0:00:00.000,0:00:05.960

When I read about medicine is often

broken down into eastern and western

0:00:05.960,0:00:13.200

medicines and eastern medicines are are

sort of categorized being holistic in

0:00:13.200,0:00:21.609

nature and Western medicine as reductional

and I want to talk about science and

0:00:21.609,0:00:31.550

reductionism. It's an interesting

distinction to make why is it that

0:00:31.550,0:00:38.590

western medicine once to sort of get

down to the granular level why can't we

0:00:38.590,0:00:47.800

take in and encompass science and

medicine more holistically. Well the

0:00:47.800,0:00:52.930

processes that happened inside

your cells and inside our bodies are

0:00:52.930,0:00:59.690

extremely complex and part of the reason

they're so complex is that when they're

0:00:59.690,0:01:08.210

working right they're invisible. They're

kind of seamlessly flowing and the

0:01:08.210,0:01:16.810

job of science has been and still is in

these domains is to tease these smoothly

0:01:16.810,0:01:22.340

working processes apart into their

individual parts. Let's take an example.

0:01:22.340,0:01:31.200

In energy production inside the cells

inside the mitochondria electrons flow

0:01:31.200,0:01:38.130

to oxygen, a gradient is created and from

that gradient energy is made in the form

0:01:38.130,0:01:46.159

of ATP. You've all seen movies where

cyanide is used as a poison and here's

0:01:46.159,0:01:53.390

an example so what does cyanide do? Well

if humans ingest this it can get into

0:01:53.390,0:01:57.960

the mitochondria it gets into the place

where the electrons are flowing to

0:01:57.960,0:02:04.770

oxygen and acts as a block there, it

stops that step and by stopping that

0:02:04.770,0:02:12.370

step it backs the systems up. And you

can't form a gradient you can't make ATP.

0:02:12.370,0:02:16.849

And your muscles run out of energy and

you can't breathe. So that would be the

0:02:16.849,0:02:22.640

mechanism so by blocking a smoothly

working process you understand something

0:02:22.640,0:02:31.709

about where it occurs and how it occurs.

Now in genetics we had great success by

0:02:31.709,0:02:38.150

creating mutations or analyzing

mutations in complicated biochemical

0:02:38.150,0:02:47.799

pathways that illuminate the individual

steps in the process. You've all seen

0:02:47.799,0:02:55.819

albino Ravens are buffalo's or

crocodiles lots of species have albinos

0:02:55.819,0:03:03.500

and normally, like me, I can make melanin

skin pigment and it's not that

0:03:03.500,0:03:09.599

complicated biochemical pathway I think

it's just two steps. And to understand

0:03:09.599,0:03:16.359

what those steps are and how they work

together you can analyze the cases where

0:03:16.359,0:03:23.829

it fails. And you can tease apart this

process and understand why when it's not

0:03:23.829,0:03:29.919

working what are the steps that would

normally happen. And that gives insight

0:03:29.919,0:03:36.639

into in this case specifically just how

particular amino acid is turned into a

0:03:36.639,0:03:43.090

skin pigment. But in disease states when

you understand that people with

0:03:43.090,0:03:48.579

Tay-Sachs disease are missing a

particular enzyme then you understand

0:03:48.579,0:03:55.870

some step in a complex system and allows

you to think about how to fix this. How

0:03:55.870,0:04:01.069

to remediate this is there something we

could give them to make this better.

0:04:01.069,0:04:04.650

Because we know what's going on

0:04:04.650,0:04:12.290

in the individual steps there. So

reductionism is limited and it doesn't

0:04:12.290,0:04:20.880

take into account the whole organism but

in science at this stage it's really the

0:04:20.880,0:04:26.539

best we can do in teasing apart the

complexities of life.