REPORT on MENTAL HEALTH in the ERA OF ARTIFICIAL INTELLIGENCE

(full report available at www.mentalhealthinternational.ca)

SERIES OF RECAPS (9)

Revolutionary Framework for the Prevention of Mental Illness

Bill Wilkerson, *LL.D. (Hon) was a former corporate chief and senior executive and a specialist in crisis management. His background ranges across business, government, politics, the arts, broadcasting, and major league sports.*

Bill is MHI Executive Chairman and McMaster University Industry Professor of International Mental Health and in the mental health field, Wilkerson:

- *Co-Founded and led the Canadian-based Global Business and Economic Roundtable on Addiction and Mental Health (1998-2011).*
- *Chaired a business-led Pan-European campaign targeting depression in the workplace (2013-17).*
- *Founded and chaired a five-city (Washington, Ottawa, Boston, Toronto, Denver) US/Canada Forum on Mental Health and Productivity (2007-13).)*

PORT HOPE, ONTARIO, CANADA (June, 2019)- There is evidence that the fields of genetics, epigenetics, social science and artificial intelligence provide a plausible framework within which to build the case for the prevention of mental disorders earlier and later in life.

This, based on the now well-established premise of genes + environment as key dynamic in the development and onset of mental illness. Among the influences of environment that influence the development and onset of mental disorders is Deep Stress.

Genetics is the study of specific genes or parts of genes whose function are known. Genomics looks at the genome as a whole. Epigenetics focuses on the interaction between our genes and the environments we are exposed to during birth and through life.

From this interaction, disease occurs, and may be predicted and mitigated and in 2013, Dr. Daniel Weinberger, Director of the Lieber Institute at Hopkins in Baltimore, told our 5th US/Canada Forum on Mental Health and Productivity in Toronto:

Centennial House, 87 Augusta Street
Port Hope, ON L1A 1H1
MENTALHEALTHINTERNATIONAL.CA

Bill Wilkerson, CO-FOUNDER, EXECUTIVE CHAIRMAN AND PRESIDENT
bill.wilkerson@mentalhealthinternational.ca
T. 905.885.1751 | ?. 905.376.9692

"*Genetic discoveries represent the first absolutely objective clues as to what mental illnesses are at a very basic cellular level by which we might be able to predict and ultimately prevent individual risk status."*

Dr. Steven Hyman leader of the Broad Institute, a joint venture of MIT and Harvard, says that investments in genetics are important and timely. "Well-designed human genetic studies, carefully interpreted, are proving a direct route to elucidate psychiatric disease mechanisms. "This, he says is "a critical step toward the significant goals of advancing biomarker discovery and new, effective therapies".

Meanwhile, genomics includes studies of DNA-sequence data which can identify variations that affect health, disease and drug response. Synthetic biology is a branch of genomics which, like AI, has been branded as both promising and perilous.

At the heart of synthetic biology is the quest to solve problems. Ontario Genomics touts it as a way to fight viruses, overcome food shortages, combat climate change.

Just as in AI, advocates and practitioners in this field are using nomenclature which reveals an ambiguity about what their end product will actually entail.

We have come across plans to design and engineer "new biological entities to cure diseases, mitigate climate change and substantiate global sustainability." The vision is appealing. The results, if achieved, could be beneficial beyond one's imagination.

That said, where do human beings enter the picture? Beneficiaries only?

Here, the spectre of Unintended Consequence rears its head. Synthetic biology is already being used to replace petrochemicals in some products, and plants are being developed to replace meat in hamburgers, all good things.

However, synthetic biology could also be used to develop pathogens that can threaten human beings. An editorial in the April 6th, 2019, edition of the Economist Magazine foresees "synthetic biology (having) a cascading effect (on society), transforming human relationships and potentially, the biological nature (of people.)"

Epigenetics: Path to Solving Mental Disorders?

Epigenetics offers a deeper well of potential for the outright prevention of mental disorders, providing the means to prevent disease and mitigate its effect, unlock the relationship between the human genome, environment, prenatal exposure and disease risk across the lifespan. Childhood is the ideal time for prevention, possibly preceding symptoms by years.

Research funded by the National Institute for Mental Health says "the ultimate goal of epigenetic studies of mental illness is to understand how genetic vulnerabilities interact with an individual's life experiences … to establish changes … that control the levels of gene expression. Epigenetic studies are providing new insights into inheritable and non-inheritable components of mental illness."

A news release by McGill University – a world leader in epigenetics – says "epigenetics is the study of changes in the way information stored in the DNA is expressed. Some epigenetic changes are part of normal development and aging but environmental health scientists are most concerned with studying how environmental factors can cause negative epigenetic changes (disease)."

According to experts consulted for this report, epigenetics can at last unlock the relationships among the patient's genome, environment, prenatal exposure, and disease risk in time to prevent diseases or mitigate their effects before they take their toll on health.

Epigenetics stands at the intersection of the genome, human development and environmental exposure which can have a profound effect on susceptibility to disease. Epigenetics is said to open what some leaders in the field call a new era in the "prevention and mitigation of disease" – including mental illness.

Dr. Gustavo Turecki, Scientific Director, Douglas Hospital Research Centre and Chairman of the Department of Psychiatry, is an expert in epigenetics. We now know there is an epigenetic basis of mental illness, ho the genome is regulated to adapt organisms to the environment. "Everything is mediated by epigenetics (which) is essential to understanding how stress and mental illness happen."

Dr. Turecki said, adding that AI will be an important tool to analyze "millions, even trillions of data points" as the cellular components of mental illness are probed to learn – ultimately – how mental illness happens and how it can be prevented.

Stress: Cause of Psychiatric Disease

In the light cast by advances of epigenetics, we now have a scientific premise to affirm what was generally acknowledged a long time ago, that the environment which humans inhabit – interacting with our genes – causes mental illness.

With this firm knowledge in hand, it seems logical to conclude we also have the rationale for attacking the cruel family of conditions called mental illness through accelerated investments in epigenetic research.

Research by the Working Group of the Psychiatric Consortium studied 37,000 people living with schizophrenia and found 128 variants associated with the disease in 108 locations in the human genome while another NIMH-funded study discovered a possible "neural signature - a pattern in the way a brain circuit works - that may help predict the onset of psychosis."

This points to the prospect of identifying people who may benefit from early intervention but also "the findings may also hold clues to the underlying brain mechanisms involved in schizophrenia." Versions of a gene linked to schizophrenia may trigger runaway pruning of the teenage brain's still maturing communications infrastructure.

A team of scientists at the Broad Institute and Harvard Medical School analyzed the genomes of 65,000 people plus postmortem brains "to discover the secrets of schizophrenia's strongest known genetic risk, a gene called C4."

Described as the "tallest tower of schizophrenia's genomic skyline," scientists found that C4's role represents the most compelling evidence to date linking specific gene versions to a biological process that could cause the illness."

Their report says, "the human genome is providing a powerful new way of prying open (this disease), peering inside and starting to see actual biological mechanisms of schizophrenia." Dr. Bruce Cuthbert, former Acting Director of the NIMH, now Head of its influential Research Domain Criteria (RDoC), in a public news release by the Broad Institute, declared these findings "a crucial turning point in the fight against mental illness. "

"And thanks to this genetic breakthrough," he says, "we can finally see the potential for clinical tests, early detection, new treatments and even prevention."

Dramatic stuff.

Refer: bill.wilkerson@mentalhealthinternational.ca