makes one tick)
- Making the home smarter
- Change itself

The panelists ended the discussion with strong words of advice to the attendees –we need to be more client-centered. In the insurance business, insurers and reinsurers need to realize consumers do not need life insurance; rather, they need financial security. Consumers do not need a mortgage; they need a home. By having the privilege of witnessing trends as they happen, reinsurers possess the opportunity to become agents of innovation and change. Recognize and accept change by being agile. Upset your company's leadership by finding out if they are willing to accept change. Only by having the willingness and courage will change really happen.

Big Data, Advanced Analytics and Data Privacy

Presenters and Panelists:

- Puneet Bakshi, VP and Chief Transformation Officer, Munich Re USA
- Tom Fletcher, VP Analytics North America, Partner Re
- Stan Ivankovik, Director of Business Development, Environics Analytics

Moderator: Alexis Iglauer, Head of Analytics and Technology, Partner Re

Mr. Bakshi proposed that by now it is recognized that advanced data analytics is a common theme in insurance and reinsurance. Most techniques employ large amounts of personal data to make predictions on individual risks. Shifts in data privacy legislation around the world have made everyone more aware

of the apparent dangers of big data and the value of protecting privacy.

Public sentiment and the regulatory environment surrounding data privacy have dramatically changed over the past few years. A clear example is the introduction of the General Data Protection Regulation (GDPR) in Europe, which defines the eight core rights of individuals. Individuals must be able to know, access, rectify, withdraw, object, object to automated processing, be forgotten and transfer their own personal data. This trend for data protection is growing globally, as well. Global insurers and reinsurers need to deal with a growing number of data protection and privacy laws around the world.

The effects of privacy legislation on the insurance industry are wide-ranging:

- Insurers are opting for anonymous data that is aggregated and used for analytics.
- The industry has become hesitant and somewhat slow to collect new data for analytic and AI capabilities.
- Anonymized and limited new data results in diminished quality of underwriting criteria.
- Due to limited and anonymized data, there is a slowdown in new product development.
- Significant capital expenditures are incurred on the protection of data.
- Claimants use privacy legislation as a tool to access information held by an insurer prior to a claim being litigated.

How is data anonymization achieved in order to meet regulatory standards?

1. Fortunately, data science experts can help anonymize and obfuscate data. Data engineers, business experts and other expert functions in the company partner up to carry out the task of data obfuscation.
2. The data within the IT infrastructure can also be separated to ensure privacy policies are met.
3. Strict access controls and auditing to the production environments must be established.
4. Externally sourced data is usually obfuscated, but for data exchanged between carriers and reinsurers, the data obfuscation step may be necessary before handing it off to the data science team.

Some of the novel ways insurance companies and other financial institutions use to meet the challenges posed by privacy legislation are: purchasing data that is already anonymized, separating data by building logical data warehouses to control access by individuals, publishing clear enterprise data privacy guidelines and principles, making those guidelines available to customers, and soliciting consent for the use of their data.

The variety and richness of available data, even when anonymized, supports new and creative uses in the insurance industry. One of the new capabilities proposed is homomorphic encryption. Using encrypted data, homomorphic encryption allows consumers to apply for insurance to an automated underwriting system without revealing their actual information to the insurance company. Other novel capabilities also include IoT sensory information for risk evaluation, use of cellular phone data for accident detection, and automated repair estimation for vehicles.

Some key takeaways from this presentation were:

- The variety of privacy laws around the world makes it difficult for a multinational insurer to develop effective data science practices.
- Segregation of data through access controls, processes and infrastructure plays a key part in maintaining compliance to legislation.
- Companies have leveraged various technologies and experts to help in overcoming the challenges of privacy laws.
- Legislation has forced the industry to develop clear privacy and data lifecycle management practices regarding the handling of data.
- New uses of data that is currently available will force reinsurers to strengthen internal data governance and privacy procedures, if they wish to effectively leverage the variety of data available from consumers.

Mr. Fletcher began his presentation by stressing that analyzing big data is beneficial for improving outcomes. For businesses, it not only reduces costs but also opens up greater market opportunities. For customers, it improves the overall customer experience.

Yet risks can be enormous if data is misused. To the company, these can be in the form of reputational risk, business loss, loss of investor confidence, class action lawsuits and regulatory fines. Many changes need to be made within the organization if risks are to be mitigated. The company should first look at its norms, values and beliefs. Then, it must create policies and procedures, look at its storage options, determine the level of data access it can tolerate, implement analytics and finally build firewalls. While leveraging data in a privacy-friendly way is needed, doing it is never an easy task. A fitting example is that in the US, an estimated 87% of the population can be re-identified with only three parameters: gender, date of birth and postal code. Companies across a whole spectrum of industries have tackled privacy issues

with various techniques yet varying success. Not one method ensures privacy protection in all situations, but among the frequently used methods are:

- Aggregation and statistical synthesis
- Deletion of, or not collecting, data
- Use of internal firewalls and detailed procedures
- Masking and encryption

Mr. Ivankovik's presentation focused on the value of using analytics insurance, particularly in market segmentation. By using sources of information like postal codes and segments, one can create profiles from demographic data, financials and survey information to generate behavioural information. The data is already anonymized. By asking clients to provide their postal code, the data from the individual is already "layered up," therefore masking any individual information before it is used by the company. The result is that products, services and messages are fully aligned with what the market wants, yet at the same time protects the individual's privacy.

Not all insurers and reinsurers use analytics. Mr. Ivankovik implores everyone to use analytics since it provides many benefits, including the ability to:

- Define market segments and identify hidden opportunities.
- Match service levels to client needs.
- Recognize and target the gaps in product penetration and market share.
- Enhance and accelerate consumer engagement with relevant products.
- Influence digital adoption and track the use of current sales channels.
- Prioritize offers based on consumer behaviours.
- Identify potential distribution channels and locations.
- Proactively pinpoint and engage at risk clients.

Using analytics to segment the market allows the insurer to understand which consumers purchase life insurance and their motivations for buying. It allows for the prioritization of segments by their potential, and also groups segments into meaningful targets for marketing purposes. Insurers can segment their markets by demographic composition (i.e., age, group, sex), financial status and needs, social values, or even lifestyle and media habits.

A successful analytics tool which provides clear value to a company is one that guides the process and removes frictional barriers. First, it must direct the consumer to visit the digital asset. Second, the client should be guided clearly through the process by entering basic information and the postal code. Third, data assets from third-party sources must be used in combination with the consumer's information to generate specific service channel strategies based on the segments created. "Geo-tailoring" of marketing campaigns using postal code and a variety of demographic information has been proven to increase the consumers' click rates and engagement rates, as well as click rates of links.

Blockchain Revolution: Has the Time for the Insurance Industry Finally Come?

Panel:

- Helen Duzhou, Financial Services Consultant, Oliver Wyman, New York
- Sven Ridehl, Co-founder, Cookhouse Lab

Moderator: Manisha Dias, Director and Actuary of Business Development, SCOR

The hype and growth of cryptocurrency such as bitcoin have brought blockchain to most everyone's attention, but what about blockchain in the insurance industry? How can it be applied and made successful in insurance?

Blockchain is defined as an encrypted database that records transactions and related details in a secure but distributed manner. It is a growing list of records, called blocks, which are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp and transactional data. By design and nature, it is resistant to modification of data.

Blockchain has three important qualities:

- Immutability – it is a safe and secure ecosystem which provides a tamper-free environment where each transaction contains a digital "fingerprint" generated through a hash function for all prior transactions.
- Decentralization – the power to update the blockchain lies with all participants, not one single participant. Participants validate the updates through hashing.
- Anonymity – the blockchain is verifiable by the public but it is anonymous. Public and private digital signatures allow the network to verify updates using public knowledge through asymmetric hashing.

The main mechanism of the blockchain that achieves all three qualities is the cryptographic hash. To add transactions to a blockchain, cryptographic hashes are calculated for the new block, which is verified by the rest of the network. The iterative process, called "mining," creates collective memories by distributing the chance to update based on the computational power. This is why a blockchain creates a chain of

trust in addition to achieving the above three qualities.

If blockchain technology works perfectly well in cryptocurrency, why not in insurance? After all, the insurance industry was built on trust, the exact same way blockchain functions.

Some brainstorming had previously been done to determine possible applications of blockchain:

- In travel delay insurance: When a flight is delayed, a claim is paid to a claimant instantaneously and on-the-spot.
- In group benefits coordination: An insured receives treatment for a medical condition, enters the data requested via an app, a quick insurance check is done by the system running through a blockchain system, and a claim is instantaneously paid to the claimant.

The biggest stumbling block to implementing blockchain in insurance is that it is computationally intense by its very nature. The speakers have therefore arrived at the conclusion that it may not be advisable for use in insurance in about 99% of cases.

The Great Divide: Partnering with InsurTechs to Transform Rather than Completely Disrupt
Panel:

- Anna Foat, Director, Global Digital Transformation, Sun Life
- Scott Marnoch, Global Innovation Leader, InsureTech Strategies, Great West Life
- Dustin Yoder, CEO, Sureify

Moderator: Joanne Bradley, VP Client Liaison, Hannover Re

The opening joke of this interactive panel session was "moving at the speed of insurance" (Read: slow!). This was reflected in the overall tone of the session, summed up as:

- 80% of the day for an innovation changer at an insurance company is spent internally trying to influence a large group (i.e., 12-14 shareholders or other key parties) in selling the needs and ways to change and who to partner with in order to move forward.
- Insurance companies are seen as "big cog wheels that are slow," where the current funding models (budgets set in the year prior) are outdated and return on investment (ROI) is difficult to prove on new ideas.
- Traditionally, the insurer is spending $100 million and 5 years to transform legacy systems, while next door an InsurTech has taken $1 million and 1 year to implement a model that instantly starts writing new business on a parallel platform.
- Legacy systems are perceived as a bigger challenge than they truly are. Digitizing the past is the wrong solution. One can still run backend processing and transactions on the legacy systems, but not putting money into them frees up money to do what you want and need to do on the front end.
- The mutual exchange of data between the consumer and the company is key. People will share data openly when they feel they will get something in return. See if your clients want digital, launch a lifetime site, find your clients, and refer the lead to an agent- a WIN, WIN, WIN! Engage with feedback, rewards and education.
- Direct companies need to leverage their reinsurance partners. While best price is important to a deal, it is equally and possibly more important to choose a reinsurance partner with robust R&D labs, tools and technology.
- Time to cross the great divide for insurers. Stop preaching and start learning. Partner up and forgo the things they've been doing the same way over and over in silos in the past, such as very little SERVICE provided to their customers. This is in comparison to banks which have mobile apps, numerous online services, etc.
- Data driven possibilities – insurance companies own A LOT of data. Focus on a meaningful way to use it.

Underwriting Modernization: Pharmacogenetics
Christopher Trevors, Director of Genetic Solutions, Dynacare

There has been exponential growth in terms of the availability and understanding of genetic information since the Human Genome Project ended in the year 2000. There has been a transition from classical genetics where we were able to diagnose genetically predisposed diseases about 50% of the time to 2019 and early stages of genomic medicine. What started out as "just a map of genes" after the Human Genome Project finished, has evolved via research to the future of predicting and managing risk, disease predication and personalized medicine. In the past, we could diagnose about 50% of genetic-related conditions; however, we could not use that information to improve care for patients.

