WEBVTT

NOTE duration: ”00:04:11.818”

NOTE Confidence: 0.94251996

00:00:05.519 --> 00:00:07.299 Stem cells are amazing cells.

NOTE Confidence: 0.94251996

00:00:07.440 --> 00:00:08.559 They are a very small

NOTE Confidence: 0.94251996

00:00:08.559 --> 00:00:09.760 number of cells in our

NOTE Confidence: 0.94251996

00:00:09.760 --> 00:00:10.260 bodies

NOTE Confidence: 0.8944067

00:00:11.039 --> 00:00:12.900 that have two special properties.

NOTE Confidence: 0.9742517

00:00:13.440 --> 00:00:14.559 The first one is they

NOTE Confidence: 0.9742517

00:00:14.559 --> 00:00:16.864 can self renew, namely whenever

NOTE Confidence: 0.9742517

00:00:16.864 --> 00:00:17.605 they divide

NOTE Confidence: 0.93240786

00:00:18.145 --> 00:00:19.185 they can make a copy

NOTE Confidence: 0.93240786

00:00:19.185 --> 00:00:19.765 of themselves.

NOTE Confidence: 0.9751436

00:00:20.224 --> 00:00:21.505 So they become so called

NOTE Confidence: 0.9751436

00:00:21.505 --> 00:00:23.845 immortal cells during our lifespan.

NOTE Confidence: 0.9855453

00:00:24.305 --> 00:00:25.585 And the second property is

NOTE Confidence: 0.9855453

00:00:25.585 --> 00:00:26.645 that they can generate

NOTE Confidence: 0.9390906

00:00:27.105 --> 00:00:29.525 many specialized cells or ordinary

NOTE Confidence: 0.9390906

00:00:29.585 --> 00:00:31.310 cells that are directly involved

NOTE Confidence: 0.9390906

00:00:31.310 --> 00:00:33.150 in tissue functions, and that's

NOTE Confidence: 0.9390906

00:00:33.150 --> 00:00:34.450 a process called differentiation.

NOTE Confidence: 0.9325591

00:00:35.070 --> 00:00:36.430 So because of these two

NOTE Confidence: 0.9325591

00:00:36.430 --> 00:00:37.870 key properties that make stem

NOTE Confidence: 0.9325591

00:00:37.870 --> 00:00:39.010 cells very special.

NOTE Confidence: 0.9816847

00:00:43.805 --> 00:00:45.085 My lab has worked on

NOTE Confidence: 0.9816847

00:00:45.085 --> 00:00:46.445 lots of things, but the

NOTE Confidence: 0.9816847

00:00:46.445 --> 00:00:48.364 common theme is working on

NOTE Confidence: 0.9816847

00:00:48.364 --> 00:00:49.425 the key genes

NOTE Confidence: 0.9731621

00:00:49.885 --> 00:00:51.965 that regulate the self renewing

NOTE Confidence: 0.9731621

00:00:51.965 --> 00:00:53.644 ability of stem cells. And

NOTE Confidence: 0.9731621

00:00:53.644 --> 00:00:55.585 particularly, we focus on,

NOTE Confidence: 0.9899256

00:00:56.364 --> 00:00:57.644 those genes which are not

NOTE Confidence: 0.9899256

00:00:57.644 --> 00:00:58.144 traditionally

NOTE Confidence: 0.95502526

00:00:58.445 --> 00:00:58.945 studied.

NOTE Confidence: 0.99277234

00:00:59.630 --> 00:01:00.610 Genetic information

NOTE Confidence: 0.98284554

00:01:01.230 --> 00:01:02.450 encoded in our DNA

NOTE Confidence: 0.9574889

00:01:02.989 --> 00:01:04.770 is then made into copies

NOTE Confidence: 0.99620676

00:01:05.150 --> 00:01:05.890 of blueprints

NOTE Confidence: 0.8288406

00:01:06.190 --> 00:01:07.950 called messenger RNA, guide the

NOTE Confidence: 0.8288406

00:01:07.950 --> 00:01:08.930 production proteins.

NOTE Confidence: 0.99908

00:01:09.310 --> 00:01:10.050 And this

NOTE Confidence: 0.8907983

00:01:10.750 --> 00:01:12.430 supposedly leads to the start

NOTE Confidence: 0.8907983

00:01:12.430 --> 00:01:13.569 of inter life process.

NOTE Confidence: 0.93320686

00:01:14.015 --> 00:01:15.694 But actually recently, we found

NOTE Confidence: 0.93320686

00:01:15.694 --> 00:01:16.655 that the story is not

NOTE Confidence: 0.93320686

00:01:16.655 --> 00:01:17.395 that simple

NOTE Confidence: 0.88323635

00:01:17.694 --> 00:01:19.694 because protein coding genes, they

NOTE Confidence: 0.88323635

00:01:19.694 --> 00:01:21.075 are not the entire

NOTE Confidence: 0.9535495

00:01:21.615 --> 00:01:22.895 picture of the secret of

NOTE Confidence: 0.9535495

00:01:22.895 --> 00:01:24.495 life. And they actually only

NOTE Confidence: 0.9535495

00:01:24.495 --> 00:01:26.175 occupies one percent of our

NOTE Confidence: 0.9535495

00:01:26.175 --> 00:01:27.535 genome. How about the other

NOTE Confidence: 0.9535495

00:01:27.535 --> 00:01:28.994 ninety nine percent of DNA?

