Treating migraines involves the use of medications, supplements, and a great deal more, which quickly emerges in a conversation with neurologist Dr. Charles Matthews. He has led more than 30,000 patient visits since establishing the North Carolina Comprehensive Headache Clinic in the mid-1990s.

Health & Healing: Is migraine basically a brain function problem?

DR. MATTHEWS: No. Although the brain is involved, we now know that multiple organ systems are also involved, both during the headache phase and between headache attacks.

For example, during a migraine, there are changes in the tendency of the blood to clot. The cardiac system is involved, as well. Some patients with migraine have a condition where the heart vessels go into spasm similar to those in the brain; they can be said to have “migraine of the heart.” The autonomic system is involved; blood pressure fluctuates during a headache—often higher but sometimes lower—such that patients with headache may also feel faint or weak when they stand.

The endocrine system is involved as well. We have a female ratio of about seven to one in the Headache Clinic, and about half the males we see don’t have migraine, so migraine is really a disease of women in almost all cases. Interestingly, the condition tends to occur after a young woman begins to have periods, often worsens during her menopause, and may go away altogether during the last two trimesters of pregnancy, and after menopause. So migraine certainly involves the reproductive hormones.

Other endocrine problems are common as well, such as problems with glucose regulation (insulin), with hunger cravings, hypoglycemia, weight gain, and associated problems with stress hormones like cortisol. And migraine affects the gut; some patients have only “abdominal migraine,” where they have the vomiting of migraine without the headache. And patients with migraine are very likely to have irritable bowel syndrome (IBS).

Basically, migraine affects the whole body.

H&H: Treating migraine seems to demand a holistic approach.

DR. MATTHEWS: That’s exactly right. When you have all these parts malfunctioning at the same time, what could possibly coordinate all these activities?

Basic neurology research offers a clue. Physiology measurements of the brain during migraine attacks demonstrate that there is a slowly spreading wave of cortical depression, called the “spreading cortical depression of Leao.” What happens is that a part of the brain “browns out” during a migraine attack and stops metabolizing glucose; and this brown-out spreads slowly across the cortex. A picture of this “brown-out,” taken on a PET scanner, is shown below.

As the brown-out spreads, surrounding areas become involved. In some cases, patients can track this spread across their brain by observing the march of symptoms through their body parts. numbness on one side of the face may slowly spread to the arm on that side, for example.

This is one of the most interesting phenomena in medicine, because it is a precise picture of something we don’t understand well: it’s a picture of wholeness in the brain.

The picture’s easy to take, but harder to explain. I infer that this brown-out occurs throughout all systems of the body, but the Leao phenomenon is known best because that’s what we can take a picture of.

The brown-out ties together all the features of migraine. Le Chatelier’s principle states that, in any complex system at equilibrium, the entire system reacts to maintain equilibrium. Nervous stability strives. Thus, when the brown-out occurs in the brain, all the surrounding areas of the brain and the nerves coming from the brain become overactive in response. This leads to sensitization of the trigeminal nerve to the face, causing pounding in the temples, to sensitive optic nerves, which make you intolerant of light; and to sensitive auditory nerves, which make you sensitive to noise.

The astonishing thing about the brown-out is that it can’t be explained as a problem in any particular place. Do certain genes explain a tendency to brown-outs? Many research scientists think so. We know that migraine runs in families, and we even have candidates for precise gene location in certain subtypes. Genetic researchers hope that when we find all these genes, we will have the final answer to the question, “What’s really going on in migraine?”

The genetic work is important, and there is no question that migraine has a genetic component. But migraine has many components.

My best answer to this riddle is that the brown-out is a metabolic problem. The metabolism is in disarray, and it will break down in whatever areas are most metabolically active.

What’s really going on in migraine? “The genetic work is important, and there is no question that migraine has a genetic component. But migraine has many components.”

H&H: What causes the metabolic problem that causes the brown-out?

DR. MATTHEWS: Genetics; hormonal disregulation of environmental factors; sleep and exercise; diet; and metabolic deficiencies.

Genetics play a partial role in susceptibility to brown-outs, and also probably to where the brown-outs occur. Environmental influences on hormones are probably also extremely important—in particular, the substances in the environment that “mimic” hormones and affect hormonal balances in the body.

Interactions between sleep, exercise habits, and lack of rest, produce metabolic stress; as does a diet of largely processed foods. Processed foods—which are designed to be metabolically unusable to optimize shelf life—not only metabolize poorly on the grocery shelves, but metabolize poorly after we ingest them. This causes disruption of the substrates of energy metabolism—carbohydrates and fats. Disordered fats in intensively farmed meats, trans fats, and processed carbohydrates and grains, are likely common problems. We have not yet evolutionarily adapted to these dietary changes.

Finally, deficiencies of magnesium and other trace minerals, inadequate stores of vitamin D and possibly other vitamins, and maybe specifically essential fatty acids, adversely affect metabolism, and sometimes correction of deficiencies can be very helpful.

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Dr. Matthews offers comfort and expert advice to this patient.

**Migraines and Your Metabolism**

The North Carolina Comprehensive Headache Clinic is an outpatient neurology facility providing diagnostic evaluation and treatment for the patient with headache.

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New patients are welcome

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