Today, many conditions have known genetic predispositions and tests available to diagnose and/or alter treatment. Oncology, neurology and cardiology are the areas which have the greatest access to these technologies and use them the most. Epilepsy

proved to be a good example of the use of genetics to improve care for patients. One in 150 people have epilepsy and 50% are known to have an underlying genetic cause. It is now becoming the standard of care to do genetic testing to find out what gene is the real culprit. This information helps select the right medication. Without it, a medication may be chosen that actually makes the seizures worse. This is one type of genetic testing which is used for diagnosis, prognosis and risk.

Pharmacogenomics can then be used to determine the right dose of a medication. Currently, most pharmacogenomic testing does not provide a diagnosis, prognosis, or alter the risk for a person to develop a health condition. Tests such as Genecept tell a health care provider how a patient's body will react to medications. With pharmacogenomics, the genetic markers dictate the medications which are likely not going to work and which ones might work better for disease treatment. Oncologists often use specific genetic markers to choose the type of cancer treatment that likely works best to treat the patient's cancer by using a tumour sequencing test like OmniSeq. To help doctors determine if a patient might be at risk for specific hereditary cancers, they may use Color's Hereditary Cancer Test. This is a saliva-based test which analyzes 30 different genes for possible increased risk of hereditary cancers such as breast, colorectal and prostate cancer.

However, there are barriers to the use of pharmacogenomics:

- Lack of regulation of laboratories – testing and marketing/sales.
- Health care provider regulation – colleges allowing health care providers to order genetic testing
  - ➢ Grey zones between a "wellness" test (which anyone can ask for) vs. a "medical" test (which only approved clinicians can order, typically a physician or nurse practitioner).
- Over promising technology potential.
- Reporting of results.
  - ➢ Integration into health records
  - ➢ Interpretation
    - ▪ Clarity and clinical guidance
    - ▪ Integration of environmental, diet and ethnic factors into the interpretation
- Reimbursement/cost.
- Education – very few geneticists due to long waiting lists, along with low amounts of genetics training in medical, nursing, and pharmacology schools and programs.
  - ➢ Health care providers
    - ▪ Physicians
    - ▪ Nurse practitioners
    - ▪ Pharmacists/PharmD's
  - ➢ Insurance providers
  - ➢ Government or policymakers
  - ➢ Patients

Pharmacogenomics is what most people think about when they think of personalized medicine. Personalized medicine is using a biomarker (protein, pathology, genetic) to decide which treatment or intervention is most likely to work for a patient. Pharmacogenomics is a form of personalized medicine that uses genetic testing to determine which medication is more likely to work best and how to avoid adverse side effects. In the past, doctors chose the treatment/medications because publications showed large proportions of patients benefited from it. Doctors used a specific medication often to treat patients because they were familiar with it, or it was new and they just read a paper on it. This is not personalized at all. Previously in the area of mental health, for example, there was an average of four or five drug failures before the right treatment was determined. Using pharmacogenomics will help minimize the chances of adverse drug reactions (ADRs), many of which are preventable. This will help improve quality of life and save health care dollars.

In the future, pharmacists will be key to the integration of these technologies into the health care system. The evolution of pharmacogenomics is moving towards full gene sequencing of large panels of genes, likely even full exome of genome sequencing. Right now, pharmacogenomics is not typically diagnosing people with conditions, but as it evolves that may be the case. This means people will know all the diseases they have or are predisposed to develop, which is good both medically and clinically. In turn, this means people will get proactive treatment. It will be a challenge for both the health care system and the insurance industry, with the current trend towards genetics information usage regulations.

In order to move forward, a cataclysmic shift in medicine needs to happen to determine who should offer the testing, what education or tools they would need, who are the best patients to test, and then what can be done with the results to maximize their utility. Also, as the technology is changing so quickly, we need to determine which tests have value and which do not. How do we offer these tests in an ethical way, with patients being well informed of the benefits, limitations and risks associated with them? Only time will tell.

ALU SURVEY - ACCELERATED UNDERWRITING

Kristin Ringland, FLMI, FALU
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Executive Summary *The latest 2019 ALU survey covered the topics of accelerated underwriting (AUW) programs and underwriting automation. It focused primarily on the following areas:*

- *How companies are using accelerated underwriting.*
- *The various components of accelerated underwriting programs.*
- *An update on underwriting automation since the 2016 ALU survey.*

The outcome of this survey provides important insights into not only the current state, but also the future of automation and accelerated underwriting within the life insurance industry.

The ALU Survey Group completed its seventh survey in 2019: Accelerated Underwriting. As we reported at the time of the Underwriting Automation survey in 2016, the insurance industry is in the middle of transformative change. This transformation has been going on for the last 3 to 6 years and shows no signs of slowing down.

Accelerated underwriting started in the US 6 years ago. In the last 2 to 3 years, more than 26 companies have implemented or piloted accelerated underwriting programs. With the relatively quick adoption rate by the insurance industry, new data sources available to enhance these programs are being quickly developed by hopeful entrants into this growing market. The research and development process can take years. The creation of a program that works in a specific organization's market can be complicated, entailing historical data analysis and extensive testing of currently offered data sources.

Accelerated Underwriting with an Underwriting Refresh provides timely and pertinent information about the components of different programs, the experience that companies have had with implementation and the launch of their programs, as well as potential changes they see in the future. Accelerated underwriting and underwriting automation are used together by many companies currently, and several companies indicate their goal is to get to a more automated process. We re-asked a few questions on the topic of underwriting automation and provide a comparison from the 2016 survey in the number of companies currently using this technology.

Past important survey topics have included underwriting audits, underwriter training and education, and we completed underwriter censuses in 2014 and 2017. The underwriter census provided valuable insight into the composition of underwriters working in the US and Canada. We plan on conducting another underwriter census in 2020 and will compare the information from previous censuses to identify changes our profession is experiencing. We encourage you to log in to the ALU website at alu-web.com to review past surveys.

The survey questions appear in bold. All other comments were gleaned through either open-ended comment fields or survey response analysis.

ALU Survey on Accelerated Underwriting

The ALU survey had three goals:

- Determine if and how companies are using accelerated underwriting.
- Identify the components of accelerated underwriting programs.
- Provide an update on underwriting automation from the 2016 survey.

The ALU Survey Group created and conducted the survey with input from the ALU executive team. Survey group members are:

- Suzanne Grover, MassMutual Life

...that April 2020 Exam Registration is now open?

Sign up today, don't delay!

ACADEMY OF LIFE UNDERWRITING

www.alu-web.com

- Donna Melfi, MassMutual Life
- Kristin Ringland, SCOR Global Life Americas
- Roberta Scott, Woodmen Life

Survey Participants

We used the ALU Marketing and Survey Groups' chief underwriter contact list to select survey participants. The survey was sent to more than 200 companies in the US and Canada and included direct carriers, reinsurers and retrocessionaires. We received responses from 64 of the companies contacted, resulting in a 32% response rate.

Responses by company type:

- Direct Carrier 84%
- Reinsurer 12%
- Retrocessionaire 3%

Number of life underwriters in the underwriting departments of companies who responded:

- <10 38%
- 11 to 25 27%
- 26-50 20%
- 51-100 6%
- 101-150 2%
- >150 6%

Does your company currently have or are you anticipating developing an accelerated underwriting program? If different aspects of your program are in different stages of implementation, please use comment box to explain.

- Yes, we currently have a program implemented (fluidless, triage automatic decision-making) 41% (26)
- We anticipate implementing a program within the next 18 months 17% (17)
- No current program and no plans to implement a program 22% (14)
- Other 11% (7)

Other comments: One company has an SI program, but it is not fully automated. Two companies are looking into possibility of a program, and one company has an underwriting rules engine that approves one-third of fully underwritten applications – they are implementing predictive models to determine which clients can be accepted without labs within the next 6 months.

Does your accelerated program utilize any of the following tools? (Select all that apply)

- Electronic health records 5%
- Credit scoring model 43%
- Medical billing model 5%
- Lab scoring model 23%
- Criminal history score 14%
- Identity verification 32%
- Other 55%

Other tools identified: MIB, IAI, pharmacy records, telephone interview, risk score model, review of several options from an artificial intelligence company, internal data captured from app, interview, etc. Most of these models are not available in Canada.

Which application formats are included in your accelerated underwriting program? (Select all that apply)

- Teleapp 41%
- Online app 48%
- Paper app 23%
- Mix 11%
- Comments 23%

Mix answer: Paper and teleapp, teleapp and online/electronic app, electronic and paper.

Comments indicated a few companies are developing electronic app and teleapp.

How are the risks for policies approved through your accelerated underwriting program?

- Fully retained 30%
- Quota share pool 52%
- Mix 2%
- Comments 16%

Mix answer: Majority fully retained and small portion shopped facultative, mix based on reinsurance pools, excess retention and quota share pools, retained up to retention and quota share above retention.

	Fluidless	Triage	Automated Decision Process
If yes, Implemented	57%	50%	41%
If yes, Piloted	4%	0%	4%
If yes, Plan to pilot in the next 18 months	33%	37%	37%
If yes, No plans to implement	7%	13%	17%

Comments indicated one company hasn't determined how the policies will be approved, and one company indicated no reinsurance.

Have you made any changes to your distribution model or targeted customer base for your accelerated program?

- Yes 16%
- No 84%

Please explain the changes you've made in reference to your distribution.

Majority of the responses indicated "no" or "none." One company indicated it added a point-of-sale decision process in banks and broker/dealers. Another company indicated it is pursuing "direct-to-consumer" (DTC), and a few companies indicated "new distribution is under review."

What is the minimum age eligible for your accelerated underwriting program?

- 16 (2)
- 17 (2)
- 18 (20)
- 19 (2)
- 20 (2)
- 21 (1)
- 40 (2)

What is the maximum age eligible for your accelerated underwriting program?

- 49 (1)
- 50 (8)
- 54 (2)
- 55 (3)
- 59 (1)
- 60 (8)
- 65 (6)
- 80 (1)
- 85 (2)
- 99 (1)

What is the maximum face amount eligible for your accelerated underwriting program?

- $250K (5)
- $300K NAR (2)
- $500K (9)
- $750K (1)
- $1 million (15)
- $2 million (1)

What is the maximum age eligible for the maximum face amount for your accelerated underwriting program?

- 40 (3)
- 45 (3)
- 49 (1)
- 50 (9)
- 54 (2)
- 55 (3)
- 59 (2)
- 60 (6)
- 65 (3)
- 99 (1)

What products does your company have available in your accelerated underwriting program? (Select all that apply)

- Perm 77%
- Term 86%
- Other 11%

One company indicated it underwrites Critical Illness through its accelerated underwriting program.

What riders are included in your accelerated underwriting program? (Select all that apply)

- Waiver 78%
- GIO 15%
- LTC 15%
- Other 26%

Other responses: ADB, Child Rider, Living Benefits Rider, Return of Premium Rider and two responses of none.

What rate classes are available in your accelerated underwriting program? (Select all that apply)

- Best non-tobacco class 78%
- Best tobacco class 45%
- Better than standard non-tobacco 59%
- Better than standard tobacco 26%
- Standard non-tobacco 81%
- Standard tobacco 78%
- Rated (enter max table available) 22%
- Other 22%

Maximum rating available: Table 3, Table 4 and "substandard offers may be made, depending on the reason (build, avocation, non-medical impairment related)." Only four of the six companies that answered "ratings are available" provided the maximum rating.

What is the withdraw/incomplete rate of your ineligible accelerated underwriting applications?

- <10% 48%
- 11-20% 33%
- 21-40% 15%
- 41-60% 4%
- 61% or higher 0%

What is the placement rate of policies approved through your accelerated underwriting program?