NOTE Confidence: 0.9795923

00:01:29.430 --> 00:01:31.290 People used to, you know,

NOTE Confidence: 0.9024405

00:01:32.069 --> 00:01:33.190 show no function in the

NOTE Confidence: 0.9024405

00:01:33.190 --> 00:01:35.110 DNAs and call them junk

NOTE Confidence: 0.9024405

00:01:35.110 --> 00:01:37.209 DNAs. And recently, we discovered

NOTE Confidence: 0.9643019

00:01:37.750 --> 00:01:39.290 that so called junk DNA

NOTE Confidence: 0.9312254

00:01:40.230 --> 00:01:41.355 are hiding different kind of

NOTE Confidence: 0.9312254

00:01:41.355 --> 00:01:42.875 genes, and they're equally important.

NOTE Confidence: 0.9312254

00:01:43.035 --> 00:01:44.075 We have twenty three thousand

NOTE Confidence: 0.9312254

00:01:44.075 --> 00:01:45.435 genes in our human genome,

NOTE Confidence: 0.9312254

00:01:45.435 --> 00:01:46.555 but we have one million

NOTE Confidence: 0.9312254

00:01:46.555 --> 00:01:48.315 of jumping genes in this

NOTE Confidence: 0.9312254

00:01:48.315 --> 00:01:49.675 junk DNA. Now we found

NOTE Confidence: 0.9312254

00:01:49.675 --> 00:01:51.055 that they're very important function

NOTE Confidence: 0.9460175

00:01:51.355 --> 00:01:52.875 in regulating the protein coding

NOTE Confidence: 0.9460175

00:01:52.875 --> 00:01:53.375 genes.

NOTE Confidence: 0.90424806

00:01:57.440 --> 00:01:58.480 So we take a very

NOTE Confidence: 0.90424806

00:01:58.480 --> 00:01:59.460 systematic approach,

NOTE Confidence: 0.9326262

00:02:00.320 --> 00:02:01.700 namely that's a multidisciplinary

NOTE Confidence: 0.9997497

00:02:02.160 --> 00:02:02.660 approach

NOTE Confidence: 0.9889864

00:02:03.040 --> 00:02:04.900 from a methodology perspective.

NOTE Confidence: 0.95929426

00:02:05.360 --> 00:02:06.960 First, we usually use cell

NOTE Confidence: 0.95929426

00:02:06.960 --> 00:02:09.440 or developmental biology methods, like

NOTE Confidence: 0.95929426

00:02:09.440 --> 00:02:09.940 microscopy,

NOTE Confidence: 0.962969

00:02:10.639 --> 00:02:11.139 transplantation,

NOTE Confidence: 0.99518555

00:02:11.600 --> 00:02:12.660 or laser ablation

NOTE Confidence: 0.97617346

00:02:13.305 --> 00:02:14.825 to identify stem cells in

NOTE Confidence: 0.97617346

00:02:14.825 --> 00:02:15.325 tissues.

