POLYCYSTIC OVARIAN SYNDROME AND METABOLIC SYNDROME: A HIDDEN LINK

Meet Ms. X: she has a problem. She is 28 years old, secure in her career, and financially stable. She and her partner agree that this would be an ideal time to start a family, but her body has other ideas: after two years of trying, she’s still not pregnant. Because of a complex sequence of events, her ovaries don’t release mature ova for the possibility of fertilization on any predictable schedule. In addition, Ms. X struggles with being overweight, constantly fights unwanted body and facial hair, and even in her 20s is still battling acne.

These problems (overweight, hirsutism, acne, ovarian cysts, and infertility) indicate a condition called polycystic ovarian syndrome (PCOS). In this condition, follicles—the site of egg release on the ovaries—don’t develop normally. The ovaries develop multiple cysts where follicles are incomplete, and the connective tissue scaffolding of the organs becomes thick and enlarged. Infertility is a frequent and frustrating complication. But that’s not all: PCOS is linked to several other issues that may put Ms. X at risk for type 2 diabetes, atherosclerosis, heart attack, and stroke. Ms. X, in her attempts to get pregnant, may discover that she is dealing with an unexpected but potentially serious problem: metabolic syndrome.

Metabolic syndrome is a reliable predictor for risks relating to heart disease (the number one killer of women in the United States) and type 2 diabetes, and the incidence of metabolic syndrome among women with PCOS is, according to at least one study, about 11 times higher than for the rest of the population.

In this article we will examine aspects of both PCOS and metabolic syndrome, with special emphasis on how hormonal imbalances tie one to the other. This will allow us to discuss health issues with our women clients who live with one or both of these conditions with much more fully formed ideas about how these challenges affect function and predict possible risks.
WHAT IS PCOS?
Here is an amazing thought: every baby girl is born with ovaries that are already equipped with a lifetime supply of cells that will eventually mature into ova when she reaches puberty. In addition to being the site of egg maturation, normal ovaries also produce several hormones, including testosterone, and a variety of subtypes of estrogen and progesterone. These chemicals work with pituitary secretions (especially follicle-stimulating hormone and luteinizing hormone) to establish a menstrual cycle. If a woman has PCOS, then her testosterone and luteinizing hormone levels are high, but follicle-stimulating hormone levels are low. Consequently, ovulation becomes irregular and infrequent, and menstruation is disrupted.

While not all experts agree on the diagnostic criteria for PCOS, a recent consensus of opinion suggests that at least two out of these three features be present in the post-adolescent female: oligo-ovulation (ovulation is irregular and reduced); hyperandrogenism (excessive levels of free testosterone are found in blood tests); and cysts form on the ovaries.* Other causative factors must be ruled out for a credible diagnosis: these include Cushing syndrome and congenital adrenal hyperplasia, which can affect testosterone secretion.

Signs and symptoms of PCOS are directly linked to hormonal disruption. Further, changes in how hormones manage blood sugar leads to a high incidence of obesity among women with PCOS, although this phenomenon is more frequent in the United States than in other countries.²

PCOS is treated mainly by managing symptoms. Because it leads to irregular periods, women who don't wish to become pregnant are frequently prescribed oral contraceptives to smooth out hormone secretion. This can be problematic, because oral contraceptives can have an adverse effect on other hormonal issues.*

Women who want to get pregnant may be prescribed fertility drugs. Medication to limit the growth of body hair and interventions to control acne may also be recommended. If a woman with PCOS is overweight, she is encouraged to find strategies to control this issue; for some, this is a particularly difficult challenge. If no other options are satisfactory, a woman with PCOS may undergo surgical ovary “drilling”: a laparoscopic procedure that is thought to destroy testosterone-producing cells and thereby reduce symptoms.

WHAT IS METABOLIC SYNDROME?
Metabolic syndrome is a collection of features that, when they occur individually, are not cause for excessive worry, but when they occur in combinations with each other, they statistically boost the risk of developing some potentially life-threatening conditions.

