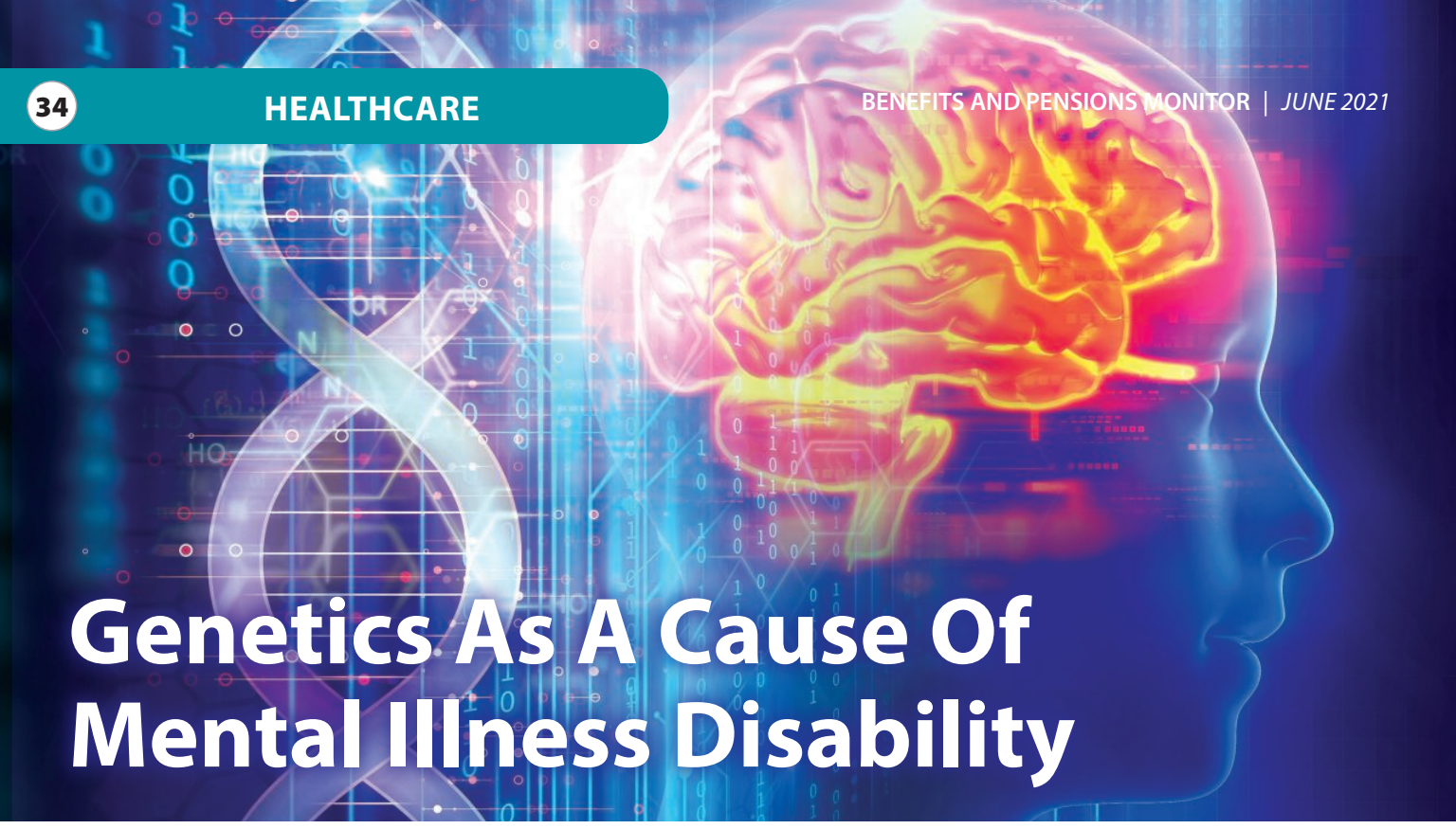

Genetics As A Cause Of Mental Illness Disability

BY: **LIZ SCOTT**

Mental illness and the resultant disability can have dramatic human and financial cost. Scientists hypothesize that genetics plays a role in mental illness conditions. They cannot pinpoint one gene that causes mental illness, but contemplate interactions. The consensus is that mental illness is triggered by a significant stressful situation resulting in complex interactions among multiple genes in multiple brain and body pathways.

We at Organizational Solutions are not scientists, we are disability case managers with a strong focus on understanding mental illness and recovery. We have concluded that based on the data collected over thousands of claims that genetics can play a significant role in mental illness. In examining disability cases, we can see that mental illness is significantly affected by an individual's genetic makeup.

For the first time in 2016, we encountered pharmacogenomics as an emerging solution when individuals were struggling with mental health conditions. We took an interest in the science in the hope that it may be able to help people with mental illness. The science promised that a genetic saliva test could help determine the best medication for a person with the least side effects.

We spoke to several providers and we selected Personalized Prescribing Inc. (PPI). Our decision was driven by science, and its use of pharmacists to interact with patients to do a health history interview, ensure an understanding of the science, and explain how it could assist.

We commenced utilizing its services for mental illness cases. Our recovery facilitators would decide if a case may qualify, obtain an agreement from the employer to spend the money, and then refer the patient.

In the beginning, we had issues getting individuals to understand that a pharmacogenomics test may assist in ensuring the best medication match. A suggestion was made that we request that the patients speak to the pharmacists to educate them on the test and science. This approach made a big difference.

Pleasantly Surprising

The results were pleasantly surprising; almost every patient was satisfied with the service. In many cases, the medication change worked wonders, with many patients reporting that they felt much better, and most have returned to work. The physicians overall accepted the pharmacist's recommendations and appreciated the contribution it made to their patient's outcomes.

