0:00:00.000,0:00:07.490

Greetings fellow heterotrophs. No I

haven't insulted you. I have just said what

0:00:07.490,0:00:13.650

you are. in every animal is a heterotrophs it just means that the organisms

0:00:13.650,0:00:20.689

eat other things each other organisms

they don't make their own food. So

0:00:20.689,0:00:29.240

obviously you eat provide the components

that make up you. And you also eat to

0:00:29.240,0:00:39.780

provide the energy you need to maintain

and build and grow and repair. What you

0:00:39.780,0:00:47.489

do is you take in energy rich molecules

mostly made in plants and you burn them

0:00:47.489,0:00:55.850

in a very slow enzymatic way. Take in

hydrocarbons like carbohydrated and you

0:00:55.850,0:01:01.430

burn them to carbon dioxide and water. So

you'll often see this analogize with

0:01:01.430,0:01:07.100

putting gas into a car and it’s really a

good analogy and deeper than you might

0:01:07.100,0:01:18.229

guess because hydrocarbons (gasoline) is a

fossil fuel it made of plant material

0:01:18.229,0:01:25.460

from the ancient worlds and its compacted and

compressed and and made into fossil

0:01:25.460,0:01:32.950

fuels but it is sunlight energy from

ancient times that's captured in that

0:01:32.950,0:01:42.829

fuel. Now in a car you burn that fossil

fuel energy explosively in one step and

0:01:42.829,0:01:47.780

you get the energy released, part of it

capture to make the car go and part of it

0:01:47.780,0:01:54.180

heats up the engine. Well, the same thing

happens in you, you take in hydrocarbons

0:01:54.180,0:02:01.189

you enzymatically burn them and you end

up with carbon dioxide and water. When

0:02:01.189,0:02:08.729

you look at how this process goes the

key organelle the mitochondria and

0:02:08.729,0:02:12.480

oxygen is crucial for this function

0:02:12.480,0:02:22.150

to proceed. And what happens in the

process is that you create a proton

0:02:22.150,0:02:27.250

gradient and sounds kind of complicated

but really what it's like

0:02:27.250,0:02:32.650

is putting water behind the dam. If you

build enough water because you put

0:02:32.650,0:02:37.750

enough water behind the dam you have

potential energy there and you make that

0:02:37.750,0:02:45.150

gradient. Out of protons and

there's a special spigot through which

0:02:45.150,0:02:51.790

these protons and only place that these

protons can flow back through and that

0:02:51.790,0:02:58.060

actually acts like a turbine and that

mechanical energy is captured in ATP and

0:02:58.060,0:03:04.329

thats what is the energy currency of the

cell that's what you can spend to think

0:03:04.329,0:03:14.650

and move and pump molecules and move

muscles. To understand how this works you

0:03:14.650,0:03:21.180

can also understand how it fails or a

different version of it more aptly. When

0:03:21.180,0:03:27.750

you are baby you had more brown fat and

brown fat is specialized fat that just

0:03:27.750,0:03:34.900

makes heat without producing ATP. So in

these cells which would be lovely to

0:03:34.900,0:03:36.319

have right now

0:03:36.319,0:03:44.329

calories are burned in exactly the same

way but the gradient doesn't form and

0:03:44.329,0:03:49.480

therefore you can't capture any ATP

energy so all the energy from the food

0:03:49.480,0:03:57.739

burned in brown fat cells goes into

making heat. So there's a little primer

0:03:57.739,0:04:06.819

about how you and every other animal

turns food energy into spendable

0:04:06.819,0:04:11.810

energy and that's what maintains cell

order and keeps you alive