CR Way Fundamental Biochemistry

Thank you for requesting this live class on the science. It is fundamental to the CR Way diet and lifestyle suggestions.

Living the CR Way activates biochemistry shown again and again in eighty years of dietary restriction research to extend life and prevent age-related disease in many species – from yeast to humans.
You can use them as your guide whether you want to lose, gain, or maintain your weight.

One of those drivers of cell growth is the insulin and IGF-1 pathway. IGF-1 stands for Insulin-like Growth Factor 1. Both insulin and IGF-1 are hormones. Although insulin is best known as a regulator of glucose, it has a primary role in driving growth throughout the whole body. Insulin-like growth factor, IGF-1, drives growth at the cellular level. Insulin and IGF-1 have very similar molecular structures and share the same cellular pathway.

The food and recipe suggestions in *The CR Way to Great Glucose Control* reduce the activity of another major growth regulator, a kinase known as mTOR, which stands for mammalian Target of Rapamycin. A kinase is an enzyme in cells that activates phosphorylation. That means that it supplies an energy molecule that fuels growth activities. mTOR got its name because it is downregulated by the drug Rapamycin, which is used to help transplant patients prevent organ rejection by their bodies.

mTOR and insulin/IGF-I pathways are linked. That makes sense since both of them stimulate growth activities in the body. In fact IGF-I and mTOR have a regulatory relationship: When IGF-I is high mTOR is similarly active. This is one reason why we recommend testing IGF-I as part of the recommended blood tests for the 125-Year Plan.

In mouse studies when mTOR is knocked out genetically, the mice live significantly longer. What's more practical to know is that mTOR is stimulated by amino acids, glucose and/or total calories. So you have some control over it.

In practical terms that means that if you want to avoid the cancer risk and the accelerated aging risk that stimulating mTOR will increase: Limit calories, control glucose well, and do not eat easily absorbed sources of protein like whey, brewer's yeast, or non-fat yogurt: They stimulate mTOR and they can also stimulate insulin and IGF1.

The current understanding is that when growth is slowed, irreplaceable cells – like stem cells – may be depleted more slowly. That extends life.

When you follow the CR Way successfully – controlling total calories, glucose, and protein intake – you activate an extraordinary molecule: AMP Kinase. (In case you care about the specifics, that's Adenosine Monophosphate Kinase.)

Take a look at some of the amazing benefits of AMP Kinase activity:

eNOS stands for endothelial Nitric Oxide Synthase which **increases** on CR Way members and, with that, blood pressure falls: 100/60 is normal for CR Way practitioners.

High-Sensitivity C-Reactive protein (hsCRP) & tumor necrosis factor (TNF) are at the **low** end of the reference range on us, indicating reduced inflammation.

Fat Synthesis decreases and with that fat Burning Increases – That is probably why body fat percentages are as low as 12% for CR Way men and 18 to 24% for CR Way women.

As you might guess, **triglycerides** are low in us, running between 45 and 65.
Cholesterol Synthesis drops, so cholesterol usually reduces for CR Way members. 150 mg/dL is normal for us.

In sync with growth downregulation, AMP Kinase reduces with **mTOR and IGF-1**

Animal studies indicate **mitochondrial biogenesis** is probable in humans, too. One study of our muscle tissue showed that, indeed, is the case.

We can test for activation of AMP Kinase by looking at Insulin-like Growth Factor Binding Protein 1 (IGFBP1), which is increased when AMPK increases.

The CR Way lifestyle activates striking changes in the cell nucleus. AMP Kinase has a regulatory relationship with sirtuin genes, which are histone deacetylases.

One of them, SIRT1, silences many anabolic activities by deacetylating histones. It broadens its silencing effect by deacetylating a methylation suppressor, SUV39H1. This increases methylation of key genes and results in increased DNA stability.

This is a primary reason why we limit methionine intake: It results in increased DNA methylation as well.

Another significant benefit of activating AMP Kinase is downregulation of inflammation. When SIRT1 becomes active, it blocks nuclear factor kappa B, a family of molecules that drives inflammation. You can test this clinically by asking for a blood test of tumor necrosis factor, one of the lab tests for the CR Way success path.

New CR Way research indicates the resounding success of this approach because the formation of senescent cells is slowed. Senescent cells are dead cells that cannot replicate. They get in the way of cellular processes and create significant disease risk.

Studies indicate that senescent cells increase with age. If the buildup of senescent cells is significant, the likelihood of developing cancer increases and heart attack risk soars.
Helping slow the aging process, glucose control reduces the formation of senescent cells.