- <40% 1%
- 41-50% 7%
- 51-60% 7%

- 61-70% 22%
- 71% or higher 52%

Does your company have a tobacco propensity model?

- Yes – homegrown 4%
- Yes – purchased 0%
- No 81%
- Not at this time – plans to implement in the future 15%

What issues have you encountered in the development and implementation of your accelerated underwriting program? Please provide details.

There were 27 responses with varying answers:

- The majority of respondents indicated issues around agent/field acceptance, training, and agent frustration around clients being kicked out of the accelerated underwriting program.
- Project and IT resource restraints.
- Complications of random holdouts.
- Mixed signals from senior management.
- Not meeting production expectation.
- Cost of implementation.
- Underwriters understanding the models.
- Not meeting approval rate.
- Higher mortality.

In the next 18 months, please advise what next steps you are considering for your accelerated underwriting program? (Select all that apply)

- Expansion of current program 63%
- Development of algorithm for triage processing 26%
- Development of algorithm for decision making 22%
- Further development of monitoring process 63%
- Expansion of client experience (client portal, online application premium payment options, etc.) 19%
- No plans at this time 4%
- Other 19%

Other responses included addition of other data sources for use in decision making, regulation impacts, how to improve decision explanations and notices, automated decision on preferred cases, and point-of-sale automated decisions.

How do you monitor your accelerated underwriting program? (Select all that apply)

- Post-issue APS 52%
- Post-issue RX check 22%
- Random holdout 56%
- Other 30%

Other responses: MIB Plan F, post-issue QuestCheck, monitoring of premium class distribution and claims experience, monitoring non-disclosure by leveraging existing third-party data sources. One respondent indicated "we don't, no resources" and a few indicated "not implemented yet."

Does your company have credible mortality data from your accelerated underwriting program?

- Yes, more favorable than expected 8%
- Yes, as expected 8%
- Yes, less favorable than expected 4% (1 response)
- No, we do not have credible mortality experience at this time 82%

Does your company have an automated underwriting system?

- Yes 48%
- No 52%

How did you develop or acquire your automated underwriting system? (Select all that apply)

- Developed within your company 32%
- Purchased from a third party 12%
- Partnered with a reinsurer 36%
- Partnered with a vendor 12%
- Other (25 responses) 20%

Other responses indicated they did not have an automated underwriting system.

The 2016 automation survey: More companies at that time were developing their own system or purchased from a third party. Note: The number of responses for this question in the previous survey was higher, which could impact percentages.

Does your company use automated underwriting for Simplified Issue/Guaranteed Issue?

- Yes 44%
- No 56%

The 2016 automation survey: The number of companies using automation for SI remains the same.

What options are available after a case is disqualified from automated underwriting? (Select all that apply)

- Full underwriting 56%
- Limited underwriting 20%
- Guaranteed issue 0%
- None 28%
- Other 16%

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Other responses indicated "there are none disqualified" or "does not apply."

What is the straight-through processing rate of your automated underwriting program?

- <10% 40%
- 11-20% 8%
- 21-40% 20%
- 41-60% 12%
- 61% or higher 20%

In relationship to your targeted straight-through processing expectation, your current straight-through processing rate is…?

- Higher than target 0%
- At target 60%
- Below target 40%

As a result of implementing an automated underwriting system, has your company experienced any of the following? (Select all that apply)

- Cost savings 11
- Cost increases 0
- Improvement in time service 16
- Delay in time service 0
- Improved policy placement rates 6
- Diminished policy placement rates 0
- Decreased mortality costs 1
- Increased mortality costs 0
- Increased complex case reviews 2
- Decreased complex case reviews 1
- Increased underwriting time availability 8
- Decreased underwriting time availability 1
- None of the above 5
- Other 7

Other responses: Too soon to tell, in combination with accelerated underwriting – some impact on tobacco classes, hope to achieve improvements in cycle time.

The top four responses were: Improvement in time service, cost savings, increased underwriting time availability, and improved policy placement rates.

In the 2016 automation survey, the top four responses were: Improvement in time service, cost savings, fewer simple case reviews and increased underwriter time availability. Note: The number of responses for this question in the previous survey was higher.

Conclusion

The goal of this survey was to determine the composition of accelerated underwriting programs and to show how companies are using their programs. Based on the survey results, the programs are being used for multiple plans of insurance with multiple riders available. The age range at which applicants can be underwritten through these programs spans from age 16 to 99 at varying face amounts. The trend in underwriting classes available has been Standard to Top Preferred; however, some companies are offering low substandard ratings.

The survey indicates the results experienced with accelerated underwriting can be very positive: cost savings, increased placement rates, increase in straight-through processing, and improved time service. A few issues companies noted are agent/field acceptance of the program, IT constraints, resources to monitor the program, cost of implementation, and a mortality impact mentioned by one company. It is important to remember when reviewing results that the accelerated underwriting programs vary greatly by company, the metrics used to measure the results may be based on different inputs, and not necessarily directly comparable.

The perfect complement to accelerated underwriting is automated underwriting. According to the survey, more people are using automated underwriting than they were at the time of our survey in 2016. The impacts of automated underwriting were similar in both surveys, even though this survey had fewer respondents.

If you are part of an organization that currently has an accelerated underwriting program or are thinking of developing one, we hope the insights from this survey provide detail on the direction the industry is headed. If a company is willing to test and learn from mistakes and implement change effectively, there is the potential to see significant improvement in efficiency and customer satisfaction.

In 2020, the Survey Group will conduct another underwriter census. Look for information on the ALU website this fall. The census will be distributed early next year. For the underwriter census, it is important to have the participation of all the underwriters in the industry: case underwriters, auditors, management, data or research underwriters, and anyone with an underwriting background. The goal is to discover how many underwriters are working in the industry, the type of work they are doing, and put together a profile of the underwriting industry in the US and Canada. As always, we appreciate your support.

About the Author

Kristin Ringland, FLMI, FALU, is the Senior Vice President, Chief Underwriting Officer-US with SCOR Global Life Americas. She began her underwriting career at Lincoln Benefit Life and most recently worked for Empire General as an Assistant Vice President. Kristin is Coordinator of the Survey Group - part of the Academy of Life Underwriting, Past President of the Kansas City Risk Selectors Group, past member of the AHOU Planning Committee and the AHOU Scholarship Task Force. Kristin has a Bachelor of Arts degree from the University of Nebraska, as well as her FLMI and FALU designations.

ART OR SCIENCE? CULTIVATING THE NEXT GENERATION OF UNDERWRITING TALENT HOLDS THE KEY

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Today, humans make the underwriting decisions with some help from machines. Tomorrow, machines will make the underwriting decisions with some help from humans.

Executive Summary *Life underwriting professionals are experiencing a paradigm shift in modus operandi, driven by the introduction of automation initiatives. Multiple consulting studies and analyses indicate that automation in underwriting is a valid business need. It will transform the role of the underwriter, so it assumes an even more valuable function within the industry. New technologies will enable the underwriter to better engage with clients, conduct research and develop innovative processes. The coevolution of humans and technology must be supported by business strategies that focus on identifying necessary underwriting skill sets, training machines and underwriters to become future-fit, and retaining the right talent. The convergence of the art of underwriting and the science of technology presents many challenges. Insurers and reinsurers must plan accordingly.*

Two centuries ago, life underwriting was pure art: the underwriter would interview the client in person and make an assessment. The concept of evidence-based underwriting emerged about a century ago when the science of health data gained credibility.[1] Underwriting, at present, is a fine balance of art and science.

The trend, however, is toward a fact-based scientific approach. Underwriting risk scoring is becoming increasingly evidence-based, with advances in the digitization of health care data and exponential improvements in predictive models. This is step one toward automation. In 1990, an actuary predicted that as health data became structured and digital in nature, underwriting risk calculations would become more automated, and the art of underwriting would gradually "die."[2] Thirty years later, that prediction is worth re-examining.

Future Automation and the Role of the Underwriter

Let us establish that an automated future for underwriting is a reality and a business necessity. In economics, a concept called the Balassa-Samuelson Effect explains how countries that do not adopt innovative technologies eventually experience higher prices (inflation), lower interest returns and lower currency exchange rates.[3] Similarly, the industries, professions or corporations that do not adopt emerging technologies experience higher costs, lower margins and eventually lower returns.[4]

For example, in 1913, Ford Motor Company introduced the innovative assembly line concept to manufacture cars. This technology reduced car production time from 12 hours to 2.5 hours, a 500% productivity boost.[5] Compared to the competition, Ford produced more cars at lower costs and improved the quality of each car, as well. At that time, Ford also offered the highest wage rate in the industry. The underwriting equivalent would be the automation of tasks increasing the underwriting capacity of an organization, lowering the underwriting costs, improving the quality of underwriting decisions, and boosting the earning potential of every underwriter with the right skill set.

A common concern associated with the coevolution of robotic automation and underwriting processes is automation could put underwriters out of their

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jobs. Let us look at an example from a closely related industry to assess this concern. In the late 1960s, automated teller machines (ATMs) were introduced for retail banking.[6] Bank employees feared the teller/cashier jobs would vaporize. The reality was bank teller jobs more than doubled in the first decade of ATMs and have since grown at 2% (equal to the rate of GDP growth) annually.[7]

What triggered the explosive increase in teller jobs? The banks re-trained their tellers to do more than just cash counting. Tellers learned to spend more time in customer engagement, product upselling and daily branch management. This made tellers more valuable to a bank compared to the pre-ATM era. Similarly, automation in underwriting will enable underwriters to focus on valuable tasks beyond just risk scoring. This will increase the worth of their skills and lead to higher demand. In addition, according to the 2017 ALU Life Underwriter Census, half of the life underwriters will retire in the next 10 years.[8] With automation and a retiring workforce, underwriting promises to become a highly sought-after profession.

Three Challenges to Effective Coevolution

The established consensus is automation in underwriting is a necessary boon. To achieve the future state combining robots and underwriters, however, the industry needs to address a few challenges and think through the long-term implications.

The first challenge: If robots do the risk scoring, then what will underwriters do? An Ernst & Young (EY) study suggests the future underwriter will be the custodian of the whole process. The underwriter will be an eclectic mix of sales executive, data scientist, customer advocate and innovator.[9] As this becomes the norm, current underwriters should consider upskilling themselves to become "future-fit." McKinsey & Company has projected the future underwriter will move away from today's commoditized role and instead act like the Chief Underwriter of his/her domain.[10]

The second challenge concerns the training of underwriters. Machines are going to take over the simpler cases, and experienced (human) underwriters will handle the complex cases containing extensive medical charts. The question is, where would junior underwriters work, and how would they receive training to become experienced professionals? In the near future, companies with a sound strategy and capability to cultivate the right talent will thrive. Underwriter training will need to include departmental rotations to understand aspects of customer engagement, data science, innovation philosophy and digital platforms.[11]

The third challenge in this future is inherent to the technology itself. Machine learning platforms that automate risk scoring are developed using past data. In the future, newer data sources like social media, the internet of things,[12] genetic testing[13] and even newly discovered health conditions will be available for underwriting decision making. While researchers and underwriters will understand the implications of this new information on risk scoring, machines will have to undergo a lag phase to accumulate enough data to be effective. In other words, the art of underwriting would still be more relevant than the science of automation in these newer cases. The artistic underwriters would chart the unknown territories and then train the machines to do their jobs.

