



## Stanford eCorner

### A Tale of Two Markets for AIDS Vaccine (Developed vs. Developing World)

Dr. Don Francis, *Vaxgen*

January 28, 2004

Video URL: <http://ecorner.stanford.edu/videos/898/A-Tale-of-Two-Markets-for-AIDS-Vaccine-Developed-vs-Developing-World>

The major market for the AIDS vaccine is in the developing world, says Francis, but there is significant demand in the United States with 40,000 new cases a year. There are a lot of unknowns in the business climate in the United States affecting the profitability of a vaccine. It is difficult to encourage investment when a blockbuster drug would have a much higher rate of return, he adds.



#### Transcript

Well, the major market for HIV vaccines is the developing world. And, we spend \$4,000 per person per year in the United States for healthcare. Whereas in Sub-Saharan Africa that's closer to probably three dollars per person per year for healthcare. And therefore the amount of money they have to purchase the vaccine is extremely low. So, the worldwide need is in those parts of the world with the least likely ability to pay for it. But, in the United States there is enough demand. We have 45,000 new infections a year. I think if we had a safe and effective HIV vaccine essentially every kid would receive it. At least every kid should. But, with the recommendations come through quickly to do that.

And, would there be a demand for this product? And could a company make money on it? I think you could, but it's unknown and therefore it's tough to get your investors in that kind of an unknown demand question. Here's an example. This is really an important side. You remember nothing else as far as value of prevention. I just took two quite large drugs, nice drugs. Are they the best drugs? Lipitor is the one to decrease your cholesterol for long-term decrease in cardiac disease. And Prilosec being a heartburn drug, it's important for people with heartburn. These are not life-saving drugs, either one of them. But, they have in the neighborhood of six billion dollars a year in revenues from those drugs. On the left are all of the 20-some vaccines we have licensed in the United States.

And you see that all of the combined have the same, there's one or two of these drugs. If you look at vaccines for the developing world, which is next to the second bar on that graph, you see why you can't compete in the pharmaceutical industry. If you have to put two to three hundred million dollars into drug development, why not put it in for one of these instead of a vaccine? So this is the opportunity cost issue for the people who have your savings and are monitoring your savings and trying to increase that in time. You want them to maximize the return for you, the investor. And so, you'd probably say, "I want to be in one of these big blockbuster drugs and not necessarily in a vaccine. It will take longer and has much lower return." Pure economic question that even though you'd say that, "Yeah, we got to make an AIDS vaccine." Sure, but if it can't be your money and say, "Well, you got ten dollars in the bank now. For ten years you can triple that or I can go to the vaccine business and I don't know what the outcome is." I think you'd be pulled on the two directions to that which would be wise for you as an individual. And that indeed is what the money managers are. And therefore the opportunity cost in investing your ten dollars into a blockbuster pharmaceutical drug versus vaccine become obvious. So, let's look at AIDS itself.

When the AIDS epidemic began, we had maybe one or two partially effective anti-viral drugs. And, if you had to ask me then, what we would have today, would we have a vaccine or we have an anti-viral drug for AIDS there would have been literally no question in my mind that we'd have several vaccines. And I don't know whether we'd have anti-viral drug or not. But, look what happened though. And this is market-driver, I think, rather than scientific-driven because the science was very, very difficult at that time to make an anti-viral agent. So, the historical aspects of this one have begun. There were many anti-viral vaccines but there were very few anti-viral drugs because they were very difficult to make. We didn't know what anti-bacterial drugs, like you penicillin. But viruses are very small, their target is very small. And they use the cellular mechanism to replicate.

When you poison the virus you tend to poison the cell and people get very sick, much like some of the anti-cancer chemotherapy drugs. So, there were very few. The development time was longer for vaccines because in vaccines you give it to the person. You have to wait for their immune system to go up. And then you can whether it works. Whereas in the anti-viral drugs, you have someone sick, you dump the drug in. if they get better you get your answer quite quickly. Social demand as I mentioned before repeatedly is low for vaccines, is high for anti-viral drugs. All these things added up ultimately that the number of available anti-viral drugs now is what, 15 that are licensed for HIV and not one vaccine. Fascinating shift in terms of science.

I think it's driven not only by science, I think it's driven by social value in the market. This is compounded by the issue of where in the world AIDS is. On the horizontal axis here's the Gross National Product per capita in a variety of countries with Switzerland on the right. If anyone of you have been to Switzerland you can see why it has the highest per capita GNP because they can afford all those lovely window boxes with the Geraniums section. US is down the line. And you see that the prevalence of infection is on the vertical axis. You see that those countries with the highest money able to pay for a vaccine are the ones with the lowest probably demand or interest in an HIV vaccine. Whereas those, especially Southern African countries, with minimum per capita GNP have massive epidemics of HIV and really limited ability to pay for the vaccine or for that matter for a therapeutic drug.