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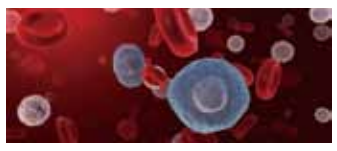


Why you should know your family's medical history

Creating knowledge that expands human possibilities

MEDIA PLANET

July 2012

PERSONALIZED MEDICINE

WHY WE NEED TO START THE CONVERSATION ABOUT OUR HEALTH

PHOTO: JASCO CHAN

THE RIGHT PERSON, THE RIGHT MEDICATION, THE RIGHT TIME

How Canada is leading **the shift from "one-size-fits-all" medicine to more individualized care**

Vision, unity of purpose, creativity, and agility

Sir William Osler, considered the father of modern medicine, observed in regards to patient care that: "Variability is the law of life and as no two faces are the same, so no two bodies are alike and no individuals react alike and behave alike under the abnormal conditions which we know as disease."

In contrast to Osler's theorem – the "individuality" of disease – contemporary medical diagnostics and treatment of disease are largely based on principles of commonalities. For example, all those presenting to their doctors with a particular combination of medical problems meeting the medical criteria for rheumatoid arthritis will be given this diagnosis and treated with the standard first-line medication.

A personalized approach

Since our health is integrally influenced by our genetic make-up, we are indeed individual in our response to disease, our reaction to its treatment and in the types of diseases we develop. As Osler's words imply, we are not well served by a "one-size fits all" healthcare model.

Our medical care needs to be more customized such that all opportunities to predict and mitigate risk for disease are optimized across the population. Personalizing healthcare does not imply that each individual receive unique medical management but rather takes into account an individual's genetic and other relevant characteristics to improve the efficacy of healthcare decisions.

Connecting the dots

This "personalized" approach, already successfully applied in a few areas of medicine, is illustrated by the use of Herceptin to treat breast cancer patients. Herceptin was designed to target a specific cancer gene mutation, HER2, found in some breast cancer patients.

While other examples of personalized healthcare are already in play, operationalizing this practice paradigm across the spectrum of medical care has until recently been impeded by the high costs inherent in obtaining a person's complete genetic profile (a.k.a. "whole genome sequencing").

Increasing accessibility

This barrier is now vanishing as a virtual freefall in gene sequencing costs has made determination of an individual's whole genome sequence increasingly affordable and available.

