PREVIEW 1 - Ben Bikman (Denver 2019)

Prof. Ben Bikman: In order to talk about metabolic function we have to zoom in a little bit and of course we come to the so-called powerhouse of the cell and that's the mitochondria. So, the mitochondria are the organelles within the cell that are taking fuel with a little help from oxygen because in a way this kind of is like a combustion event.

It is burning these nutrients, we have to have oxygen. And now in the presence of oxygen, the mitochondria are using the-- they are catabolizing these nutrients, this nutrient energy. In the process as a result of any chemical reaction we always get a little bit of heat.

So, I'm going to denote that, and I'll come back to that idea, but the mitochondria are better than a normal campfire. They aren't just producing heat, they're clever enough to actually get something productive out of it and that productive thing that I want you to keep in mind is the production of a molecule called ATP.

You've likely heard of it but just to create a common definition for the sake of my talk, ATP represents cellular or chemical currency. We often say that, we professors teaching our undergraduate students and because I've missed classes all week, you're my undergraduates for today. That's not an insult, I hope.

But nevertheless the ATP, is what the cell actually uses to get work done. It will use ATP for example to relax the muscle when the muscle is contracting and relaxing, that's a phenomenon known as cross bridge cycling at the microscopic level and we need ATP to do that.

Neurons in the brain and nervous system will use ATP to maintain the appropriate shifting or flux of electrolytes for the sake of conducting an impulse across the length of a neuron in many, many more things.

Suffice it to say the cell will use ATP to get something done, which I'm just going to define right here as work. So, the production of ATP represents a cell being productive.