

There's a cross-section of that sort of tower, which is known as a villus. The villus is lined by cells on the outside that are the fully differentiated cells that play an important role in absorbing nutrients whenever you eat. Those fully differentiated cells come from the undifferentiated stem cells that reside at the bottom where that arrow is in what is known as a crypt. So if you could run the video now you will see how this process works. So we're looking now from the inside of one of these villi, and now we're going to go through the cross-section view and look down at the crypt. Now this is a video developed from real mouse studies in which you can turn a stem cell a blue color through a genetic trick, then you can watch every cell that is born from that stem cell will be blue and you can watch it develop. The cells move up the crypt, they get into the lumen, they differentiate along the way. They'll get to the top of the villus, they'll then complete their life cycle of absorbing nutrients and then undergo programmed cell death or apoptosis. This is also happening in all of our colons right now at a very rapid rate, we're still before lunch, I think you're probably ok with that. So what happens if you have a mutation in the stem cell? There's a common mutation in colon cancer in a gene called APC that's important in cell fate. So the cells that have that mutation are now are in that greenish brown color, they're going to have trouble making it through that final stage of differentiation and they're starting to pile up. And therefore a tumor starts to develop.