Several diagnostic criteria for metabolic syndrome have been developed, but a widely accepted one proposes that metabolic syndrome can be identified when at least three of these five risk factors are simultaneously present:
- High fasting blood glucose (over 100 mg/dL after nine hours of fasting).
- Abdominal obesity (a waist measurement exceeding 35" for women or 40" for men); this is somewhat flexible to allow for individual variations.
- Elevated triglyceride levels (over 150 mg/dL).
- Low levels of high-density lipoproteins (under 40 mg/dL for men; under 50 mg/dL for women).
- Hypertension (systolic over 130; diastolic over 85).³

Other possible features in metabolic syndrome include a high risk of blood clotting and high levels of C-reactive protein (an indicator of inflammation). When these factors appear in combinations of three or more, they set the stage for an extremely elevated risk of type 2 diabetes, atherosclerosis, heart attack, heart failure, aneurysm, and stroke. Studies show that people with metabolic syndrome have a twofold risk of atherosclerotic cardiovascular disease, and a fivefold risk of type 2 diabetes (which itself raises the risk for cardiovascular disease).⁶
Treatment for metabolic syndrome is often divided into short-term and long-term goals. Short-term goals include lowering blood glucose and correcting cholesterol levels with medical intervention. Long-term goals include increasing physical activity and losing weight. Reducing body weight by 5–7 percent (10–14 pounds for a 200-pound person) significantly reduces the risk of complications due to insulin resistance. Exercise improves insulin action and decreases blood glucose. Limiting alcohol use and quitting smoking are other important steps.

Our role with a client caught in this tangle is to be a source of compassion and peace in a world of frustration.

THE LINK BETWEEN PCOS AND METABOLIC SYNDROME
Curious readers will now be wondering why these two conditions, which don’t seem obviously linked, appear together so frequently. The connection between these two problems is a silent but potentially dangerous risk factor: insulin resistance. Insulin, you will recall, is a hormone produced by the pancreas that transports blood glucose into hungry cells: especially skeletal muscle and fat cells. Insulin requires receptors on target cells to allow it access; a series of reactions inside the cell allow glucose to be burned in a very clean and efficient way that creates the potential for energy. Insulin resistance is identified when circulating levels of insulin are normal or above normal, but targeted cells fail to receive it. The precise causes of insulin resistance are not fully understood. A genetic component seems clear, but this condition may also be promoted or triggered by eating habits that tax the pancreas and by lack of exercise, which allows blood sugar to elevate.

If cells become resistant to insulin, then three bad things happen: insulin accumulates in the bloodstream (hyperinsulinemia); glucose accumulates in the bloodstream (hyperglycemia) and cells have to burn other fuel sources to make energy—a process that generates a lot of metabolic wastes. In the long run, this sequence is a setup for type 2 diabetes and cardiovascular disease (i.e., metabolic syndrome). But for many women, hyperinsulinemia is also a setup for PCOS.

The relationships between hyperinsulinemia and both metabolic syndrome and PCOS are complicated and often circular. A very abbreviated explanation includes the following factors:

- Insulin resistance requires that cells burn non-glucose sources of fuel, namely proteins and fats; this produces a variety of metabolic by-products that are potentially toxic.
- Because a person who is insulin resistant must derive energy from fats and proteins instead of carbohydrates, the potential to gain weight is much greater than for the rest of the population.
- Being overweight increases the risk of losing insulin receptors and promoting insulin resistance.
- Elevated insulin acts on the pituitary to increase the secretion of luteinizing hormone.
- Elevated insulin acts with luteinizing hormone in the ovaries to promote the production of various forms of testosterone. This suppresses the maturation of follicles and interferes with ovulation.
- Elevated insulin also acts on the liver to reduce testosterone-neutralizing enzymes, allowing free testosterone to influence cell functions.
- Excessive testosterone makes sebaceous glands more active, leading to acne.
- Excessive testosterone promotes secondary male sexual characteristics, especially the loss of head hair (alopecia) and the growth of facial and body hair (hirsutism).
- Having a large omentum (“apple shape”) may promote excessive testosterone production through insulin resistance and its effects on the ovaries; having excessive testosterone may in turn promote having a large omentum.
- Elevated insulin acts on the liver to promote the production of triglycerides: these are a form of cholesterol carriers associated with an increased risk of atherosclerosis.

