Cornell University
Graduate School

Cornell University Three Minute Thesis (3MT) Competition

Jeffrey Pea, Biomedical & Biological Sciences: “Oh-No Varies! Tales of DNA and Infertility.”

[Clock Ticking]

>> Narrator: Cornell University 2019 Three Minute Thesis finalist. Jeffrey Pea, Biomedical & Biological Sciences: “Oh-No Varies! Tales of DNA and Infertility.”

>> Pea: Every time I go home for the holidays, I always get the same question, "So Jeff, when do we expect some grandchildren?" Now I'm not going to talk about my dreams for fatherhood today. But this same question is really difficult for many women out there who suffer from reproductive challenges. You see, in the U.S. at least one in nine women suffer from some form of natural infertility and this symptom is only worsened by age. In fact, when women reach their mid to late 30's their success for pregnancy drastically decreases. This is becoming more apparent as more women choose to focus on their academic and professional careers making us wonder why is it so hard to have children in the first place? Part of that answer might come in the quality of a woman's egg, specifically in their DNA. You see as the DNA is passed on from mother to child, that DNA must be accurate. So no mistakes can be made there. And as a woman ages there's accumulation in damage in their DNA and this could cause risks in both pregnancy complications as well as genetic disorders such as Down syndrome. And so for us the big question is how do we make sure that these eggs stay both stable and correct? And this is where my research comes in. My work focuses on repair factors, which are proteins that check and correct the DNA before it's passed on. These repair factors are found all across the body to help prevent diseases such as cancer. But my group and I believe that these same repair factors play a pivotal role in the ovary and creating high quality eggs. So in order to test this, we genetically modified mice to be missing some of these repair factors and see how that impacts their reproductive health. To our surprise we found that these mice actually produced normal amounts of eggs. But a closer look actually shows some major complications. Some of these eggs have incorrect number of chromosomes where some of the other ones have tangled up DNA, like a Jackson Pollock painting. And so these mice, although they're making normal amounts of eggs, actually are all bad eggs. And these are actually unable to fertilize, and these mice are sterile. So from these observations we believe that these specific repair factors play a role in not producing the eggs themselves but actually maturing them and getting them ready to create offspring. And that concept is really important in understanding how we can tackle some of our current challenges as reproductive care. Thank you.

[Applause]