



Stanford eCorner

Moore's Law for Pharma

DJ Kleinbaum, *Emerald Therapeutics*

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DJ Kleinbaum of Emerald Therapeutics explains "Eroom's Law," which says that the cost of getting a drug developed and approved will double every nine years. At that pace, pharmaceutical companies would have to spend \$16 billion on drug development in the year 2043, according to Kleinbaum. Aside from driving up national spending on healthcare, the industry would be forced to develop only the most profitable drugs — not the ones most needed.



Transcript

- So I assume that all of you have heard of Moore's law, right? Anyone not heard of Moore's Law? Alright, so Moore's Law tells about the, is about the density of transistors on microchips, but really you can think of it as describing the reduction in cost of these chips over time, of computing over time. Has anyone heard of Eroom's Law? Alright, we have a couple. So Eroom's Law is something that we have in the life sciences and this comes from a paper that was published in 2012, but actually we've sort of known about this for longer. Brian and I used to talk about this all the time in graduate school. And Eroom's Law is essentially the opposite. Eroom's Law says that the cost of getting a pharmaceutical approved doubles every nine years. That's kinda scary. So just to give you a sense, this has been happening since 1950 and now we're at the point where getting a drug developed costs on the order of two billion dollars depending on what study you read. So how can this have happened for 60 years? How has the industry not collapsed under it's own weight? Well it's because our spending on healthcare has also increased exponentially during that time. And the pharmaceutical companies can correctly say that they're only a tiny fraction of this problem and they're right.

But in 2004, our per capita spending on healthcare in this country was \$9500 per person. So the spending on healthcare, that's not an infinite resource. At some point, we can't spend more per person on healthcare. We'll just be spending all of our money on healthcare. And the point at which that, the point at which that happens and that intersects with this exponential from Eroom's Law means that it could become financially infeasible to make new drugs. And just to give you a sense, this is not something that's gonna be your children's problem or your children's children's problem. In 1943 I'll be...1943... In 2043 I'll be 60 years old and hopefully will still be alive. If Eroom's Law continues, it'll cost 16 billion dollars to develop a drug at that point. That means that only the most valuable drugs are worth making.

There are whole swaths of things that just aren't worth discovering at that price point. And so that's a really scary thing and that's a problem that we have to solve. So just to show you that I'm not all gloom and doom, there is actually a sort of silver lining hiding here. So if you look from basically the late '80s through the late '90s, you see the only point in this graph where things kind of level out. And that's where the first wave of biotech drugs sort of came through the market. And biotech drugs like antibody-based drugs are different in that it's a completely different mode of action, it's a completely different platform from traditional small molecule pharmaceuticals. And so that's really a key to solving this problem is new platforms for drugs. And that's what we wanted to do, that's what we are doing with Emerald's Therapeutic platform and our goal with the ECL is to actually make it easier for people to focus on running the world's most efficient laboratory so we can make it easier and cheaper for scientists to do research to discover new platforms so that we can help reverse this trend.