

WEBVTT

00:00:05.130 --> 00:00:08.341 The endothelial cells line every single vessel of the body

00:00:08.341 --> 00:00:11.344 from the large aorta that pumps blood out of the heart

00:00:11.469 --> 00:00:16.099 to even the capillary cells that get one tenth the size of a human hair,

00:00:16.099 --> 00:00:19.602 and so it's the endothelial cells that are in contact with the blood

00:00:19.602 --> 00:00:24.024 that regulate the blood flow, the platelet activation, the immune cell activation.

00:00:24.065 --> 00:00:28.528 There's at least 11 different types of endothelial cells in the lung alone.

00:00:28.570 --> 00:00:32.073 The heart probably has six different types of endothelial cells

00:00:32.073 --> 00:00:35.076 and what's important for me is that all of these endothelial cells

00:00:35.076 --> 00:00:38.663 respond differently to infection or trauma.

00:00:43.376 --> 00:00:46.796 My lab focuses on blood vessel dysfunction in critically ill children,

00:00:46.796 --> 00:00:50.341 and we're keen to really understand how to diagnose

00:00:50.341 --> 00:00:53.511 the differences between endothelial cell activation,

00:00:53.511 --> 00:00:58.516 which is generally a helpful process to stop blood bleeding where a cut is,

00:00:58.516 --> 00:01:01.061 or to bring immune cells to where an infection is,

00:01:01.061 --> 00:01:04.314 from endothelial cell dysfunction, which is bad,

00:01:04.314 --> 00:01:08.902 which allows too much bleeding or recruits too many or not enough immune cells.

00:01:09.611 --> 00:01:14.532 We're especially focused on how the endothelial cells regulate the vascular barrier.

00:01:14.532 --> 00:01:16.284 When someone becomes critically ill,

00:01:16.284 --> 00:01:18.453 their hands and their face get all swollen.

00:01:18.453 --> 00:01:20.872 That swelling happens in their organs too,

00:01:20.872 --> 00:01:23.917 and that leads to the organs not working properly

00:01:23.917 --> 00:01:26.503 and so my lab exists to understand
00:01:26.503 --> 00:01:29.464 how this phenomenon called capillary leak,
00:01:29.464 --> 00:01:32.592 where blood volume leaks from inside the blood
vessel space
00:01:32.592 --> 00:01:35.220 to outside the blood vessel space, happens.
00:01:41.643 --> 00:01:45.730 It's very challenging because endothelial cells are
on the inside of the blood vessels.
00:01:45.730 --> 00:01:47.148 So they're hard to study.
00:01:47.148 --> 00:01:50.193 But my lab starts with a highly translational
process.
00:01:50.193 --> 00:01:53.655 We get samples at the bedside of critically ill
children,
00:01:53.655 --> 00:01:56.407 whether it's blood, lung fluid
00:01:56.407 --> 00:02:00.954 or actually we found a way to collect individual
endothelial cells and analyze them
00:02:01.538 --> 00:02:07.669 and identify processes or targets that we can then
study in cultured endothelial cells
00:02:07.669 --> 00:02:11.381 and collections of cells that are known as
organoids.
00:02:12.090 --> 00:02:16.511 From that analysis, has been very, very illuminat-
ing and telling of what
00:02:16.511 --> 00:02:20.014 endothelial cells are doing in the blood vessels of
critically ill children
00:02:25.812 --> 00:02:29.524 Ultimately, we want to be able to diagnose and
treat capillary leak
00:02:29.524 --> 00:02:33.236 and capillary leak makes every disease process
worse,
00:02:33.236 --> 00:02:36.239 and so if we had tools that could diagnose it,
00:02:36.239 --> 00:02:39.993 we could better triage the organ support that we
provide,
00:02:39.993 --> 00:02:41.619 whether it's a breathing machine
00:02:41.619 --> 00:02:44.330 or medicines to make the heart beat faster and
stronger,
00:02:44.330 --> 00:02:48.543 and ultimately we want to be able to treat it to
give a medicine or a therapy

00:02:48.543 --> 00:02:52.547 that reduces the amount of blood volume leaking out into the tissues.

00:02:54.257 --> 00:02:58.219 I was motivated to conduct research based on my experiences at the bedside,

00:02:58.219 --> 00:03:01.514 and would have children come in that were critically ill,

00:03:01.514 --> 00:03:03.391 and we would see them get swollen

00:03:03.391 --> 00:03:05.059 and we would see their organs fail,

00:03:05.059 --> 00:03:08.396 and we had no tools to diagnose it, no new treatments.

00:03:08.396 --> 00:03:11.399 So I became inspired to research capillary leak

00:03:11.399 --> 00:03:14.360 from my clinical experiences of critically ill children.

00:03:14.694 --> 00:03:17.363 That translational approach still motivates us today.