



MITOLINKS
The Adult Metabolic Diseases Clinic
Mitochondrial Disease
Support Group Newsletter

PSYCHIATRIC SYMPTOMS AND MITOCHONDRIAL DISORDERS

Background

Mitochondria are tiny, cucumber-shaped cells within the body that are responsible for turning the food we eat and air we breathe into ATP (Adenosine triphosphate), a form of energy that is used by the body. All functions in the body are dependant on this energy.

Mitochondrial disorders are a group of genetic diseases that are caused by defects in the way that mitochondria make energy for the body. Mitochondrial disorders can lead to chronic deterioration and affect multiple organs of the body.

Inheritance of a gene mutation (change) in the mitochondrial DNA is inherited from the mother. While inheritance of gene mutations in nuclear DNA that affect mitochondrial function may be inherited from either the mother or father.

Mitochondrial disorders may present at any age and to varying degrees of severity. Mitochondrial disorders progress slowly over time, but stressors like illness, aging, and trauma may worsen symptoms and hasten progression.

Symptoms of mitochondrial disorders may include: fatigue, muscle weakness, hearing loss, droopy eyes, vision changes, migraine headaches, seizures, stroke-like episodes, movement disorders, diabetes, gastro intestinal problems, and cardiac symptoms.

Mitochondria and the Brain

Brain development and function is dependent on the energy supplied by the mitochondria. Mitochondrial dysfunction has been linked to other brain diseases (Alzheimer's, Parkinson's, Huntington's), and, more recently, psychiatric disorders. Clinicians have noted the prevalence of psychiatric

symptoms in some patients with mitochondrial disease. Research is currently being done to explore how the two may be linked. Patients who first exhibit a psychiatric symptom (such as bipolar disorder, major depressive disorder or schizophrenia) may be found to have a mitochondrial disorder.

Getting it right

It is not unusual for a patient to wait years before a diagnosis of a mitochondrial disorder is made. However, studies show that psychiatric symptoms may be present years before a diagnosis of a mitochondrial disorder, highlighting the importance of considering this as a diagnosis from the onset of symptoms. Getting the right diagnosis can be a long and frustrating process for patients, family and care providers.

Psychiatrists may not consider mitochondrial disease when first assessing a patient with a psychiatric symptom. Some clues may help guide family and medical practitioners toward a diagnosis of a mitochondrial disease.

- An unusual presentation of a psychiatric symptom
- Personal or family history of multiple medical symptoms, including:
 - muscle weakness, hearing loss, fatigue, migraines, diabetes, stroke-like episodes, history of seizures, droopy eyes, poor vision, gastro intestinal symptoms and difficulty swallowing
- Deterioration of symptoms while on medications to treat psychiatric symptoms
- Presence of white matter changes or atrophy on brain imaging

How to get the right diagnosis?

- Provide a detailed family history with emphasis on family members already diagnosed with a mitochondrial disorder or who have symptoms that strongly suggest a mitochondrial disorder.
- Insist on laboratory and imaging testing that may help determine a diagnosis of a mitochondrial disorder.
- Ask for a referral to a neurometabolic specialist for an assessment and medical opinion.

Will a diagnosis make a difference?

Making the right diagnosis has important treatment implications for mitochondrial patients with psychiatric symptoms. Some types of psychiatric medications can impair mitochondrial functioning and worsen symptoms. Choosing the right medication is essential. In addition, some patients may benefit from the recommended mitochondrial 'vitamin cocktail'. In a study conducted by Dr. M. Tarnopolsky and colleagues, 58% of their patients studied, remained stable, from

a psychiatric point of view, on minimal or no psychiatric medications and mitochondrial supplements (Anglin et al, 2012).

What is the cause of psychiatric symptoms in patients with mitochondrial disorders?

There is still a lot of research to be done in this area. The mitochondria play an important role in the body's functioning, not only in producing energy. They are involved in metabolic function, in reducing free radicals (which damage cell walls and DNA) and regulation of apoptosis (programmed cell death). It is possible that alterations in any aspect of mitochondrial function can lead to psychiatric symptoms.

In addition, illnesses associated with mitochondrial disorders such as, stroke-like episodes and lactic acidosis (build-up of lactic acid) can result in psychiatric symptoms.

Further study of mitochondrial dysfunction in patients with psychiatric symptoms is ongoing. Researchers are looking at identified mitochondrial DNA mutations (changes) that are related to specific types of psychiatric disorders like major depressive disorder, bipolar disorder and schizophrenia. In addition, DNA mutations that are associated with some psychiatric disorders target mitochondria; the exact impact is unknown and further study is ongoing.

What steps to take?

Living with a diagnosis of a mitochondrial disorder is challenging. Experiencing psychiatric symptoms can be frightening and isolating. For many patients the stress of a mitochondrial disorder diagnosis can be emotionally overwhelming. Transient experiences of mood change are normal. Illness uncertainty (a sense of loss of control, an unpredictable future and complexity of an illness) affect how an individual adjusts to a diagnosis of a serious illness. Fluctuations in mood and transient feelings of depression are common as one learns to cope with a chronic illness.

Intervention, either with medication or a referral to a psychiatrist, is necessary when psychiatric symptoms overshadow the patient's ability to cope and function in their daily life. There are two classes of symptoms – symptoms you are aware of, such as, feelings of overwhelming and persistent sadness (depression) or symptoms you are not aware of but others observe, such as, hallucinations or paranoia (psychosis).

What steps should you take?

- Communicate with your family and medical team about your concerns and symptoms

- Ensure testing is undertaken to rule out illnesses that are contributing to the symptoms, such as, stroke-like episodes
- Ask for a referral to a psychiatrist to help with medication recommendations
- See a psychologist for support and learn ways to cope with a chronic illness for you and your family
- Participate in mindfulness, meditation, stress management, or cognitive behavioural therapy sessions to help with everyday management of your illness
- Limit contributing factors including: fatigue, sleep deprivation, reactions to medications, over-use of narcotic pain medications
- Limit alcohol intake, which is toxic to the mitochondria and acts as a depressive

References and further reading:

MitoAction.org podcast '*Psychiatric Disorders in Mitochondrial Disease*':
<http://www.mitoaction.org/psychiatric-disorders-mitochondrial-diseases-mitochondrial-dysregulation-psychiatric-disorders>

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