

MTOR: The Master Conductor

"MTOR senses the environment and orchestrates genetic responses and cellular programs by directing proteins and enzymes."

MTOR, it sounds like a term you might hear from a transformer movie. But in reality, it is a protein that turns on or off other proteins and enzymes. My thanks to Dr. Alex Vasquez for introducing this exciting concept and challenging us to apply it in clinical practice. Dr. Vasquez believes mTOR is the best single link between toxic chemicals, hyperglycemia, mitochondrial dysfunction and the clinical outcomes of cancer and inflammatory diseases. That's a huge statement by someone who spends much of his life reading and studying peer reviewed journals on health and disease.

He describes mTOR as a "master conductor". If you think about it, the conductor of a symphony has an inner sense of direction as he begins a performance based on the skill of the musicians, the acoustics of the concert hall, or the musical piece performed. By sensing his environment he shapes and brings harmony to each musical piece performed. Similar to a "master conductor", mTOR



senses the environment and orchestrates genetic responses and cellular programs by directing proteins and enzymes.

For example if we activate mTOR, inflammation, pain, autoimmunity, excessive cell growth and proliferation occur. MTOR activation down regulates apoptosis, the process that the body uses to selectively kill cells that are rapidly growing and ultimately can cause cancer.

MTOR is a very strange acronym. M stands for mechanism or mammalian (depending on which source you read), T for target, O for the word of, and

R for the drug rapamycin. Rapamycin is an antimicrobial substance produced by soil organisms that was found later to bind mTOR and block its action. So it's the "mechanism or mammalian target of rapamycin." It's kind of a weird name to be sure.

Studies have shown if we block mTOR with rapamycin we see anti-inflammation, pain reduction, immunosuppression which is important for autoimmunity, as well as anticancer benefits even some anti-aging effects in mice. As you might expect blocking this protein can be done in many ways other than the drug rapamycin. But here

is the 30,000 foot view on this topic. Having more control over mTOR gives you more clinical effectiveness against cancer, inflammation, autoimmunity, pain, diabetes, obesity, and environmental toxins.

So although mTOR is a weird name, struggling to understand its process and some of the consequences can have great benefit on your patients and even your family's wellbeing. Let's look at some of the precipitating factors that may turn our Dr. Jekyll like conductor into the rogue Mr. Hyde.

What are the cellular factors that cause mTOR to go rogue and activate? Dr. Vasquez has some in-depth charts outlining the enzymes and resultant effects of mTOR but I think this simplified version will help us understand the processes. Let's look at the chart.

In the left column we see four major precipitating factors: toxic chemicals, dysbiosis, inflammation and sustained hyperglycemia.

Under the heading toxic chemicals we see ROS, heavy metals, and environmental chemicals. Under the heading dysbiosis we see microbial byproducts or debris, oxidative stress caused by microbes, LPS and of course leaky gut which creates a hyper vigilant immune system. Inflammation in this diagram refers to hidden infections. Sustained hyperglycemia creates excess growth factors, insulin being one of the main ones. These precipitating factors create mitochondrial dysfunction/hyperpolarization which is a major switch for activating mTOR.

Once mTOR is activated, look on the right side of the diagram for effects. mTOR reduces the management of environmental toxins, creates more inflammation and pain, and increases the factors that set up autoimmunity, promotes excessive cell growth leading to cancer, and

promotes blood sugar dysregulation as well as obesity. All these factors contribute to further inflammation which leads to more mitochondrial polarization which causes an increase in mTOR activation and the cycle escalates.

In effect, mTOR causes more inflammation and less regulation. See the links below for a more thorough discussion by Dr. Vasquez. One of the studies Dr. Vasquez uses in his webinar identifies NAC as a very potent mTOR inhibitor. Several studies focus on autoimmunity highlighting the condition lupus. Doses for mild lupus patients begin at 1800 mg of NAC per day. For more advanced cases of lupus and other autoimmune cases 4800 mg of NAC have been used effectively and safely.

Both Vasquez and the author of the study point out the ethical nature of using nutrients, particularly NAC, as a modulatory agent for mTOR. Therapeutic costs range from about \$300.00 a year with no side effects whereas the drugs used to treat rheumatoid arthritis at this level cost \$22,000.00 a year and have serious side effects.

Remember the R in mTOR stands for rapamycin. Dr. Vasquez says besides NAC, you also block mTOR with other natural therapies that begin with R like Resveratrol, R-Lipoic Acid, restricted calories and ridding the body of toxins. As you can see we have barely introduced the rogue conductor mTOR, much less solved the problem.

You will be hearing more about this topic. But for now by using the diagram and reducing the precipitating factors and following Dr. Vasquez's five-part protocol we can go a long way to avoid turning on our hidden rogue conductor.

Thanks for reading this week's edition. I'll see you next Tuesday.