The Winding Road Ahead

It is difficult to imagine a future of underwriting without a human touch. While today humans do the risk scoring and decision making in underwriting, machines/robots help them make these decisions faster and better. In the future, underwriters will be training the robots to analyze client applications, develop risk scores, apply underwriting guidelines and issue policies. As with bank tellers years ago, these future human underwriters will need to adapt and develop the skills to serve as the guardians of complex, scientific and robotic-based underwriting processes. The focus should be on recruiting, training, cultivating and retaining the right underwriting talent. Future underwriting teams will be more than just groups of medically savvy individuals. They will be a mix of technology enthusiasts, data scientists, medical professionals, management intellectuals and "super smart robots."

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About the Author

Rahul Garg, MD, is a physician turned management professional who is passionate to facilitate the transformation of life and health related professional services. A degree in medicine and an MBA have enabled Rahul to wear multiple hats as a clinician, health care strategist and an executive consultant for the insurance organizations. Rahul's work in digital health has facilitated governments, private corporations and insurance providers in transforming the legacy practices into sustainable digital cultures. Previously, Rahul authored thought leadership white papers addressing the future outlook of life underwriting, challenges of implementing blockchain in health care, fail-and-success factors for digital health, and the possibilities created by artificially intelligent solutions. Rahul is currently working on the RGA Underwriting Solutions Team, based out of Toronto.

FIGHTING FRAUD TODAY AND TOMORROW: DATA-DRIVEN DETECTION FOR LIFE INSURANCE

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Executive Summary *The third in a series on fraud, this latest article from Reinsurance Group of America examines the future of fighting fraud and how predictive analytics can play a role in protecting insurers and consumers. Hear about how leveraging the latest technologies can provide a strong defense against fraud. Integrating machine learning, predictive analytics and the newest data mining tools into fraud detection efforts is already strengthening fraud detection and mitigation capabilities for early adopters.*

Preventing insurance fraud will never be easy, and establishing fraud safeguards, no matter how sophisticated, does not mean your company is fully protected. Vigilance must be paramount and consumers agree. According to statistics from the Coalition Against Insurance Fraud, most consumers think insurance companies should do a better job informing people about the cost of fraud (86%), verify information more carefully (84%), investigate claims more rigorously (73%), prosecute more cases of suspected fraud (73%) and require more documentation (61%). Generally speaking, consumers expect insurance companies to have appropriate safeguards in place to prevent fraud. We have an obligation and, in the majority of states in the US, a legal requirement to do exactly that.

Current State

Many insurers already have anti-fraud units in place, and these units need to be the first line of defense against fraud rather than the sum of fraud-fighting efforts. Strategies such as fostering a zero-tolerance culture for fraud and providing anti-fraud training to employees and agents can also be effective means to identify fraud, both before and after it comes on the books, and mitigate its potential impact. For fraud prevention, underwriters and other teams can play very important roles. It is important the organization delivers a clear message to employees that it is everyone's responsibility for anti-fraud.

Additionally, more frequent reporting and prosecution of fraud could make a significant impact. RGA's Global Claims Fraud Survey indicates less than 2% of identified insurance fraud results in prosecution. Fraudsters are aware that insurers are reluctant to prosecute, due to both the high cost of litigation and the uncertain outcomes. Organized fraud groups make it their business to know which companies have strong fraud teams and are most likely to prosecute. Even though it is expensive, making prosecution a credible threat may ultimately serve as a deterrent.

Beyond these current safeguards, as the insurance industry evolves and adapts, it is important for insurers to be proactive in rooting out gaps and flaws and to prepare for the fraud of the future.

Explore New Avenues

Insurance companies are working tirelessly to develop technology to enhance the customer journey; all the while fraudsters are looking for ways to exploit these systems. As criminals seek to take advantage of new vulnerabilities among insurance companies, experts within the industry are working to identify innovative tools and approaches for detecting and preventing fraud.

Leveraging the latest technologies can provide a strong defense against fraud. Integrating machine learning, predictive analytics and the newest data mining tools (as well as data scientists) into fraud detection efforts is already strengthening fraud detection and mitigation capabilities for early adopters. Although the proprietary fraud/fraudster databases

maintained by many insurers and reinsurers are a plus, a central information repository for reporting actual or suspected insurance fraud would be a much stronger weapon in the war on fraud. One such example is FraudShare, a database that LIMRA and LOMA worked with fraud prevention experts and developers at member firms to create. The goal of FraudShare is to combat account takeovers and enable carriers to monitor and better understand new fraud challenges by documenting fraudulent activity in a secure database. Such repositories make it easier to identify and stop would-be perpetrators.

Looking toward the future, artificial intelligence and machine learning are currently being applied to fraud detection and mitigation and will be deployed much more broadly. The enormous amounts of data now available, both structured and unstructured, can be sifted to detect patterns indicative of fraud that even a few years ago might have been impossible to see. Algorithms can be trained to identify information applicable to fraud cases and, as data is added, can continually evolve and improve capabilities. This holds out some hope that insurers may soon be able to stay one jump ahead of some of the more ingenious fraudsters.

This kind of algorithm is not science fiction; RGA is currently developing a proprietary algorithm in Asia customizable for individual product portfolios (e.g., life, accident, etc.), and using it to analyze fraudulent claims behavior by product, as well as by company. Although the current focus is on claims, as that is where substantial fraud is known to occur, there is interest in refining the algorithm so it might at some point be able to detect underwriting fraud, as well.

The most important thing to understand is this: There is no one magic tool for combating fraud. We must ensure our fraud prevention tools and technologies are broad and well integrated, and we must be both proactive and willing to adapt nimbly – just like the fraudsters we are pursuing.

About the Author
Linhui Dong, PhD, CSPA, is Vice President, Data Science, and a member of RGA's Global Research and Data Analytics (GRDA) leadership team. He is responsible for managing the Data Science team in Shanghai and also in St. Louis. Linhui provides strategic direction and leads new data science initiatives to develop and execute data-driven solutions. He joined RGA in 2018 and is based in St. Louis, MO. Prior to coming to RGA, Linhui served as Analytics Lead – Specialty Markets for Munich Re America and as Actuarial Director and Head Modeler of Personal Insurance for AIG. He began his financial services career as a Consultant, then Senior Consultant and Associate of Research & Data Analytics for Travelers. Linhui holds a PhD in Economics and a Certified Specialist in Predictive Analytics (CSPA) designation.

CONGENITAL HEART DISEASE – UNCERTAIN AND HIGH-RISK LESIONS

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Executive Summary *Congenital heart disease (CHD) is the most common newborn congenital disorder. With better detection and intervention options, life span and health span of some simple cardiac lesions are the same as in otherwise healthy patients. CHD with uncertain or severe prognosis involves heart malformations which cause obliteration of one of the functional ventricles or complete dissociation of the separate functions of the left and the right side of the heart. Repair of these lesions often requires complex, staged procedures, and to date, even with the best interventions, prognosis remains guarded. This article will review uncertain and high-risk CHD lesions, their symptoms, treatments and associated mortality risks.*

Introduction

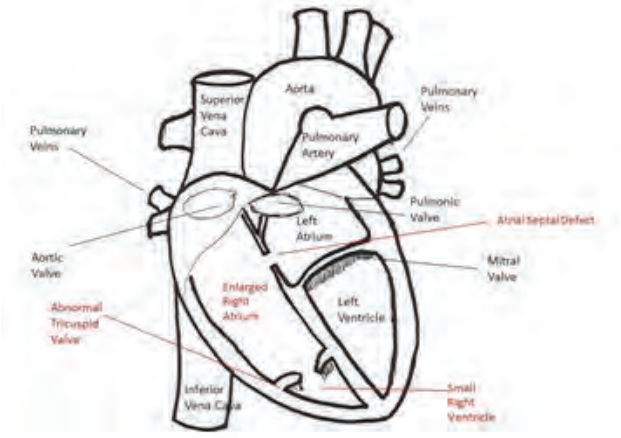
In the June 2017 and March 2018 editions of *ON THE RISK*, we briefly discussed normal embryologic and neonatal development of the heart, explored the incidence of congenital heart disease (CHD), and evaluated the risk of insuring applicants with mild to moderate-risk lesions. This included both those individuals who had not undergone intervention, as well as those who had undergone a wide range of medical and surgical interventions. This article is the final in a three-part series and will focus on uncertain or high-risk lesions. It is helpful to revisit the normal cardiac anatomy discussed in the first article to understand how these anomalies lead to impairment and therefore impact mortality. It is also helpful to refer to the second article to identify how corrective techniques, for even some of the more moderate lesions, can still offer a fair to good quality of life.

Some rare lesions have uncertain risk because there are an insufficient number of patients to analyze and predict risk and mortality. Moreover, many of these rare lesions are complex and have poor outcomes in infancy; therefore, despite even the best medical and surgical treatment, few if any live into adulthood. For the most complex cases, those who survive into adulthood represent a very small subsegment of an already small population, and in this fraction of a fraction, data is even more limited. These more complex or uncertain risk lesions include transposition of the great arteries post arterial switch procedure, congenitally corrected transposition (L-TGA), Ebstein's anomaly of tricuspid valve and single (univentricular) ventricle defect. The March 2018 article previously discussed the two transposition anomalies. This article will focus on Ebstein's anomaly of the tricuspid valve and the single ventricle spectrum of disorders. [1,2]

Ebstein's anomaly of tricuspid valve

Case 1: A 37-year-old female applying for a term policy has a history of Wolf-Parkinson-White syndrome and is status post ablation. She has mild mitral regurgitation and mild aortic regurgitation. Additionally, she has echocardiograms from 2009 and 2011 which mention she has mild Ebstein's anomaly of the tricuspid valve (Figure 1, next page). She reports being asymptomatic and living an active lifestyle.

Figure 1 - Ebstein's Anomaly



The tricuspid valve separates the right atrium from the right ventricle. When the right ventricle contracts to propel blood to the lungs, the tricuspid valve normally closes to prevent retrograde flow of blood. Ebstein's anomaly of tricuspid valve is a malformation of the tricuspid valve that causes the valve to not completely close, whereby blood leaks back into the right atrium. The risk of Ebstein's anomaly is one in 20,000 live births in the US. The risk is increased if the mother was taking lithium during early pregnancy. Overall, it accounts for less than 1% of congenital heart disease cases.[3, 4]

There are different morphologies to the anomaly of the tricuspid valve which can lead to very different clinical presentation. Normally, the tricuspid valve consists of three leaflets – anterior, posterior and septal. In Ebstein's anomaly, the septal and posterior leaflets are downwardly displaced into the right ventricular apex, affecting the right ventricular outflow tract. This downward displacement of the valve essentially divides the right ventricle into two chambers: the proximal portion of the right ventricle acts as the right atrium (becomes atrialized), and the distal portion functions as the right ventricle. The right atrium becomes larger than normal and the atrialized right ventricle is thin-walled. The distal functional right ventricle becomes small and has poor contractility, which affects its ability to propel blood forward. Additionally, in Ebstein's anomaly, the tricuspid valve leaflets may be stuck to the heart septum (divides right and left heart) or the walls of the right ventricle. The leaflets don't have the proper motion or mechanics to allow for closure to prevent leakage of blood back into the right atrium.

Ebstein's anomaly is associated with various other cardiovascular defects, most commonly patent foramen ovale (PFO) or atrial septal (septum secundum) defects. In addition, ventricular septal defect (VSD) and patent ductus arteriosus (PDA) can occur. Accessory conduction pathways are present in 6-36% of patients with Ebstein's, which can lead to arrhythmias causing syncope and sudden death.[3]

The signs and symptoms of Ebstein's anomaly can occur at any age depending on the severity of the defect and presence of any additional helpful or harmful cardiovascular defects. The regurgitation of blood due to incomplete tricuspid closure causes increased atrial pressures and ultimately right-sided heart failure. Once right heart failure ensues, the patient can experience edema, hepatomegaly and dyspnea. Cyanosis from right-to-left shunting of blood can lead to blue or purple lips, skin and nails. Accessory conduction pathways can lead to abnormal heart rhythms, causing dizziness, syncope and heart racing. On physical exam, an early systolic click and wide splitting of heart sounds due to right bundle branch block can be appreciated.

