Reinventing the Condom

Why is the Bill & Melinda Gates Foundation seeking ideas for the next generation of condoms?

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What is one of the oldest medical devices in existence? What is the most effective method of preventing sexual transmission of HIV? What medical product is so simple that it can easily be manufactured by the millions and costs just pennies? The answer to all three is the same – the condom. The fact that such a modest device, nothing more than an inert sheath of latex, is one of the most effective tools in our armamentarium against HIV infection, and additionally prevents unintended pregnancy, is frankly astounding. When used consistently and correctly, condoms are extremely effective at preventing HIV infection and unplanned pregnancy.

Quite simply, condoms save lives. But if condoms are so marvelous, why are we seeking ideas for the Next Generation of Condoms in our current Round of Grand Challenges Explorations (GCE)?

It may seem obvious, but the success and impact of any public health tool hinges on that tool being used consistently and correctly by those who need it. Vaccines sitting on shelves don't prevent disease. New tuberculosis drug regimens won't help if patients stop taking them halfway through the necessary days. Likewise, the potential value of condoms is limited by inconsistent use.

Women, particularly those in high risk groups such as commercial sex workers, often face difficulties negotiating condom use; the fact that the term "condom negotiation" even exists and is so common in discussions about HIV prevention or reproductive health speaks to the central shortcoming of our current generation of condoms. The undeniable, and unsurprising, truth is that most men prefer sex without a condom, while the risks related to HIV infection and complications of unplanned pregnancy are disproportionately borne by their partners.

Ultimately, the field is moving toward new classes of products, referred to as Multi-purpose Prevention Technologies (MPTs) that will meet multiple of the sexual and reproductive health needs of men and women, including HIV prevention and contraception. These might include combination vaginal rings, co-administered or co-formulated injectable products, or new "on demand" products like fast-dissolving vaginal films. A number of concepts are already being actively pursued by product development organizations CAMI database). While potentially transformational, most of these products are high risk, years away from being available, and their path through development, regulatory approval, and delivery remains unclear.

In the meantime, we have a product that is safe and effective, but underutilized. What if we could develop a condom that would provide all the benefit of our current versions, without the drawbacks? Even better, what if we could develop one that was preferred to no condom?

While there have been few modification to condom design that have had substantial impact on the condom market, there are opportunities for taking a radically different approach to condoms being pursued currently. Researchers at the University of Washington are developing a condom using a technique known as electrospinning, which creates tightly woven fabric out of nanometer-sized polymer strands and which could be used to deliver spermicidal or microbicidal agents in addition to providing a barrier.

Origami Condoms provides an excellent example of a private enterprise focused on new condom design to promote consistent use by emphasizing the sexual experience.

The idea of a condom that men would prefer to no condom is a revolutionary idea, but we know more today about sexual function than at any time in the past, and advances in relevant disciplines such as neuroscience, vascular biology, urology, reproductive biology, materials science, and other fields can contribute to new and unconventional approaches. We hope this GCE call will provide a thought-provoking challenge to innovators from many areas who may never have thought about how they could build a better condom.