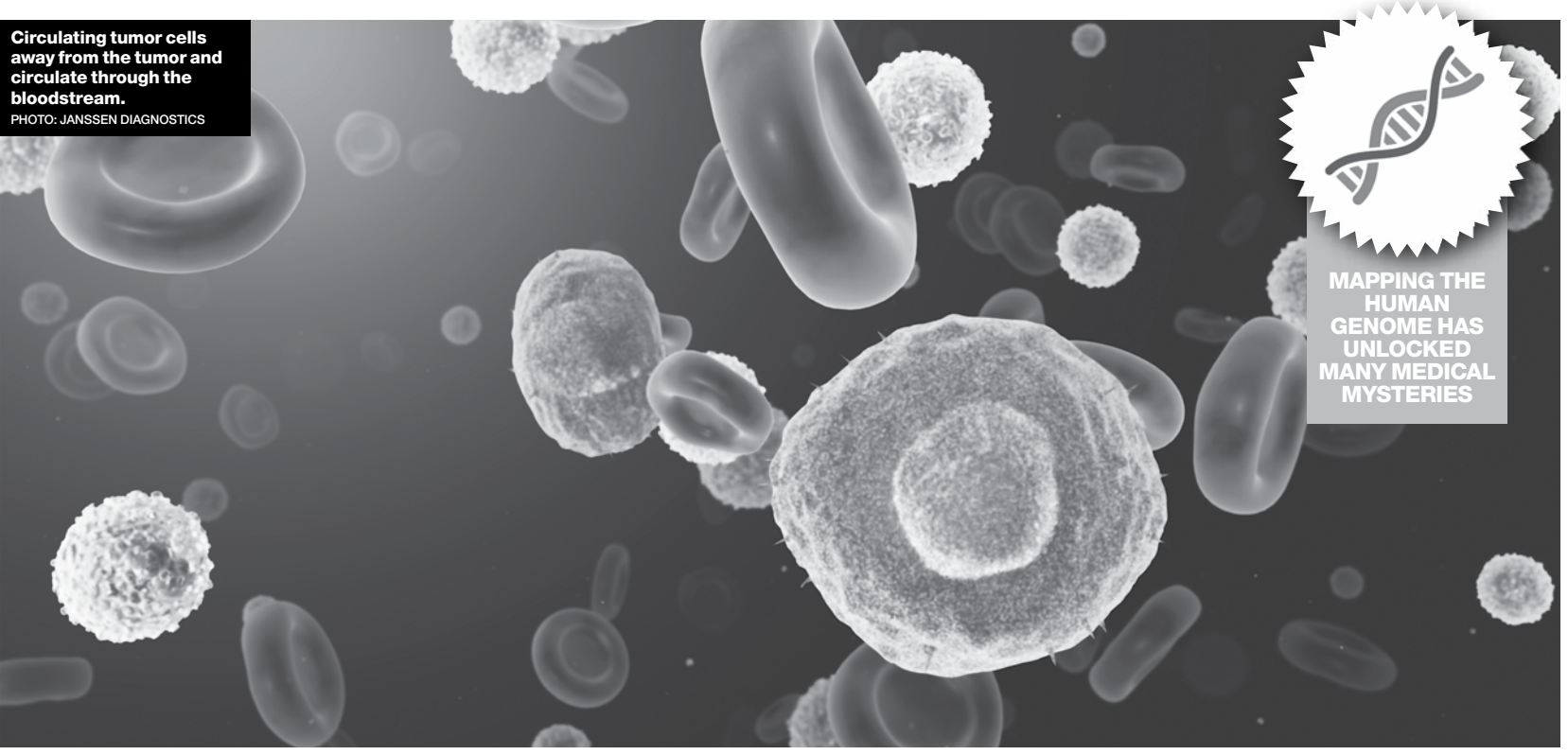
While potentially transformative to the practice of medicine, connecting population-wide genome sequencing to personalized and more effective healthcare will be no small challenge. As it happens so often in medicine, technology has radically outpaced the understanding of the knowledge it produces. The scientific and medical communities face a virtual tsunami of personal genetic information that is only in the early stages of interpretation.

As evidenced by the poor state of health informatics across this country, the healthcare system does not respond well to demands for rapid change.

But change it must. The healthcare system needs to define its own VUCA: the Vision, Unity of purpose, Creativity and Agility that has driven the extraordinary advances in information and, for that matter, genetic technologies. Only then can we deliver the personalized healthcare that Osler envisioned and Canadians deserve.

DR. KATHERINE SIMINOVITCH
Director, Personalized Genomics and Innovative Medicine, Mount Sinai Hospital
editorial@mediaplanet.com

NEWS



Circulating tumor cells away from the tumor and circulate through the bloodstream.
PHOTO: JANSSEN DIAGNOSTICS

MAPPING THE HUMAN GENOME HAS UNLOCKED MANY MEDICAL MYSTERIES

Finding the answers within our DNA

■ **Question:** How has science really helped us identify whether or not we have or will develop life altering conditions?

■ **Answer:** The discovery of genetic mapping has opened up a whole new world of possibilities with regards to identification, diagnosis, and treatment.

Molecular biology is driving major change in medical practice and transforming how physicians manage patient health.

Traditional approaches to health care are shifting at a furious pace. Medical care that was once ruled by stethoscopes and x-rays has evolved into a hunting expedition inside the body's own cells for the underlying mechanisms of disease.

Research and advanced technology have brought us to a new era in health care that's more preventive in nature, with treatment backed by strong scientific data and early diagnosis.

New discoveries

Our modern revolutionary wave in medicine began with the discovery of DNA's molecular structure and surged forward again with the sequencing of the human genome. Advances in science, specifically related to genomics, are dominating medicine and health care now and will continue onwards into the future.