The diagnosis can be made by ultrasound imaging before birth in severe cases. Typically, however, initial testing is done with electrocardiogram (EKG) and chest radiograph (CXR). EKG evaluates for arrhythmias which can be fatal. CXR can detect cardiomegaly due to regurgitation of blood and can be followed up with a transthoracic echocardiogram. Diagnosis is confirmed when the transthoracic echocardiogram shows a >8 mm/m^2 apical displacement of the tricuspid valve compared to the mitral valve.

The treatment for those with mild anomalies focuses on medical management, because no surgical treatment is needed to correct the abnormality. Medications are given to control the heart rhythm, and antibiotics may be given prior to dental procedures. In more severe cases, surgery may be required to repair or replace the tricuspid valve and thereby improve right ventricular function. Conduction pathways can also be corrected during surgery to change abnormal heart rhythms back to normal.

The prognosis depends on how early in life a child has symptoms of heart failure and abnormal heart rhythms. Generally, patients diagnosed after 1 year of life can have good prognosis and just require routine cardiology follow-up for echocardiograms and medication management – these generally represent more mild anomalies.

Again, small data sets make long-term prognosis unknown at best, to guarded at worse. To quote Brackenridge's thoughts on Ebstein's anomaly from his book on life risk: "What is in store for the applicant over age 30 with normal functional capacity, no arrhythmias, mild tricuspid regurgitation, no cardiac enlargement, and no atrial septal defect? There is no

available long-term study past age 65 of such subjects. It would appear the majority will develop significant tricuspid regurgitation or serious arrhythmias."[5]

Single ventricle physiology (univentricular heart)

Case 2: You receive a request for a quick quote about a 15-year-old male with hypoplastic left heart syndrome who underwent a three-stage procedure in infancy. The family is pricing with a series of insurers and wants to know if your company can be competitive with an offer.

In a single ventricle defect (SVD), there is only one functional ventricle strong enough to pump blood to the pulmonary and systemic circulations. The causes of SVD include: hypoplastic left heart syndrome (HLHS), tricuspid atresia, double outlet left/right ventricle and double inlet ventricle. SVD occurs in five out of every 100,000 live births in the US.[6] SVD is most commonly caused by HLHS, which accounts for 2-3% of all congenital heart disease and 2-3 cases per 10,000 live births in the US.[6, 7, 8]

Our discussion will focus on HLHS (Figure 2a) since it is the most common cause of SVD. As illustrated in the diagrams of the different anomalies, all anomalies have only a single functional ventricle which, without repair, frequently leads to death in infancy. As can be seen in Figure 2b, tricuspid atresia leads to a hypofunctioning right ventricle (RV) due to its failure to fill from the right atrium and thereby a left-sided univentricular heart. Figures 2c and 2d show the double outlet ventricles – where either the left ventricle (LV) or RV can develop embryologically to supply both the aorta and pulmonary artery in a double outlet ventricle, thereby rendering the opposite side hypofunctioning. Figure 2e (next page) shows the double inlet ventricle – where both atria drain into a common ventricle, rendering the contralateral ventricle hypofunctioning.

Figure 2a - Hypoplastic Left Heart Syndrome (HLHS)

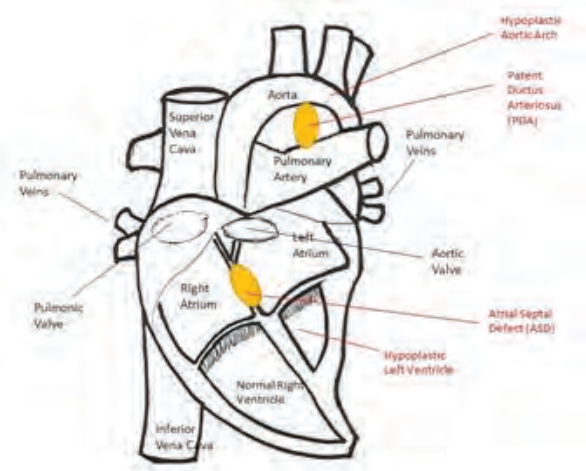


Figure 2b - Tricuspid Atresia

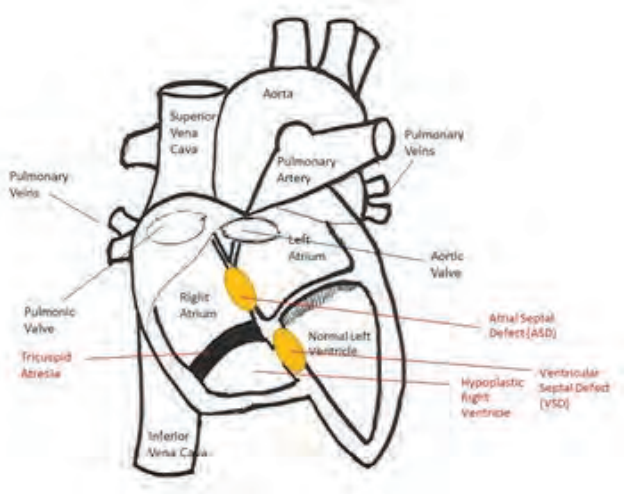


Figure 2c - Double Outlet Left Ventricle

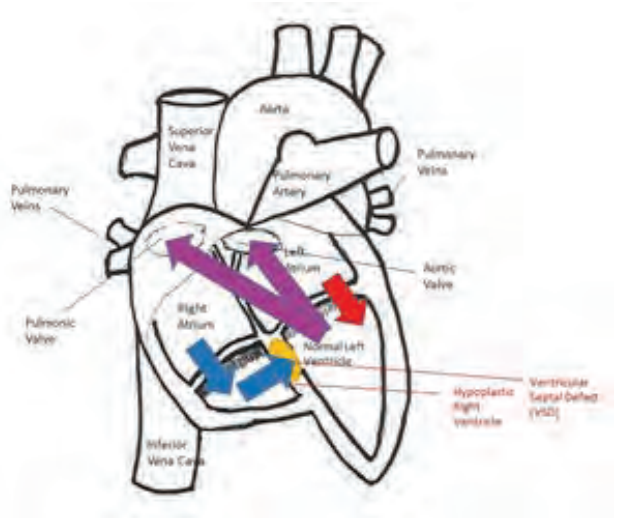


Figure 2d - Double Outlet Right Ventricle

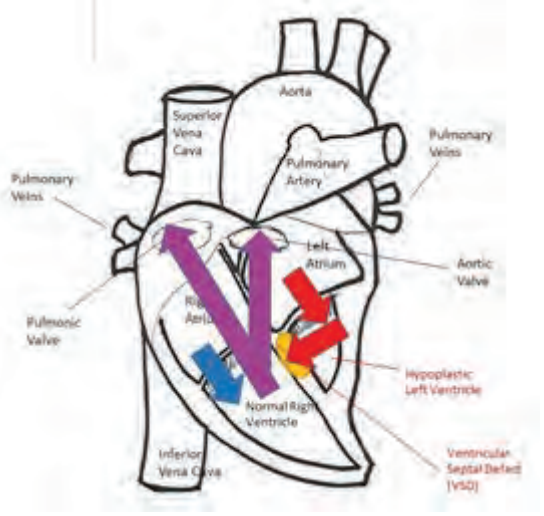
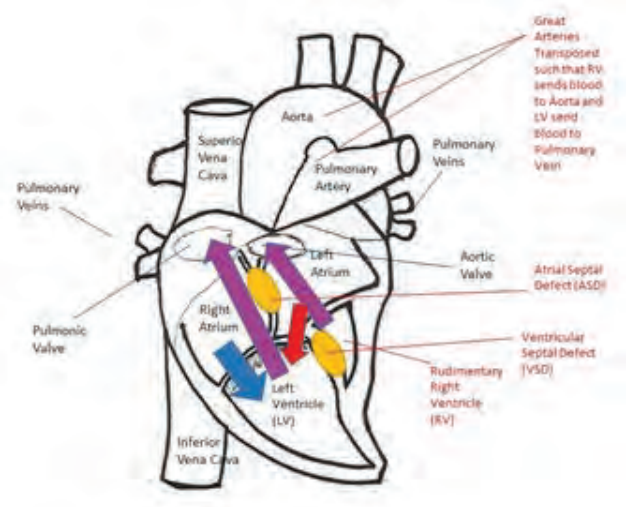


Figure 2e - Double Inlet Ventricle



HLHS consists of significant hypoplasia or underdevelopment of the left ventricle, stenosis or atresia of mitral and/or aortic valves, and hypoplasia of aortic arch and ascending aorta. Neonates require a patent ductus arteriosus (PDA) to maintain adequate systemic circulation because the right ventricle must supply both the pulmonary and systemic circulation. Many neonates also have an associated atrial septal defect (ASD) to allow mixing of oxygenated and deoxygenated blood. HLHS primarily occurs sporadically, but there is growing evidence of a genetic component, which is associated with a greater mortality risk.

A patient with HLHS will present within a few months of birth with signs and symptoms of cyanosis. This includes lethargy, difficulty feeding and breathing, and blue or purple lips, skin and nails. The patient may also have cool extremities, hepatomegaly and tachypnea. Diagnosis is made based on clinical signs and symptoms, as well as imaging. CXR may show fluid buildup in lungs due to a univentricular heart. However, echocardiogram is the best test to visualize the defects in the heart.

Treatment involves staged reconstruction, in a series of open-heart surgeries over several years. The first step is called the Norwood procedure. This allows the right ventricle to pump blood to the systemic circulation, and a shunt, either via a subclavian artery (Blalock-Taussig) or directly from the RV, is made. The Glenn procedure is performed next, connecting the superior vena cava (SVC) to the pulmonary circulation and eliminating the shunt. With this procedure, there is still desaturation due to venous mixing. Finally, the Fontan procedure is a two-stage surgical repair that diverts the two large veins (superior and inferior vena cava) of the upper and lower body to directly return blood to the lungs without passing the heart, directly to the pulmonary artery. This procedure ensures blood will be oxygenated and then delivered out to the body again.

The mortality for a patient with a single ventricle defect depends on the cause of the single ventricle. For patients with HLHS, the 5-year post-surgery survival rate is approximately 60-70%.[7] Although the survival rate may seem low, 95% of neonates with HLHS die within the first month of life, if not treated. With the advent of procedures such as the Fontan, patients have been able to survive past infancy and into their 20s and 30s. This was not the case even 50 years ago. Despite advances, we still don't have enough years of follow-up with these patients to assess life span and mortality. Some Fontans go on to receive heart transplants.

Discussion

Ebstein's anomaly and single ventricle physiology present the most complex and uncertain of the CHD lesions in the spectrum of disorders reviewed in our three-part series of articles. Both of these lesions, when considered on an individual basis, are generally uninsurable to very high substandard ratings.

Case 1 presents the example of Ebstein's anomaly and the case of a young patient who already has some arrhythmias and valvulopathy. Given the young age, her long-term prognosis is uncertain. Clearly, this case does not present a "best case" Ebstein's at first glance. Therefore, it should be considered very high substandard to uninsurable.