NOTE Confidence: 0.99227023

00:02:15.865 --> 00:02:17.225 And once we know where

NOTE Confidence: 0.99227023

00:02:17.225 --> 00:02:18.605 are the stem cells

NOTE Confidence: 0.9944517

00:02:18.905 --> 00:02:19.965 exactly located

NOTE Confidence: 0.9293218

00:02:20.264 --> 00:02:21.544 in the tissues, then we

NOTE Confidence: 0.9293218

00:02:21.544 --> 00:02:22.845 take a genetic approach

NOTE Confidence: 0.97797185

00:02:23.225 --> 00:02:24.745 to knock out genes in

NOTE Confidence: 0.97797185

00:02:24.745 --> 00:02:25.405 the genome

NOTE Confidence: 0.9022585

00:02:25.865 --> 00:02:27.739 to see which genes knock

NOTE Confidence: 0.9022585

00:02:27.739 --> 00:02:28.860 out will lead to stem

NOTE Confidence: 0.9022585

00:02:28.860 --> 00:02:30.459 cell defect. And then after

NOTE Confidence: 0.9022585

00:02:30.459 --> 00:02:32.000 that we take a molecular,

NOTE Confidence: 0.8667599

00:02:32.860 --> 00:02:33.360 biochemical,

NOTE Confidence: 0.9328053

00:02:33.819 --> 00:02:35.760 and also genomic approach

NOTE Confidence: 0.96574944

00:02:36.060 --> 00:02:37.660 to study how the gene

NOTE Confidence: 0.96574944

00:02:37.660 --> 00:02:39.180 looks like, what kind of

NOTE Confidence: 0.96574944

00:02:39.180 --> 00:02:40.300 function they will do when

NOTE Confidence: 0.96574944

00:02:40.300 --> 00:02:41.360 they make their proteins,

NOTE Confidence: 0.88762474

00:02:41.685 --> 00:02:42.965 and what will the protein,

NOTE Confidence: 0.95414066

00:02:43.605 --> 00:02:44.645 will be doing in the

NOTE Confidence: 0.95414066

00:02:44.645 --> 00:02:45.145 cell

NOTE Confidence: 0.9394345

00:02:45.605 --> 00:02:47.205 to make certain kind of

NOTE Confidence: 0.9394345

00:02:47.205 --> 00:02:48.885 stem cell structure or turn

NOTE Confidence: 0.9394345

00:02:48.885 --> 00:02:50.725 on off certain signaling pathways

NOTE Confidence: 0.9394345

00:02:50.725 --> 00:02:52.325 in stem cells. Recently, my

NOTE Confidence: 0.9394345

00:02:52.325 --> 00:02:53.765 lab also took on structural

NOTE Confidence: 0.9394345

00:02:53.765 --> 00:02:54.745 biology approach.

NOTE Confidence: 0.9933968

00:02:55.110 --> 00:02:57.110 We are using cryo electron

NOTE Confidence: 0.9933968

00:02:57.110 --> 00:02:57.610 microscopy

NOTE Confidence: 0.995406

00:02:58.230 --> 00:03:00.250 to study those key proteins

NOTE Confidence: 0.9605284

00:03:00.870 --> 00:03:02.569 that determine stem cell fate,

NOTE Confidence: 0.93684494

00:03:03.510 --> 00:03:05.030 how they look like, and

NOTE Confidence: 0.93684494

00:03:05.030 --> 00:03:06.010 how they function,

NOTE Confidence: 0.9762878

00:03:07.430 --> 00:03:09.425 is, you know, moved in

NOTE Confidence: 0.9762878

00:03:09.425 --> 00:03:10.465 three d and four d

NOTE Confidence: 0.9762878

00:03:10.465 --> 00:03:12.005 way, to really

NOTE Confidence: 0.97880787

00:03:12.465 --> 00:03:14.065 switch the function of other

NOTE Confidence: 0.97880787

00:03:14.065 --> 00:03:15.365 molecules in the cells.

NOTE Confidence: 0.91786796

00:03:20.360 --> 00:03:21.400 In my lab we have

NOTE Confidence: 0.91786796

00:03:21.400 --> 00:03:23.080 been focusing on when these

NOTE Confidence: 0.91786796

00:03:23.080 --> 00:03:24.600 stem cell genes are active

NOTE Confidence: 0.91786796

00:03:24.600 --> 00:03:25.900 in non stem cells,

NOTE Confidence: 0.96457165

00:03:26.360 --> 00:03:27.560 or when they are overly

NOTE Confidence: 0.96457165

00:03:27.560 --> 00:03:29.000 active in stem cells, what

NOTE Confidence: 0.96457165

00:03:29.000 --> 00:03:30.040 kind of cancer they will

NOTE Confidence: 0.96457165

00:03:30.040 --> 00:03:31.819 cause. And we found that

NOTE Confidence: 0.96457165

00:03:32.040 --> 00:03:32.540 many

NOTE Confidence: 0.8336752

00:03:32.965 --> 00:03:33.784 types of cancers,

NOTE Confidence: 0.9730788

00:03:34.644 --> 00:03:36.504 actually related to this.

NOTE Confidence: 0.98648864

00:03:36.885 --> 00:03:37.924 And so this is very

NOTE Confidence: 0.98648864

00:03:37.924 --> 00:03:39.224 exciting for us because

NOTE Confidence: 0.99865067

00:03:39.525 --> 00:03:41.224 it provides a new approach

NOTE Confidence: 0.9399911

00:03:41.685 --> 00:03:43.284 to understand and potential to

NOTE Confidence: 0.9399911

00:03:43.284 --> 00:03:44.984 treat cancers. Now we can

NOTE Confidence: 0.9399911

00:03:45.045 --> 00:03:46.344 use a small RNAs

NOTE Confidence: 0.9359125

00:03:46.680 --> 00:03:48.040 that specifically knock down these,

NOTE Confidence: 0.9359125

00:03:48.280 --> 00:03:49.900 overly active stem cell genes,

NOTE Confidence: 0.97843474

00:03:50.520 --> 00:03:52.280 and we see a tremendous

NOTE Confidence: 0.97843474

00:03:52.280 --> 00:03:53.640 impact. And so this is

NOTE Confidence: 0.97843474

00:03:53.640 --> 00:03:55.320 a method very different from

NOTE Confidence: 0.97843474

00:03:55.320 --> 00:03:55.960 the current,

NOTE Confidence: 0.9888838

00:03:56.280 --> 00:03:56.780 immunotherapy.

NOTE Confidence: 0.9219346

00:03:57.400 --> 00:03:58.760 We hope to actually develop

NOTE Confidence: 0.9219346

00:03:58.760 --> 00:04:00.600 or help develop a, a

NOTE Confidence: 0.9219346

00:04:00.600 --> 00:04:01.580 completely new

NOTE Confidence: 0.9948982

00:04:02.165 --> 00:04:03.925 type of targeted approach to

NOTE Confidence: 0.9948982

00:04:03.925 --> 00:04:04.905 cancer research.