

WEBVTT

NOTE duration: "00:04:08.448"

NOTE Confidence: 0.9734701

00:00:06.319 --> 00:00:07.060 The vasculature

NOTE Confidence: 0.97642684

00:00:08.080 --> 00:00:09.840 is the interface between the

NOTE Confidence: 0.97642684

00:00:09.840 --> 00:00:11.059 blood and the tissue,

NOTE Confidence: 0.99562836

00:00:11.440 --> 00:00:12.880 and it determines what you

NOTE Confidence: 0.99562836

00:00:12.880 --> 00:00:15.174 absorb from your blood and

NOTE Confidence: 0.99562836

00:00:15.174 --> 00:00:16.695 how waste products in the

NOTE Confidence: 0.99562836

00:00:16.695 --> 00:00:18.795 tissue get cleared and evacuated

NOTE Confidence: 0.99562836

00:00:19.095 --> 00:00:20.454 from the body. And so

NOTE Confidence: 0.99562836

00:00:20.454 --> 00:00:22.314 blood vessels function as gatekeepers

NOTE Confidence: 0.99562836

00:00:22.535 --> 00:00:23.195 of health.

NOTE Confidence: 0.98599035

00:00:23.654 --> 00:00:25.895 Vasculature growth is adapted to

NOTE Confidence: 0.98599035

00:00:25.895 --> 00:00:27.255 tissue growth. As long as

NOTE Confidence: 0.98599035

00:00:27.255 --> 00:00:29.660 tissue grows, vasculature will grow.

NOTE Confidence: 0.98599035

00:00:29.660 --> 00:00:31.359 And so many tissue diseases

NOTE Confidence: 0.99801636

00:00:31.740 --> 00:00:33.020 also have a root cause
NOTE Confidence: 0.99801636

00:00:33.020 --> 00:00:34.239 in defective vasculature.
NOTE Confidence: 0.9737438

00:00:39.500 --> 00:00:41.280 We're trying to better understand
NOTE Confidence: 0.9737438

00:00:41.340 --> 00:00:42.699 blood vessels with the goal
NOTE Confidence: 0.9737438

00:00:42.699 --> 00:00:44.495 of finding cures for the
NOTE Confidence: 0.9737438

00:00:44.495 --> 00:00:46.354 many diseases that are associated
NOTE Confidence: 0.9737438

00:00:46.495 --> 00:00:47.315 with defective
NOTE Confidence: 0.9649658

00:00:47.615 --> 00:00:48.115 vasculature.
NOTE Confidence: 0.9939033

00:00:48.575 --> 00:00:50.015 For vessels to form the
NOTE Confidence: 0.9939033

00:00:50.015 --> 00:00:51.854 right blood tissue interface, they
NOTE Confidence: 0.9939033

00:00:51.854 --> 00:00:52.895 have to be different in
NOTE Confidence: 0.9939033

00:00:52.895 --> 00:00:54.735 different tissues. For example, the
NOTE Confidence: 0.9939033

00:00:54.735 --> 00:00:56.655 kidney has very permeable blood
NOTE Confidence: 0.9939033

00:00:56.655 --> 00:00:58.510 vessels that allow exchange of
NOTE Confidence: 0.9939033

00:00:58.510 --> 00:01:00.110 waste products and and urine
NOTE Confidence: 0.9939033

00:01:00.110 --> 00:01:00.610 production.

NOTE Confidence: 0.9883996
00:01:00.989 --> 00:01:02.270 In the brain, blood vessels
NOTE Confidence: 0.9883996
00:01:02.270 --> 00:01:04.030 have to protect neurons. So
NOTE Confidence: 0.9883996
00:01:04.030 --> 00:01:04.990 in the brain, they form
NOTE Confidence: 0.9883996
00:01:04.990 --> 00:01:06.750 a very tight barrier and
NOTE Confidence: 0.9883996
00:01:06.750 --> 00:01:08.350 everything that gets across is
NOTE Confidence: 0.9883996
00:01:08.350 --> 00:01:10.030 very tightly regulated to keep
NOTE Confidence: 0.9883996
00:01:10.030 --> 00:01:10.930 the brain healthy.
NOTE Confidence: 0.96606445
00:01:11.275 --> 00:01:12.255 And one example,
NOTE Confidence: 0.98059475
00:01:12.634 --> 00:01:14.075 of our research is we
NOTE Confidence: 0.98059475
00:01:14.075 --> 00:01:15.694 found that there are molecules
NOTE Confidence: 0.98059475
00:01:15.755 --> 00:01:17.194 in the brain, a signaling
NOTE Confidence: 0.98059475
00:01:17.194 --> 00:01:19.034 pathway that is responsible for
NOTE Confidence: 0.98059475
00:01:19.034 --> 00:01:20.395 the integrity of the blood
NOTE Confidence: 0.98059475
00:01:20.395 --> 00:01:22.174 brain barrier. And we developed
NOTE Confidence: 0.98059475
00:01:22.235 --> 00:01:22.735 antibodies
NOTE Confidence: 0.9546712