The example presented in Case 2 discusses a hypoplastic left heart case. This is a young patient who appropriately underwent a three-stage procedure for treatment of the HLHS. Very limited information is offered, and for a myriad of reasons, the case presents an example of poor insurance risk. It is by far the worst of the congenital heart syndromes. Although prognosis is better with repair, there is still shortened life span and health span because of congestive heart failure and arrhythmias. Additionally, this is an adolescent who has not undergone the "stress test" of pubertal development and volume changes associated with puberty. Even in best-case scenarios, the data sets are so small that the risk remains at best uncertain. Considering all this, it would be difficult to provide a "competitive offer" at this time.

Conclusion

CHDs with high or uncertain risk generally involve the complete obliteration of the functions of one of the ventricles, and are generally repaired in complex, multistage procedures. Even in those caught early and appearing mild, there is still the risk of conges-

tive heart failure and fatal arrhythmias. Heart failure and arrhythmias are due to changes in the muscular and electrical circuitry of the heart caused by pressure changes resulting from the anomalies, as well as sudden alteration in these pressures following repair surgeries. Evidence suggests mortality ratios exceed 500% with these rare lesions; however, existing published research does not incorporate the constantly evolving and improving surgical techniques and medical therapies. While these cases are currently considered high-substandard at best, these novel treatment paradigms will undoubtedly alter short-term and long-term survival in these individuals.[9]

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THE 2018 CHARLES A. WILL AND CANADIAN EDUCATIONAL AWARD WINNER

Special congratulations to Ecaterina Karina Lavric, recipient of the 2018 Charles A. Will Award. The annual winner of this award is the student achieving the FALU designation who had the highest grade on the ALU series exams. Ecaterina is also the winner of the Canadian Education Achievement Award. The annual recipient of this award is the student achieving the FALU designation who had the highest grade on the ALU series of exams in Canada.

About the Authors

Paulo Pinho, MD, FAAP, FACP, is a graduate of New Jersey Medical School's combined BS-MD program with the New Jersey Institute of Technology. After medical school, he completed his residency in Internal Medicine and Pediatrics at the University of Medicine and Dentistry of New Jersey. Following residency he served as a Medical Chief Resident at the University Hospital in Newark, NJ. He is board-certified both by the American Board of Internal Medicine and the American Board of Pediatrics. Early in his career he was in private practice in NJ and Staten Island, NY, treating children and adults, including those with special needs. In 2006, he founded PASE Healthcare, PC, a unique private practice serving adults and children in Millburn, NJ, and became its sole proprietor. In 2014 he merged PASE with Atlantic Health's Practice Associates Medical Group. He was on the medical staff of St. Barnabas Medical Center in Livingston, NJ and Overlook Hospital in Summit, NJ. He remains a clinical assistant professor in the Department of Internal Medicine at Rutgers NJ Medical School and has served as a clinical preceptor for medical students, residents and Nurse Practitioner students. In 2016, he joined the Prudential Global Health Organization where he serves as a Medical Business Consultant with the role of rotating through the organization's business units to change core processes and generate cross-functional initiatives, develop knowledge sharing programs across the medical community, and engage in research.

Susan Machutt, MSN, APRN-BC, ANP, having obtained her RN, initially began working at Mayo Medical Center in the Surgical Cardiovascular ICU. She cared for post-operative open heart adult as well as pediatric congenital heart repair patients. Her later RN work at Mayo included the Cardiac Post-Interventional unit, caring for patients having PCI and pacemaker procedure. After working many years as an RN, she returned to the University of Wisconsin and obtained her Master of Science in Nursing degree and Adult Nurse Practitioner certification. As an NP, she joined a private cardiology practice in the Minneapolis area, working with a wide variety of general cardiology patients. Later, she joined Minneapolis Heart Institute at Abbott Northwestern Hospital as part of the Heart Failure service. It was there where she was part of the team of providers who cared for advanced heart failure and heart transplant patients in both the inpatient and outpatient settings. In addition to over 12 years of clinical NP experience with cardiology patients, she more recently was a provider in a home-based clinic practice involving geriatric patients with complex medical and mental health issues. Susan joined the Medical Department at Prudential in April of 2016.

Neil Nadpara is a graduate of The College of New Jersey (TCNJ) where he received his degree in Economics and is currently a 4th year medical student at Rutgers New Jersey Medical School (NJMS). He is part of the combined BS-MD program between TCNJ and NJMS. At Rutgers-NJMS, he has been involved in concussion, cancer and ENT research. His concussion research focused on studying the effect of a mild traumatic brain injury on memory and reaction time has been published in the *Journal of Neurotrauma*. At the cancer center, he examined the effect of novel delta opioid receptor antagonists on inhibition of multiple myeloma growth. His ENT research analyzed the effect of residency training or PGY level on outcomes of different ENT surgeries, which has been published in the *American Journal of Otolaryngology*. Outside of research, he is passionate about empowering the local community youth through educational programs. He has been Director of the Mini-Medical School program, which provides mentorship, education and early exposure to the field of medicine to over 200 high school students for 8 weeks each semester. He is also interested in Global Health and has planned and volunteered for a medical outreach program in Peru. After medical school, he plans to pursue a residency in Internal Medicine in an urban, underserved area. His long-term goal is to be involved in work that combines his interests in business and medicine.

MUSIC TO MY BRAIN

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Executive Summary *For centuries, music has been known to have the power to drastically affect our moods and behaviour. By examining the anatomy of the brain, as well as the structures involved when listening to and processing music, we have been able to recognize the relationship between sound frequencies, brainwaves and cognition. These findings have fundamentally augmented our understanding of how music therapy may be utilized to treat or rehabilitate individuals with cognitive impairments, consequently impacting risk associated with underwriting insurance.*

If you have ever listened to a song that brought you back to an exact moment in your past, then you may have wondered why and how that happens. What about hearing a melody that reminded you of a distinct smell, taste or emotion? For years researchers have been putting together pieces of the puzzle in an attempt to explain how these complex emotions are triggered. Why does your heart seem to race faster when listening to an upbeat song by Kanye West, and stir slowly when a Celine Dion ballad comes on?

In this article, I will attempt to describe the basic umbrella of subdivisions of the nervous system, as well as the brain structures and chemicals involved when exposed to music. Given my sincere interest in this topic, I feel it's noteworthy to mention that I have been playing music since age 5, and that I did my undergrad in the Specialist Program in Neuroscience at the University of Toronto. However, being in the insurance industry, I should probably also mention how this could be useful to a Life underwriter.

In Life underwriting, we are generally aware that clients with a history of Alzheimer's or dementia are typically uninsurable. However, because so much research has been done on the effects of music therapy on patients who exhibit symptoms associated with these diseases, it may be possible to extrapolate these findings to milder cognitive impairments. It has also been demonstrated that music can provide or assist in reducing the need for medication for certain conditions such as anxiety and depression.[1,2] To explain these processes, we must first take a look at the wondrous and elaborate architecture of our nervous system.

Part I: Anatomy

Our nervous system can be divided into the central nervous system (CNS) and the peripheral nervous systems (PNS). While the CNS is made up of the brain and spinal cord, the PNS consists of the nerves and ganglia. The autonomic nervous system (ANS), regulated by the portion of the brain called the hypothalamus, is a division of the PNS, with two branches of nervous systems: the sympathetic and the parasympathetic. These systems work together harmoniously, providing the mechanism that our bodies use to function in every moment of our lives.[3]

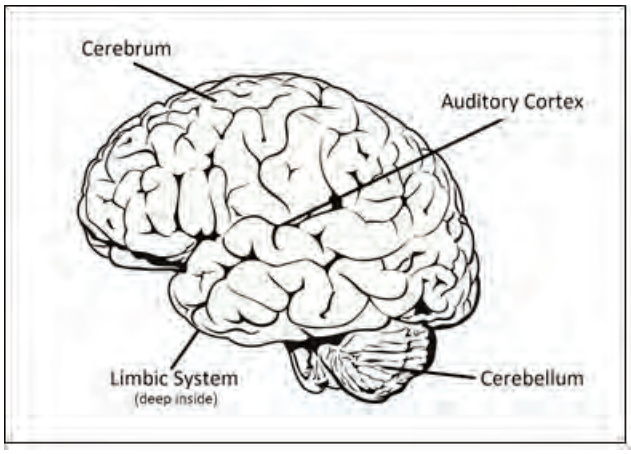
To break it down, the parasympathetic nervous system (PSNS) controls the body at rest, as well as homeostasis, and is responsible for the body's "rest and digest" functions. It decreases the heart rate, with longer neuron (nerve cell) pathways, referred to as a slower system. On the other hand, the sympathetic nervous system (SNS) controls the body's responses to a perceived threat, the primary mechanism in the control of the "fight-or-flight" response. Correspondingly, it increases contraction of the heart by way of very short neuron pathways (faster system). Other responses of the SNS include releasing adrenaline, dilatation of the pupils and bronchial tubes, as well as muscle contraction.

In the brain, dopamine functions as a neurotransmitter, a chemical released by neurons to send signals to other nerve cells.[4] This dopamine pathway plays a significant role in our pleasure-reward behaviour. Most types of rewards increase the level of dopamine

in the brain. Many addictive drugs can also increase dopamine neuronal activity, which is the same brain chemical responsible for that state you're in when you feel great after eating chocolate, or from the "runner's high" after a marathon. And you guessed it, listening to music contributes to this dopamine effect as well.

Another neurotransmitter which is vital to emotions is oxytocin, not to be confused with the painkiller Oxycontin.[5] This is the "bonding" hormone which helps us create a stronger trust, bonds and relationships with the people around us. This is an important factor for why we tend to get closer to people with a good sense of humour. Since humour also helps release oxytocin, you are more likely to bond with people who make you laugh. To understand how a song, let's say "Dancing Queen" by ABBA, can cause this cascade of events in the brain, let's take a closer look at the brain.

There are four main sections of the brain involved in listening to music. These are the auditory cortex, the limbic system, cerebellum and the cerebrum.



The cerebrum is the largest part of the brain located at the front and top of the head.[6] This area is associated with recalling memories when remembering lyrics and sounds of a song. This region is stimulated to keep the song in working memory by bringing up images that are associated with the sounds, and to visualize the music when playing it. The motor cortex is also an area of the cerebrum which processes visual and sound cues, helping control the body's movements, such as when playing guitar.

The cerebellum is the second largest organ in the brain and located in the back of the head.[7] This area is the vital centre for balance, rhythm and coordinating skeletal muscle movement when hearing or playing music. Together with other parts of the brain, the cerebellum affects the rhythmic movement in the body when moving in response to music, as in reading or visualizing music when playing an instrument.

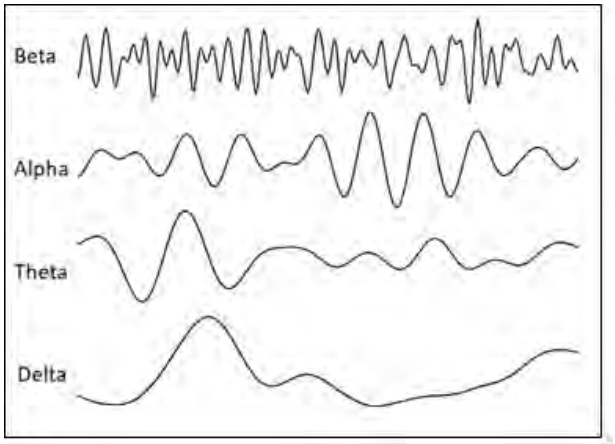
The limbic system includes the amygdala, which is the emotion centre of the brain, responsible for fear conditioning or the associative learning process by which we learn to fear something.[8] The limbic system also includes the hippocampus, which plays an essential role for sending memories out to the appropriate part of the cerebral hemisphere for long-term storage and retrieving when necessary. This works in conjunction with the formation of new memories about past experiences.