Medical research facilities in hospitals, universities and innovation centres across the country are dedicating their efforts in molecular medicine to investigate underlying risk factors and causes of many health conditions.

From reactive to predictive

Early results are appearing in laboratories and medical centres throughout Canada. Health care is moving away from a reactive model where patients are admitted to hospitals or visit their physicians with an illness that requires diagnosis then treatment through surgery or drug therapy.

"Medicine needs demonstration projects to show how genomics and personalized health will work and to help allay fears about what lies ahead."

Pierre Meulien
CEO and President,
Genome Canada

Instead, we are heading towards a medical practice that is more preventive, predictive and tailored to a person's own molecular biology. This is the essence of personalized medicine.

Creating a new language

We are already witnessing some early indicators of how molecular biology as a base for personalized medicine is reshaping health care and recreating our knowledge of medical science.

An entirely new vocabulary has been spawned to produce a language of molecular medicine related to patient care. Specialties such as immunogenetics and pharmacogenetics enable physicians and researchers to peer into the human body and investigate the root cause of disease.

Newly discovered genomic variations associated with cholesterol levels, high blood pressure, diabetes and other risk factors or cardiovascular disease– a leading killer in North America and around the world – are slowly making their way to patients at the bedside.

Same conditions, new outlooks

We are learning, for instance, how inflammation at the cellular level leads to arteries clogged by plaque, which in turn can rupture causing heart attack and stroke.

Heart attack patients are being saved by a bedside genetic test that shows whether they carry a gene that reacts to a popular clot-busting drug during treatment.

Medical science continues to investigate human genomics to uncover the mysteries of childhood neurological disorders, such as autism.

Genomics tools are used to identify drug toxicity and adverse drug reactions. Cancer patients are being classified and treated according to the molecular nature of their tumors.

These are but a few examples of personalized medicine.

Looking to the future

We know how environment, behaviour and lifestyle can influence the progression of disease. Now we are proceeding swiftly along a new path of personalized medicine using the tools, technology and knowledge of genomics to learn how to identify and provide treatment.

PIERRE MEULIEN
editorial@mediaplanet.com

FACTS

More than $130 million in funds have been set aside for Canadian researchers to demonstrate the effectiveness of personalized medicine.

The research must deliver tangible results showing the medical value or practical applications, and lead to economic or social benefits for Canada. These results could include:

- new technologies
- changes in clinical practice
- new uses of existing drugs, or
- reduction in adverse drug reactions

At least 13 large-scale projects are expected to be funded, with work commencing in 2013.

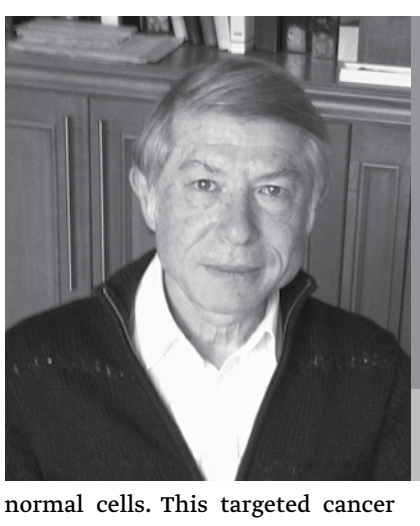
Personalized health is especially promising for infectious and autoimmune diseases, cancer, cardiovascular and neuro-degenerative diseases, psychiatric disorders, diabetes and obesity, arthritis, pain, inflammation, Alzheimer's and rare diseases.

"This competition is significant because we will understand which technologies can be integrated into the health system in an economically viable manner," says Meulien.

Typical of Genome Canada-funded projects, researchers must also incorporate ethical, environmental, economic, legal and social aspects of their work.

Treatment without side effects

With the help of advanced science, organizations now have the ability to create treatment therapies that target cancer cells specifically.



"Once our drug is on the market, we don't anticipate any problems, only progress."