The good news in all this tangle is that insulin resistance and its consequences are treatable. Muscular activity increases insulin sensitivity and burns blood sugar. Weight reduction can reverse several processes seen with insulin resistance, as well as reducing blood pressure—another factor in metabolic syndrome. And a variety of drugs can increase both the number of insulin receptors and their
efficiency; these are often prescribed to help control type 2 diabetes. In fact, this strategy has been shown to be so effective that women with PCOS who want to become pregnant may be counseled to treat their condition with diabetes drugs: an indirect route to improved ovarian function.

WHERE DOES MASSAGE FIT?
Any therapist who works with females in their childbearing years may have clients who are living with PCOS and/or metabolic syndrome. And while it is probably false to claim that massage will “fix” this problem, we can, with sensitivity and good information, at least try to contribute to an environment that has the best possible outcomes for our clients.

If we have a client who has PCOS, it is important to bear in mind that her ovaries may be enlarged and in a location that is vulnerable to bruising or crushing. A healthy, non-pregnant woman’s ovaries are typically located down low in the pelvis (more or less behind where the pubic hair begins to grow). This keeps them out of reach of most types of deep abdominal work. But a woman with PCOS may have ovaries that are located higher and more lateral than we anticipate. If this condition is identified, these clients need to receive bodywork that does not risk impinging or bruising these delicate structures. In other words, deep abdominal work must be conducted extremely conservatively. Some experts suggest addressing abdominal issues indirectly through reflexive techniques, and/or approaching abdominal work for women clients with PCOS by improving the quality of the muscles and fascia of the abdominal wall, working obliquely rather than deeply.

The appropriateness of massage in the context of metabolic syndrome depends entirely on the health and resiliency of the client. If this person successfully controls his or her condition through diet and exercise adjustments, massage is probably safe and appropriate. If this person has developed any of the serious complications associated with these conditions, judgments must be made to accommodate possible weaknesses of the circulatory and urinary systems.

Perhaps the most dependable role for a massage therapist or bodywork practitioner with a client caught in the PCOS/metabolic syndrome tangle is to be a source of compassion and peace in a world of frustration, conflicting and contradictory information, and unanswered questions. We can, through the creation of a welcomed relaxation response, promote and support the self-care that must be at the center of any choices our clients make on their own behalf.

WHAT HAPPENED TO MS. X?
Ms. X. went on birth control pills to try to regulate her cycle; this was a mixed success. Then, on her doctor’s advice, she stopped taking them and began treatment with fertility drugs, to no avail. Her next strategy was to lose weight (she lost 50 pounds through diet and exercise) along with using insulin uptake drugs. She found that this regimen did not regulate her cycle, so she also started acupuncture treatments. With this strategy she had more success: her first child was conceived very shortly thereafter, and her second was born just last summer.

Author’s note: many thanks to all the women who contributed to the profile of Ms. X.

Ruth Werner is a writer and educator who teaches several courses at the Myotherapy College of Utah and is approved by the NCTMB as a provider of continuing education. She wrote A Massage Therapist’s Guide to Pathology (Lippincott Williams & Wilkins, 2009), now in its fourth edition, which is used in massage schools worldwide. Werner is available at www.ruthwerner.com or wernerworkshops@ruthwerner.com.
Copyright of Massage & Bodywork is the property of Associated Bodywork & Massage Professionals and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.