The auditory cortex is primarily a part of the temporal lobe which is located at each side of the brain.[9] This area contains brain cells that are organized by sound frequencies, which also help to analyze the information from music such as volume, pitch, speed, melody and rhythm.

While this introduction to brain anatomy involved in listening to music may have totally gone over your head, how they work together will blow your mind. In Part II, I will briefly describe brainwaves and how they are affected based on what we're doing in our daily lives. Even if it's just laying back and listening to your favourite Pink Floyd album, or dancing in a club to your favourite Justin Bieber song.

Part II: Brainwaves

Because the brain is an electrochemical organ, activity originating from it is presented in the form of brainwaves. There are four categories of these brainwaves, varying in frequency. When the brain is aroused and actively engaged in mental activities, such as making a speech or playing piano, it generates beta waves. These have a frequency of 15 to 40 cycles per second (c/s). The next category are the alpha waves, which are slower and higher in amplitude at a range from 9 to 14 c/s. This alpha state usually occurs when a person is taking a long walk on the beach or is meditating. The third state includes the theta brainwaves, which are even slower with a range of 5 to 8 c/s. This is often present when we take a break from a task and wander off to a daydream state, or "la-la land." This may also occur when engaged in a repetitious activity, such as driving on a highway or taking a shower. Since the task becomes so automatic, we can be mentally disengaged while we perform it. The final state is delta, where the brainwaves are the slowest frequency. This range is typically from 1.5 to 4 c/s. A deep, dreamless sleep would be an example of this state.[10]



Within these brainwave states, music has the potential to alter a person's state of consciousness. It has the potential of shifting a person's perception of *virtual time* perceived in the left brain (real-time minutes and seconds), to *experimental time*, which is perceived through memory. If you recall, the right-brain processes information with an intuitive and creative approach, while the left brain is immersed with analytic thinking, such as solving a math equation. The corpus callosum, a structure made of nerve tissue, is involved in the communication between the two sides.[11]

Experimental time is an experience of a tension state followed by resolution. The rate of the experimental time sequence influences the time perception. Since music causes states of tension and resolution cycles, slow moving music can lengthen the perception of time because an individual's memory has more time to experience those cycle states. This can cause clock time to become distorted and people can lose track of time. Humans keep time to music involuntarily, even when not consciously paying attention to it.

Music may activate the flow of stored memory across the corpus callosum. This allows the right and left brain hemispheres to work in harmony rather than in conflict.[12] Since music is nonverbal in nature, it will trigger the right hemisphere. When used in a therapeutic nature, the verbalization of words will trigger the logical left brain at the same time. There is evidence that music therapy has facilitated the communication between the left and right brain. This is particularly true in individuals with pervasive developmental disorders, autism and brain injury.

Brain imaging techniques discovered by Dr. Robert Zatorre and his colleagues demonstrate that imagining music can activate the auditory cortex almost as strongly as listening to it.[13] They also observed that envisioning music stimulates the motor cortex, while conceptualizing the action of playing music activates the auditory cortex. This means that a person can hear music even if it is not really playing!

Part III: Cognition

Synesthesia, which is thought to be genetic, happens when perception in one sense activates a perception in another sense whereby they anomalously blend together.[14] A person who experiences musical synesthesia may see a color, smell something, experience a taste, or feel a temperature change due to the music he is listening to. This occurs when there is an increase in the "cross-talk" between different cerebral regions, and music clearly aids this cross-talk. A unique example of this is chromesthesia, which is a specific form of synesthesia whereby a person sees visual images, such as colors or shapes, when he is listening to music.[15] And this phenomenon is not from having dropped too much acid in the '70s either.

Highly creative individuals generally have a different pattern of brain waves than "normal" or non-creative people.[16] Music has the ability to stimulate the production of alpha and theta waves in the brain. Big bursts of these alpha waves consequently induce creativity, while the theta waves are associated with the process of dreaming, learning, states of enhanced creativity and relaxation. Additionally, the perception of virtual vs. experimental time allows us to access different areas of stored memories in the brain, affecting our nervous system, and ultimately our disposition.[17]

In Canada, an estimated 65% of music therapists work with elderly who are cognitively impaired.[18] Since music has been found to stimulate various parts of the brain, it has also been demonstrated that it enhances the memory and emotions of Alzheimer's and dementia patients.[19] It has also been proven that in advanced Alzheimer's patients, there is an ongoing aptitude to appreciate music. Since it evokes positive emotions, it can help Alzheimer's patients share positive moments with their loved ones. Furthermore, individuals who participate in singing while listening to music exercise both sides of the brain, while managing stress. As previously noted, this management of stress is prompted by the release of the "happy" chemicals from the brain, such as serotonin, melatonin and prolactin.

Individuals who have been diagnosed with mild cognitive impairment (MCI) may exhibit symptoms of depression, anxiety, irritability, aggression, apathy and trouble remembering things.[20] It should not be surprising to underwriters if they see more of these types of therapies in future Attending Physician Statements as a source of alternative therapy used in

conjunction with traditional medications. Although most types of dementia, such as Alzheimer's, may not be insurable in the Life insurance marketplace, we can see how music can have great potential as an alternative therapy for milder cognitive impairments. Simply put, music has the power to make you feel good! So next time you're listening to Air Supply's greatest hits and it reminds you of walking through a beautifully scented floral meadow in the summertime breeze, you'll know why.

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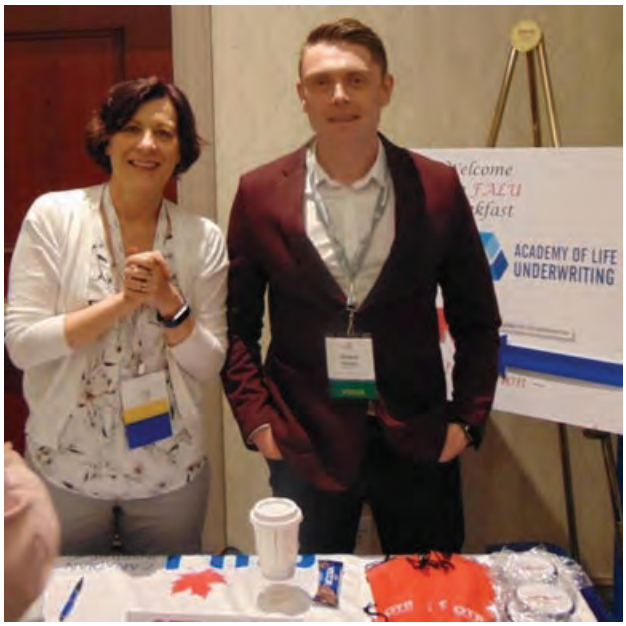
About the Author

Garen Markarian has over 10 years of experience in the insurance industry. He has an undergraduate degree in Neuroscience from the University of Toronto and a post-graduate diploma as a Clinical Research Associate from the Michener Institute. Garen has been a featured author of underwriting-focused blogs for LOGiQ³. He is also a member of the LOGiQ³ Underwriting Team involved in production underwriting, case clinic presentations, audits and content development for the Underwriting Training Program. He is currently located in Toronto.



At the 2019 CIU General Meeting in Toronto: Lianne Heppenstrijdt, Sun Life and Michael Maunder, Munich Re, greet attendees to the FALU breakfast sponsored by the Academy of Life Underwriting and On The Risk.

THE DEATH OF A CANCER

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Executive Summary *In the March 2019 issue of ON THE RISK, Dr. Richard Braun covered the basics on the history and current protocols for cervical cancer screening in the US. This article provides an in-depth look at one country's success in approaching the early prevention of cervical cancer. In Australia, by 2020, cancer of the cervix is set to become rare and will likely be eliminated by 2028 – a world first. Dr. John Cummins outlines why and how this can be achieved and what this means for cancer of the cervix globally.*

Background

Cancer of the cervix is the third most common cancer diagnosed and the fourth most common cause of cancer death globally. Each year, somewhere between 250,000-310,000 women are estimated to die from cancer of the cervix.[1] Carcinomas of the cervix are most often of squamous cell origin (squamous cell carcinomas or SCC) whereas adenocarcinomas, while less frequent, have been increasing in prevalence globally and now cause more than 25 % of all cervical cancers.[2] Adenocarcinomas have been historically more difficult to detect by routine Pap screening, as squamous lesions are more likely to be visually apparent than adenocarcinoma, and adenocarcinomas tend to occur higher in the cervix or be unevenly distributed ("skip lesions").[3]

Virtually all (99.7%) cases of cervical cancer are caused by sexually transmitted chronic human papillomavirus (HPV) infection. While most often HPV infection is benign and has no potential for carcinogenesis, some HPV variants are more likely to become chronic and cause cancer more than others. For example, HPV Types 16 and 18 are responsible for approximately 70% of all cervical cancer,[4] with Type 16 found in approximately 50% of patients. Other factors frequently associated with an increased risk of cervical cancer include stress, immunosuppression, chronic exposure to tobacco, and oral contraceptive therapy. The latter of these factors is associated with both SCC and adenocarcinoma of the cervix.

Timeline of carcinoma of the cervix screening and prevention in Australia

There are three historic components to the screening/prevention program in Australia.

1. *Pap smear testing*

Australia introduced a national cervical screening program in 1991, which involved a Papanicolaou (Pap) smear test every 2 years, examining cervical cells microscopically (i.e., cytology) for precancerous/cancerous changes. Abnormalities would lead to further investigation by a specialist and generally locally ablative therapy of any offending lesion discovered.

2. *Mass HPV vaccination of teenagers*

The first HPV vaccine was created by researchers Ian Frazer and Jian Zhou at the University of Queensland and approved by the US Federal Drug Administration in 2006. This was a quadrivalent vaccine protecting against four strains of oncogenic HPV virus.

The free, national HPV vaccination program was first offered to Australian schoolgirls aged 12-13 in 2007, with a catch-up program for women aged up to 26. Between 2007 and 2009, 72% of girls aged 14-15 had received three doses of the quadrivalent vaccine over 6 months.[5] In 2013, the program was extended to cover both boys and girls aged 12-13.

In 2018, Australia commenced using the new nonavalent HPV vaccine, Gardasil 9, replacing the quadrivalent vaccine, thereby protecting against an additional five strains of HPV (Types 6, 11, 16, 18, 31, 33, 45, 52 and 58). The program began in line with the school year and reduces the number of doses from three to two (spaced 6-12 months apart).

