Module 8 Transcript

Pollutants and Toxins

"There's so much pollution in the air now that if it weren't for our lungs there'd be no place to put it all."
-Robert Orben

When you think about pollution, what comes to mind? That swirling island of garbage in the pacific ocean? Seagulls coated in thick black oil in the Gulf of Mexico? A power plant sending plumes of smoke into the sky. But what about the smaller picture--the environmental intruders that come into play when you zoom way, way in? At the cellular level, we see an entire world of poisons and environmental toxins, which create effects every bit as worrisome as their macro-counterparts.

Toxins. It's a buzzword. A hot concept in advertisement, pop culture, and the top-ten article with a sensational headline that your friend from high school posts on social media. But with all the hubbub surrounding them, it's surprisingly difficult to pin down a consensus as to what, exactly, a toxin is... and what it is not.

Dosis sola facit venenum, translated from Latin, "the dose makes the poison." This adage, as simple as it may be, is a central paradox of toxicology. "All things are poison," writes Paracelsus, "and nothing is without poison, the dosage alone makes it so a thing is not a poison." This ancient principle hits on the primary truth that anything can be considered a poison, when presented in large enough doses, even water. For our purposes, however, and in the interest of practicality, we'll have to draw a hard line somewhere. What is toxic for your brain and what isn't?

Dorland's Medical Dictionary defines *toxin* as "a poison, especially a protein or conjugated protein produced by certain animals, higher plants, and pathogenic bacteria," but that definition would limit our discussion to substances created by living things, and completely

ignore synthetic toxins and other man-made causes of inflammation, depression and anxiety.

Regardless of a precise definition, suffice it to say that there are harmful substances in the environment, and in products you use every day, and there are more of these than there have ever been before in human history.

For example: You may have heard of phthalates. These chemicals--found in plastic products of all kinds: toys, makeup, household cleaners, dishware, all kinds of things you probably come into contact with every day--have come under deeper scrutiny in recent years. They're known to be what are called endocrine disruptors. They disrupt the way our hormonal system can work.

But phthalates are far from the only danger. Mercury, cadmium, lead, other heavy metals, pesticides, xenoestrogens.

All in all, women consume, on average, 168 chemicals each and every day, through self-care products alone. Foods can contain untold numbers of artificial chemicals, dyes, flavorings, fillers, pesticides, preservatives. The human brain is being exposed to more harmful substances than it ever has, throughout history. It's impossible not to ask: what is this doing to our brains?

Unfortunately, there is not as much research on the relationships between environmental toxicity, inflammation, depression, and anxiety as we might prefer. There are some studies examining the effects of high-level poisonings from substances such as lead, mercury or other life-threatening toxic cases, but more research is starting to reveal that "lower-level toxic exposures may accumulate over time to cause slower degeneration of brain and nervous system tissue, resulting in more subtle signs of illness and symptoms. Long-term exposure may lead to apoptotic (cell death) events in susceptible brain and nervous system

tissue. For instance, an epidemiologic study compared 281 young adults who had been exposed environmentally to lead as children with 287 reference non exposed control subjects. It was found that exposed individuals had significantly more neuropsychiatric symptoms than the other group after 2 decades of initial exposure. All to say, studies like these show that our brains are vulnerable to environmental toxins and often the symptoms of our exposure takes years to manifest. It's one of the many reasons we want to be on the lookout at all times to minimize the amount of toxic pressure on our modern brains.

And these molecules are mechanistically connected to our old friend inflammation, that's how our bodies respond to toxins leading to the risk factors we know are associated with an increased burden of depression and anxiety and other mental health disorders.

We'll get deeply into diet and the complexities of modern eating a little later on, but suffice it to say, you can find toxic particles in both highly processed, packaged foods as well as the produce section. In mass-produced cookware, utensils, and kitchen tools. And so many places in how our food is produced and brought to our table. These materials can increase inflammation and exacerbate the effects of depression, anxiety, and other symptoms.

So what, then, is one to do? While total "clean living" may seem like a pipe dream, there are steps that we can all take to reduce our exposure to these toxic substances, and thereby experience better mental health.

They can be small steps like just not heating up your food in plastic anymore, or doing a better job reading the ingredient list so you're not bringing these molecules into your home, feeding them to your brain and the brains of your family members. You can look into your personal care products and try to reduce the number of chemicals you're putting on your body. These all might seem like small steps, but I think they're so important because otherwise that word "toxins" can seem like this evildoer, this nebulous power out there hurting our brain health. It's important to be very clear: while there are toxins out there in

our everyday lives, the more aware and empowered we can be, the more we can do to reduce our exposure.

There's no going back to a world without modern toxins. And, to be honest, it's unlikely that such a world would ever really exist. The most we can do is to make small lifestyle changes, increase our own awareness, and use this to decrease the amount of toxins that our brain and our bodies encounter in our everyday lives.