00:01:23.320 --> 00:01:24.520 that can shut off this
NOTE Confidence: 0.9546712

00:01:24.520 --> 00:01:25.020 pathway,
NOTE Confidence: 0.9992327

00:01:25.320 --> 00:01:27.160 and these antibodies are able
NOTE Confidence: 0.9992327

00:01:27.160 --> 00:01:27.980 to transiently
NOTE Confidence: 0.95910645

00:01:28.360 --> 00:01:30.060 and safely and reversibly
NOTE Confidence: 0.97477216

00:01:30.440 --> 00:01:31.960 relax the blood brain barrier.
NOTE Confidence: 0.97477216

00:01:31.960 --> 00:01:33.080 And this allows you to
NOTE Confidence: 0.97477216

00:01:33.080 --> 00:01:34.680 get drugs into the diseased
NOTE Confidence: 0.97477216

00:01:34.680 --> 00:01:35.980 central nervous system.
NOTE Confidence: 0.98017436

00:01:36.975 --> 00:01:38.415 More than ninety nine percent
NOTE Confidence: 0.98017436

00:01:38.415 --> 00:01:39.935 of drugs cannot cross the
NOTE Confidence: 0.98017436

00:01:39.935 --> 00:01:41.455 blood brain barrier, and so
NOTE Confidence: 0.98017436

00:01:41.455 --> 00:01:43.215 brain diseases cannot be cured,
NOTE Confidence: 0.98017436

00:01:43.455 --> 00:01:44.495 currently. And so we are
NOTE Confidence: 0.98017436

00:01:44.495 --> 00:01:46.335 hoping that this, approach of
NOTE Confidence: 0.98017436

00:01:46.335 --> 00:01:47.795 blood brain barrier modulation

NOTE Confidence: 0.9992454
00:01:48.255 --> 00:01:49.615 will allow us to transform
NOTE Confidence: 0.9992454
00:01:49.615 --> 00:01:50.815 the way we treat brain
NOTE Confidence: 0.9992454
00:01:50.815 --> 00:01:51.315 diseases.
NOTE Confidence: 0.98072815
00:01:55.880 --> 00:01:57.320 Blood vessels, when you take
NOTE Confidence: 0.98072815
00:01:57.320 --> 00:01:58.360 them out of the body
NOTE Confidence: 0.98072815
00:01:58.360 --> 00:01:59.240 and you put them in
NOTE Confidence: 0.98072815
00:01:59.240 --> 00:02:00.759 a dish, they lose all
NOTE Confidence: 0.98072815
00:02:00.759 --> 00:02:02.920 these functional specialization. So for
NOTE Confidence: 0.98072815
00:02:02.920 --> 00:02:04.280 the longest time, we really
NOTE Confidence: 0.98072815
00:02:04.280 --> 00:02:06.345 couldn't study this organ specific
NOTE Confidence: 0.98072815
00:02:06.405 --> 00:02:07.865 difference in in the vasculature.
NOTE Confidence: 0.9536268
00:02:08.485 --> 00:02:10.325 Nowadays, we have single cell
NOTE Confidence: 0.9536268
00:02:10.325 --> 00:02:10.825 sequencing,
NOTE Confidence: 0.99461013
00:02:11.125 --> 00:02:12.165 and so we can take
NOTE Confidence: 0.99461013
00:02:12.165 --> 00:02:14.005 every single cell and determine
NOTE Confidence: 0.99461013

00:02:14.005 --> 00:02:15.305 its molecular composition.

NOTE Confidence: 0.9773702

00:02:16.005 --> 00:02:17.445 And this way, these hidden

NOTE Confidence: 0.9773702

00:02:17.445 --> 00:02:19.260 pathways that are responsible for

NOTE Confidence: 0.9773702

00:02:19.419 --> 00:02:21.439 organ specialization can be discovered.