Igor Sherman
CEO,
Alpha Cancer Technologies Inc

Chemotherapy — as described by the Canadian Cancer Society — is the use of prescription drugs to destroy cancer cells. While some chemotherapy drugs are given as the sole treatment for cancer, more often than not, several chemotherapy drugs are given together to ensure effectiveness. With that in mind, any cancer treatment can have adverse effects - but it's hard to know if or when they might happen to you. Some of the more common side effects include fatigue, gastrointestinal distress, weight and hair loss.

But what if we had the means to treat cancer while reducing or completely preventing the adverse effects that many often deal with?

A new view on cancer therapy

Alpha Cancer Technologies Inc. (ACT) has created an innovative approach to the advancement of healthcare. Increasing the quality of life is not only a priority, but the result of a new chemotherapy delivery system.

Alpha-Fetoprotein (AFP) is a unique delivery platform which allows chemotherapy drugs to kill cancer cells exclusively without damaging normal cells. This targeted cancer therapy is a human protein that is produced by the embryo as it grows which means that every human being is exposed to AFP and is a carrier.

Upon birth the protein is no longer found, however, it will show up again when there is cancer in the body. When chemotherapy is attached to AFP, there are many benefits which take place such as: reduced toxicity, significant survival benefits, greater opportunity to treat more frequently and targeted killing of cancer cells even in chemotherapy resistant tumors.

Looking ahead

"Results show that AFP is extremely safe. Simply put, this is a game changer in the treatment of cancer," says Richard Potts, Chairman of Alpha Cancer Technologies Inc. Sixty to ninety-five percent of all cancers can potentially be treated by using this approach. One of the major problems with most chemotherapy drugs is nerve damage, loss of sensitivity and chronic pain.

But ACT has started a series of experiments to show that the AFP delivery technology does not have these side effects. "Once our drug is on the market, we don't anticipate any problems, only progress," Dr. Igor Sherman, CEO of Alpha Cancer Technologies Inc. (ACT) says.

PAULEANNA REID
editorial@mediaplanet.com

DON'T MISS!

Roberto Lara
SoCRA Certified Clinical Research Professional
Director of Business Development
Scimega Research Inc

What is a CRO?

A Contract Research Organization, also known as a Clinical Research Organization (CRO), is a service organization that provides support and/or services to pharmaceutical, biotech and medical device industries as well as foundations, research institutions, and universities. There are over 1,100 CROs in the world. What separates Scimega Research Inc from the rest is our dedication to exclusively providing expert oncology clinical research services in Canada for 15 years.

What is a clinical trial?

When the term clinical trial is mentioned many automatically assume one refers to paid healthy volunteer studies. The truth is that clinical trials are much more. They play a crucial role in understanding how our body reacts to the drugs that devoted researchers develop to treat everything from seasonal allergies to the flu and even the most challenging of diseases like heart disease and cancer. There are several reasons why patients volunteer for clinical trials but for most, it is the possibility to help themselves and to help others who may benefit from developing a new medication or treatment.

How has Scimega contributed to the advancements made in oncology thanks to clinical trials?

Scimega's two-pronged approach includes attracting cutting edge oncology clinical research and facilitating sponsor access to pertinent data, thereby accelerating our clients "go/no-go" decision making ability. Since 1997, we have invested much effort and marketing dollars promoting Canada's oncology clinical research potential. In 2008, we introduced the Reverse Feasibility Program – bringing biotech sponsors and Canadian investigators together to facilitate recruitment and accelerate study start-up times while meeting the needs of Canada's cancer patients.

What are common misconceptions regarding clinical trials?

The most frequently mentioned concern as to why people do not participate in clinical trials is the fear of receiving placebo instead of the active drug. However, for a life-threatening condition such as cancer all participants will receive the standard of care treatment at the very least, for practical and ethical reasons.

How has science and personalized medicine benefited from the use of clinical trials?

Personalized medicine has the potential to optimize targeted delivery and dosing of treatments so patients can receive the most benefit with the least amount of risk, cutting out the difficulties of the current trial-and-error process many patients endure to find the correct drug and dose to treat a condition.

ROBERTO LARA
editorial@mediaplanet.com