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Figure 1: National HPV vaccination coverage for female adolescents turning 15 years of age

Year	Coverage Dose 1	Coverage Dose 2	Coverage Dose 3
2012	82.7	79.2	71.5
2013	82.1	78.4	71.7
2014	83.7	80.3	74.1
2015	86.4	83.7	78.0
2016	86.5	83.8	78.6

Notes:
1. Coverage is calculated as doses administered and reported to the HPV Register/Estimated Resident Population expressed as a percentage.
2. Year is the year in which females turn 15 years of age; 15 years of age is used as the age for routine review of vaccination coverage that provides the best comparsion to allow for these varing ages in administration, as per World Health Organization (WHO) recommendations.
Source: National HPV Vaccination Register 2017; Victorian Cytology Service 2017

A recent study suggested that up to 93% of cervical cancers in Australia are associated with the HPV types covered by the new vaccine.[6] In addition, by moving to the nonavalent vaccine and decreasing the number of recommended doses, the rate of compliance with the vaccination schedule is expected to increase.[7]

3. *HPV testing*
In late 2017, Australia moved from a biannual Pap smear program to a five-yearly HPV testing program. International randomized trials comparing HPV DNA testing with cytology for primary screening have shown HPV testing for those strains known to be more likely to lead to high grade lesions to be superior.[5] For HPV-positive women, liquid-based cytology testing will be reflexively performed on the sample. The advantages of HPV screening over the traditional Pap tests include:

- A significant false-negative rate for Pap vs. HPV tests (30% vs. 2-3%) required more frequent Pap screening to minimize failure in detecting disease.
- Women who test HPV-negative are at very low risk for cervical cancer for at least the following 5 years. Compared with cytology, HPV testing provides 60-70% greater protection against invasive cervical cancers[8] and significantly reduces the incidence of adenocarcinoma.
- Opportunity for self-collection (for women who, for a variety of reasons, decline to be examined by a practitioner) in under-screened populations.

Hence the participation rate is expected to increase in concordance with a higher diagnostic rate. In addition, the increasing percentage of women being vaccinated with an anticipated much lower prevalence of HPV transmission was another reason for updating the national cervical cancer screening program.

Results

As a result of the initial cervical screening program with Pap smears, the incidence of cervical cancer in Australia halved from approximately 13 cases per 100,000 women in 1991 to 7 cases per 100,000 women in 2002. The death rate has dropped to 2 per 100,000.[9]

Due to the latency period of 10 to 15 years between HPV exposure and cervical cancer development, it was not thought to be likely that there would be significant decreases in cervical dysplasia or cancer for many years after the implementation of vaccination programs. Surprisingly, however, reporting around the world has shown:

- A reduction of 90% for HPV Types 6, 11, 16 and 18.
- A decrease by 85% for high-grade cervical abnormalities.
- A lowering of 45% for low-grade abnormalities.[10]

In countries such as Australia, that have achieved vaccination rates greater than 70%, there has already been a 47% reduction in high-grade cervical neoplasia.[11] Early data from the Victorian Cervical Cytology Registry in Australia showed a decrease in high-grade cervical abnormalities in girls younger than 18 years within 30 months of the introduction of the vaccine.[12]

A recent study published in the *Journal of Infectious Diseases*,[13] showed among women aged 18 to 24, the rate of HPV infection dropped from 22.7% to just 1.5% by 2015. Recent research has also shown a decline in HPV among males. "We are forecasting that over the next 30 to 40 years, rates of cervical cancer will drop from around the current 930 cases a year in Australia to just a few," says the author of the study, Professor Garland.

The screening program has been shown to be 100% effective at preventing cervical cancer for women who take full part in the program. There is a real prospect that, by combining the cervical cancer immunization

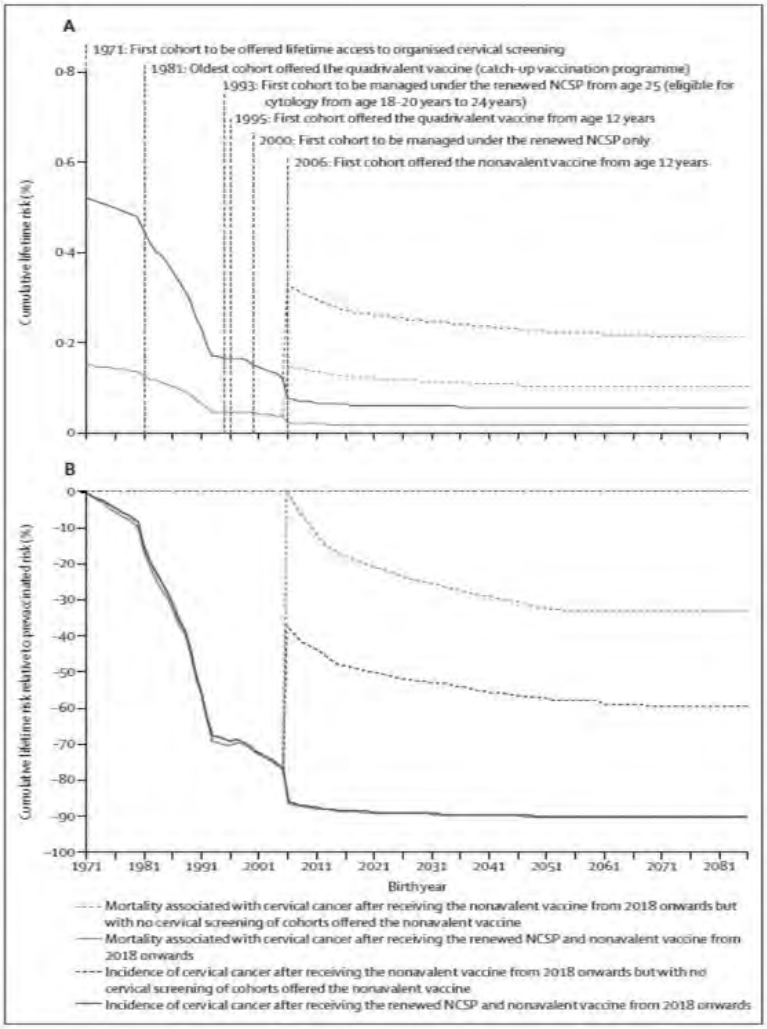
program now with the new nine-valent vaccine, and the improved screening program, the 200 cases of cervical cancer deaths that occur in Australia each year will drop over the next few years to negligible numbers.

Despite the success of the previous program based on two-yearly Pap smears, there had been no change in the incidence and mortality associated with adenocarcinoma of the cervix. It's important to note that the prevalence rate of any HPV infection is 72% in adenocarcinoma.[14] The renewed program, based on five-yearly HPV testing, is predicted to deliver an additional decline of 24-36% in the incidence and mortality from cervical cancer by enhancing the rate of detection of HPV precursors of both adenocarcinoma and squamous cell cervical cancers. In Australia, in 2008, 65.1% of cervical cancers were squamous cell carcinoma and 25.7% were adenocarcinoma, with adenosquamous (3.3%) and other cervical cancers (5.9%) making up the remainder.[15]

If current practices continue, the disease will be eliminated as a public health problem in Australia by 2028, all but eradicated by 2066 globally, and there will be about one case per 100,000. By 2100, there would be just three deaths per million women (compared to 21 deaths per million, or about 260 deaths each year today).[16]

As the figure below shows, in addition to demonstrating the time course of the prevention program, it remains critically important for a woman to still have HPV screening despite completing the vaccination program.[16] There will be some oncogenic viruses not covered by the Gardasil 9. Nonetheless, if one had the full vaccine regimen and was not screened thereafter, the odds of developing cancer of the cervix is still as low as a woman born after 1971 participating in the older Pap smear program – prior to vaccinations and HPV testing.

Figure 2: Cumulative lifetime risk of incidence of invasive cervical cancer and associated mortality in Australian women, by birth year



Data are (A) cumulative lifetime risk; and (B) cumulative lifetime risk, relative to the prevaccinated risk. The prevaccinated risk refers to the cumulative lifetime risk calculated for the 1971 birth cohort (i.e., the first Australian cohort who received organised cervical screening and were not offered human papillomavirus vaccination). NCSP=National Cervical Screening Program.
Source: www.thelancet.com/public-health, Vol. 4, January 2019

Going global

As of May 2017, more than 270 million doses of HPV vaccines have been administered worldwide. Over 10 million doses of Gardasil 9 have been given in the US in the past year. Nearly 50% of girls and boys in the US are now receiving the cervical cancer vaccines, and universal immunization programs are in place in many European countries, as well as in Canada. While dozens of countries around the world now vaccinate their teenagers from HPV, many are still missing out, as the vaccine remains relatively expensive, even when offered at a lower price in some countries.

Gardasil inventor Ian Frazer and the University of Queensland have waived millions of dollars in royalties on sales of the cervical cancer vaccine in 72 Western countries. Professor Frazer said the decision, along with initiatives by the charitable Frazer Family Foundation (run by Professor Frazer and his wife Caroline), the Bill and Melinda Gates Foundation, and the World Health Organization (WHO), would help ensure the vaccine was available in the developing world at the heavily subsidized cost.[17] Professor Frazer notes that education programs are important before introducing the vaccine. The logistics for delivering Gardasil in some countries needed to be worked out carefully before it could be introduced.

Other cancers

It is also crucial to note that HPV is the reputed agent in a number of other cancers and conditions. Oncogenic HPVs cause almost 100% of cervical cancers, 90% of anal, 70% of vaginal, 40% of vulvar, 50% of penile and 13% to 72% of oropharyngeal cancers, with HPV16 predominating in all of these non-cervical HPV-related cancers. HPV6 and HPV11, which are classified as low-risk genotypes, cause 90% of genital warts, as well as the rare but debilitating recurrent respiratory papillomatosis.[18] It is anticipated that the cancers and diseases noted above will also fall in incidence at a rate similar to the causative contribution of HPV.

Conclusion

By combining the cervical cancer immunization program with the new nine-valent vaccine and the improved screening program, there is a potential for this virus-induced cancer (whose only host is the human) to be eradicated from Australia and quite likely globally within the next few decades. This is a true testament to the scientific rigor in understanding disease causation and prevention, in combination with a determination to utilize public health initiatives to their maximum extent via individual and governmental efforts.

Not only could this improve claims experience with respect to mortality (as well as disability) for cancer of the cervix (especially in developing countries), but could likely also lead to decrease in other cancers caused by the same oncogenic virus, i.e., anal and oropharyngeal cancers. Additionally, there may be other benefits. With an increased exposure to the health care system, particularly in rural and remote areas, there may be opportunistic interventions that will also enhance primary prevention, i.e., other vaccinations and basic health checks addressing cardiovascular risk factors, as examples.

This is a further example of how modern medicine is transforming the prevalence and outcomes of cancer medicine, which eventually will have significant impacts on future claims, as well as underwriting experience.

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About the Author

John Cummins, MD, graduated from medicine at the University of Sydney in 1984 and was admitted to the Royal Australian College of Physicians as a Specialist Physician in General Medicine in 1992. He completed a master's degree in Public Health at the University of Minnesota in 1995. John has worked within the insurance industry since 2005 with both direct companies and reinsurers. He currently holds the Chief Medical Officer position at SCOR Global Life Australia as well as being Practice Principal at Executive Medicine. John has a passion for the areas of evidence-based preventative medicine focusing on screening for and managing cardiovascular disease and cancer, as well as wellness at work.

The 2019-2020 CIU Executive Committee: (left to right) seated: Vanessa Ma, CIU Secretary, RBC Insurance; Marth Ham, CIU Treasurer, Swiss Re; Brigitte Mallozzi, CIU Immediate Past Chair 2019, Hannover Re; Jennifer Dahl, CIU Chair 2019-2020, SCOR Global Life Canada; Lianne Heppenstridjt, CIU Program Director, Sun Life Financial; Erica Hind, CIU Assistant Program Director, Hannover Re; standing: Jim Braund, CIU Assistant Treasurer, Optimum Re; Sandy Resendes, CIU Executive Member, RGA Canada; Jeff Schafer, Executive Member, The Co-operators; Hamid Izadi, CIU Technical Director, Partner Re; Steven Miller, CIU Conference Director, Partner Re; Shawn James, CIU Vice-Chair, Sun Life Financial.

In the June issue of *ON THE RISK* a photo of William Rooney, MD, employer should read SCOR.

FALU Quiz Answer Key:

1. b
2. b
3. d
4. a
5. d

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