NOTE Confidence: 0.9773702

00:02:21.500 --> 00:02:22.620 And so by reading the

NOTE Confidence: 0.9773702

00:02:22.620 --> 00:02:24.459 vasculature code, you can find

NOTE Confidence: 0.9773702

00:02:24.459 --> 00:02:25.980 molecules that are more expressed

NOTE Confidence: 0.9773702

00:02:25.980 --> 00:02:27.659 in one vascular bed compared

NOTE Confidence: 0.9773702

00:02:27.659 --> 00:02:29.419 to another. And usually, these

NOTE Confidence: 0.9773702

00:02:29.419 --> 00:02:30.939 molecules then also have a

NOTE Confidence: 0.9773702

00:02:30.939 --> 00:02:32.139 function there. So once these

NOTE Confidence: 0.9773702

00:02:32.139 --> 00:02:33.360 molecules are identified

NOTE Confidence: 0.986707

00:02:33.875 --> 00:02:35.315 by single cell sequencing, then

NOTE Confidence: 0.986707

00:02:35.315 --> 00:02:37.175 we can use biochemical techniques,

NOTE Confidence: 0.986707

00:02:37.315 --> 00:02:38.595 go back to cell culture,

NOTE Confidence: 0.986707

00:02:38.595 --> 00:02:40.035 and also test the function

NOTE Confidence: 0.986707
00:02:40.035 --> 00:02:41.555 of these molecules in genetic
NOTE Confidence: 0.986707
00:02:41.555 --> 00:02:43.334 approaches in model organisms.
NOTE Confidence: 0.9926758
00:02:44.194 --> 00:02:45.974 We also developed an MRI
NOTE Confidence: 0.9926758
00:02:46.035 --> 00:02:47.255 based imaging approach
NOTE Confidence: 0.977948
00:02:47.680 --> 00:02:48.900 to look at the meningeal
NOTE Confidence: 0.977948
00:02:48.960 --> 00:02:50.880 lymphatic vessels surrounding the brain
NOTE Confidence: 0.977948
00:02:50.880 --> 00:02:52.560 in human patients, and that
NOTE Confidence: 0.977948
00:02:52.560 --> 00:02:54.020 now allows us the possibility
NOTE Confidence: 0.99454755
00:02:54.480 --> 00:02:56.080 to investigate how patients with
NOTE Confidence: 0.99454755
00:02:56.080 --> 00:02:56.580 neurodegenerative
NOTE Confidence: 0.9898507
00:02:57.120 --> 00:02:59.440 diseases, how these diseases relate
NOTE Confidence: 0.9898507
00:02:59.440 --> 00:03:00.100 to dysfunctional,
NOTE Confidence: 0.9852702
00:03:00.800 --> 00:03:02.980 lymphatics and dysfunctional brain drainage,
NOTE Confidence: 0.9852702
00:03:03.275 --> 00:03:04.395 and then try to develop
NOTE Confidence: 0.9852702
00:03:04.395 --> 00:03:06.015 approaches to make these lymphatic
NOTE Confidence: 0.9852702

00:03:06.235 --> 00:03:07.995 vessels better to improve brain
NOTE Confidence: 0.9852702

00:03:07.995 --> 00:03:08.495 health.
NOTE Confidence: 0.9137207

00:03:14.075 --> 00:03:15.855 I believe it's very important
NOTE Confidence: 0.9166667

00:03:16.580 --> 00:03:17.959 to understand diseases,
NOTE Confidence: 0.96970624

00:03:18.500 --> 00:03:20.419 that you understand how the
NOTE Confidence: 0.96970624

00:03:20.419 --> 00:03:21.799 normal healthy vasculature
NOTE Confidence: 0.9450141

00:03:22.099 --> 00:03:23.860 develops. And then understanding what
NOTE Confidence: 0.9450141

00:03:23.860 --> 00:03:25.079 is different in diseases,
NOTE Confidence: 0.98391724

00:03:25.459 --> 00:03:26.980 you can find pathways that
NOTE Confidence: 0.98391724

00:03:26.980 --> 00:03:28.739 are responsible for diseases and
NOTE Confidence: 0.98391724

00:03:28.739 --> 00:03:30.659 then develop drugs to tackle
NOTE Confidence: 0.98391724

00:03:30.659 --> 00:03:31.095 this.
NOTE Confidence: 0.99365234

00:03:31.575 --> 00:03:32.315 It's estimated
NOTE Confidence: 0.9969308

00:03:32.695 --> 00:03:34.455 that two thirds of all
NOTE Confidence: 0.9969308

00:03:34.455 --> 00:03:35.515 human mortality
NOTE Confidence: 0.986084

00:03:36.215 --> 00:03:38.475 is directly related to vascular

NOTE Confidence: 0.986084
00:03:38.615 --> 00:03:39.115 dysfunction.
NOTE Confidence: 0.9600423
00:03:39.575 --> 00:03:40.775 And so our goal as
NOTE Confidence: 0.9600423
00:03:40.775 --> 00:03:41.275 researchers
NOTE Confidence: 0.98249424
00:03:41.575 --> 00:03:43.095 is to explore these sixty
NOTE Confidence: 0.98249424
00:03:43.095 --> 00:03:44.315 thousand miles of endothelium
NOTE Confidence: 0.9802912
00:03:44.615 --> 00:03:46.470 and find new approaches to
NOTE Confidence: 0.9802912
00:03:46.470 --> 00:03:47.990 keep your tissues healthier for
NOTE Confidence: 0.9802912
00:03:47.990 --> 00:03:49.830 a longer time. No single
NOTE Confidence: 0.9802912
00:03:49.830 --> 00:03:51.430 laboratory can tackle this on
NOTE Confidence: 0.9802912
00:03:51.430 --> 00:03:52.390 its own, but in a
NOTE Confidence: 0.9802912
00:03:52.390 --> 00:03:53.990 place like Yale, by working
NOTE Confidence: 0.9802912
00:03:53.990 --> 00:03:55.850 together, exchanging ideas,
NOTE Confidence: 0.98489815
00:03:56.230 --> 00:03:57.830 tools, and methods to test
NOTE Confidence: 0.98489815
00:03:57.830 --> 00:03:58.570 these ideas,
NOTE Confidence: 0.9858023
00:03:58.883 --> 00:04:00.482 we can make inroads and
NOTE Confidence: 0.9858023

00:04:00.482 --> 00:04:02.163 come together for the betterment

NOTE Confidence: 0.9858023

00:04:02.163 --> 00:04:03.142 of human health.