OSI was intrigued with the outcomes and requested some data to determine the success of the program. We learned almost every patient we referred had many genetic variants that impacted the efficacy and side effects of mental illness medication. The information was quantified through a genetic mutation score (GMS) and morbidity score.

The GMS is an absolute number, but the morbidity score is not. The GMS is an indication of the variations in the genes that play a role in drug response. In mental illness, there are two main metabolism genes, the CYP2C19, and the CYP2D6. There is also a cascade of drug neurotransmitter genes, each playing a small role in impacting a drug's effectiveness and side effects. The morbidity score is a self-reported score by the patient per the pharmacist that dealt with that patient.

A score of five is attributed for each of the metabolic genes, with zero for normal metabolizers, two for intermediate, and five for poor or ultra-rapid metabolizers. They attributed a score of zero for drug neurotransmitter genes that are all normal and five for many mutated drug neurotransmitter genes (See *Exhibit 1*).

A patient with a GMS of five points or more is more likely to encounter challenges in being prescribed the correct medication. The higher the score, the bigger the challenge.

The morbidity score is a measure of the severity of the patient's case. They scored zero for no side effects and five for multiple and/ or severe side effects, and self-reporting by the patient on how they feel from zero to five. Individual mutation

scores against their morbidity scores for two years, 2018 and again for 2019, were plotted. *Exhibit 2* shows the results of the data collected:

Exhibit 3 plots the change of morbidity scores against the genetic mutation scores.

Significant Observation

One significant observation jumped out of the graphs above: 100 per cent of the patients we referred had genetic mutation scores of five or more!

The graphs have clarified two things for our organization:

- It became clear why so many people report challenges with their mental illness medication, while others report that their medication worked almost immediately.
- We conclude that a high genetic mutation score is most likely the cause that drove our referred individuals to disability. Had their medication worked early, they would not have descended into disability.

The science of pharmacogenetics has proven to be an important part in managing mental health disability cases to resolution. There are endless case studies that demonstrate the profound impact the correct medication can make on someone's health outcomes. One of the initial cases where PPI was enlisted to assist was a severe and prolonged depression. The individual had been struggling for over two years and had lost the ability to function even with the activities of daily living. In discussing the case with the treating physician and the individual, a decision was made to try pharmacogenetics. The testing confirmed the individual was on the wrong medication. The physician used this information to match a more suitable medication. Following this change, the individual was able to fully recover and resume everyday activities including work within six weeks.

We have found that at least 80 per cent of those referred are on the wrong medication or the wrong dosage. The caveat with this data is we only refer those that we feel may be struggling with the medication. Another caution is medication cannot be a used as a replacement for appropriate therapy. The best success in mental health recovery is a combination of the correct diagnosis, the right medication, and the right treatment. Pharmacogenetics has helped improve the outcomes and reduce the human cost of mental health disabilities. **BPM**

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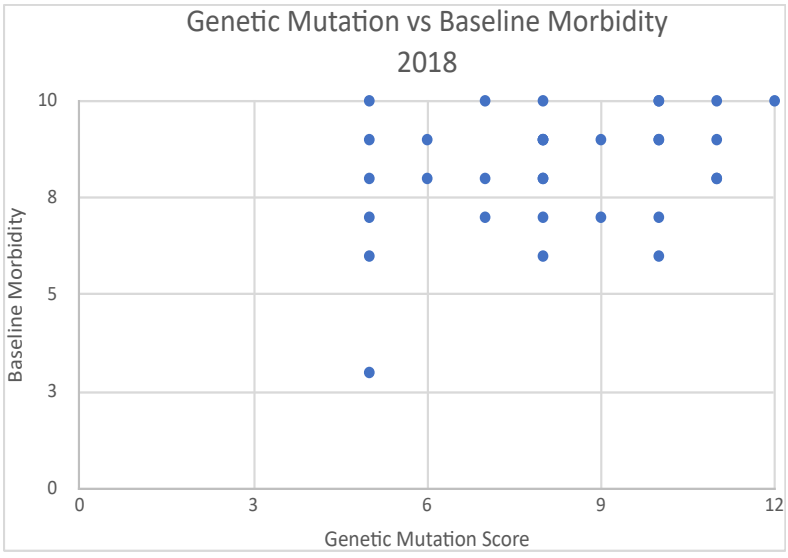
Exhibit 1

Genetic Mutation	Maximum Score
Metabolic gene mutations	5 each (10 for 2 mutated genes)
Neurotransmitter genes	1 for each, for a maximum of 5
Maximum Total	15

Exhibit 2



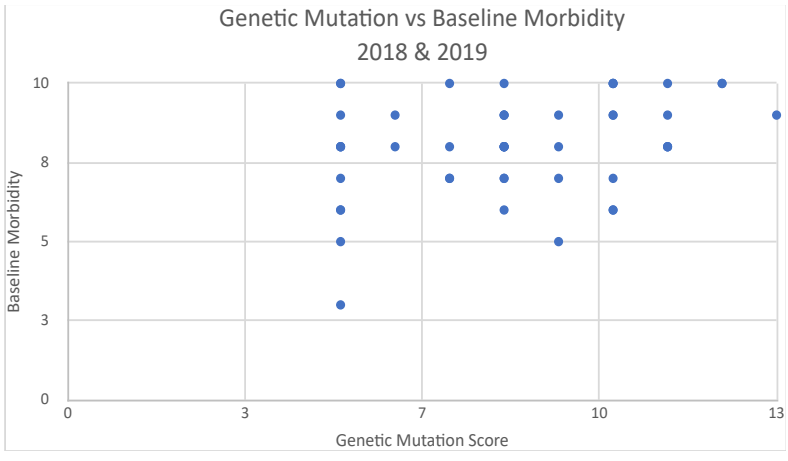


Exhibit 3