

## Condoms and Sexually-Transmitted Infections

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Related Article, see p. 2645

Polarization of opinion about condoms may finally be starting to abate, as scientific evidence mounts that their use can reduce the risk of most sexually transmitted infections, including human immunodeficiency virus (HIV) infection. In the past, proponents of condom use were often pitted against those arguing that the best way to ensure 100 percent protection against sexually transmitted infections was to abstain from sexual intercourse until marriage and then to refrain from extramarital sex. Certainly, the latter approach would offer 100 percent protection if everyone adhered to it. Fortunately, common ground is now being reached, as it becomes clearer that for many people, neither abstinence until marriage and subsequent faithfulness nor consistent condom use alone is a practical preventive solution.<sup>1</sup>

In the United States, the polarization around the issue of condoms peaked in 2001, when Public Law 106-554 went into effect. This law required the Food and Drug Administration (FDA) to re-examine existing condom labels to determine the “medical accuracy” of their description of condoms’ effectiveness in preventing human papillomavirus (HPV) infection along with other sexually transmitted diseases (STDs). Previously, in the face of this pending legislation, four government agencies — the FDA, the National Institutes of Health (NIH), the Centers for Disease Control and Prevention, and the U.S. Agency for International Development —

convened a panel of condom experts in June 2000 to review the available evidence. The final report from this meeting concluded that condom use reduces the risk of pregnancy, HIV transmission, and among men, gonorrhea.<sup>2</sup> For all other sexually transmitted infections, adequate data were lacking. The report emphasized that “the absence of definitive conclusions reflected inadequacies of the evidence available and should not be interpreted as proof of the adequacy or inadequacy of the condom to reduce the risk of STDs other than HIV transmission in men and women and gonorrhea in men.” Despite this clear caveat, further efforts were undertaken to pressure the FDA to add a warning to condom labels about their lack of protection against HPV transmission.

Six years later, we have strong evidence that condom use reduces the risk of transmission of HIV,<sup>2</sup> gonorrhea and chlamydia,<sup>3</sup> and herpes simplex virus<sup>4</sup> in both women and men; in this issue of the *Journal*, Winer et al. (pages 2645–2654) present evidence that it also reduces the risk of HPV infection in women. The scientific community clearly made a concerted effort both to collect additional data and to refine analytical approaches so that more accurate inferences can be drawn.

That said, the protection that condoms offer against a specific sexually transmitted infection cannot be precisely quantified. For example, experts estimate that consistent condom use reduces the risk of HIV transmission by

about 80 to 90 percent. We are unable to quantify this protective effect more precisely for two reasons. First, we cannot objectively measure the consistency or correctness of condom use, since as with most sexual behavior, these practices are not independently observed or verified. Thus, we have to rely on self-reported sexual activity, with its questionable validity. Second, the transmissibility of HIV hinges on a host of factors, including sex, the stage of infection, the status of male circumcision, and the presence or absence of other infections. These variations in HIV transmissibility will influence the effectiveness of condoms even when they are used consistently and correctly, because they can break or slip off (albeit relatively rarely).

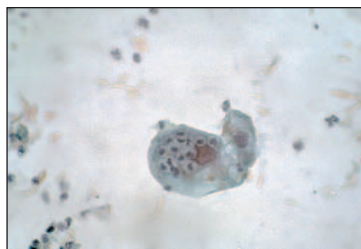
In the case of an infection such as gonorrhea or chlamydia, it would not be ethical, given that treatment is readily available, to conduct studies of discordant couples in order to assess the effectiveness of condoms. Thus, there is the further challenge of appropriately controlling for differential exposure status because the likelihood of condom use is often related to the risk of exposure. For example, mutually monogamous couples with no risk of transmission of an infection are less likely to use condoms than are single young adults with increased risk. Unless this differential risk of exposure is appropriately controlled for in the analysis, it can lead to an underestimation of the effectiveness of condoms.<sup>3</sup> Al-

though we will never have a precise estimate of effectiveness, strong empirical evidence indicates that condom use considerably reduces the risk of transmission of most sexually transmitted infections.

A theoretical concern exists that the promotion of condom use could lead to “risk compensation” — in other words, that men who use condoms might feel safer and consequently have sex more frequently or with more partners, thus reducing or even reversing the protection offered by condoms. However, a review of 174 condom-related prevention approaches concluded that these interventions designed to reduce the risk of HIV infection do not increase unsafe sexual behavior.<sup>5</sup> Despite this reassurance, we must continue to be vigilant when promoting the use of condoms to avoid giving users a false sense of security; we should refer, for example, to “safer sex” rather than “safe sex.”

Moreover, the promotion of condom use needs to be part of a more comprehensive approach to risk reduction, often referred to as the ABC approach (abstain, be faithful, and use condoms). In fact, a whole alphabet of prevention approaches will collectively optimize the effect of HIV prevention. This multifaceted ap-

proach consists of incremental steps and results in collectively effective (but not perfect) prevention programs. Promising additional components (e.g., male circumcision, microbicides, treatment of herpes simplex virus infections, and vaccines) must be rigorously evaluated and scaled up if and



**Dysplastic Cell Showing Features of HPV Infection.**

when they are shown to be effective.

What does this mean for clinicians who counsel patients about sexual health? First, persons who abstain from sexual intercourse or who are uninfected and mutually monogamous eliminate the risk of sexually transmitted infections. Second, persons who choose to be sexually active can be reassured that condom use can reduce the risk of most STDs. Third, like any other prevention tool, condoms work only when they are used. Consistent and correct use is essential for optimal risk reduction. Fourth, condom use is only one of a growing ar-

ray of methods for reducing the risks associated with sexual activity and should be targeted to groups in which sexual exposure to infection is likely. And finally, when used consistently and correctly, condoms also reduce the risk of unintended pregnancy. Condoms are just one tool in the armamentarium against sexually transmitted infections; only by harnessing all the evidence-based prevention tools can we move toward true sexual health.

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3. Warner L, Stone KM, Macaluso M, Buehler JW, Austin HD. Condom use and risk of gonorrhea and chlamydia: a systematic review of design and measurement factors assessed in epidemiologic studies. *Sex Transm Dis* 2006;33:36-51.
4. Wald A, Langenberg AG, Krantz E, et al. The relationship between condom use and herpes simplex virus acquisition. *Ann Intern Med* 2005;143:707-13.
5. Smoak ND, Scott-Sheldon LA, Johnson BT, Carey MP. Sexual risk reduction interventions do not inadvertently increase the overall frequency of sexual behavior: a meta-analysis of 174 studies with 116,735 participants. *J Acquir Immune Defic Syndr* 2006;41:374-84.

**CORRECTION**

**Condoms and Sexually-Transmitted Infections**

Condoms and Sexually-Transmitted Infections (June 22, 2006; 354:2642-3). On page 2643, the figure was incorrectly labeled "Dysplastic Cell Showing Features of HPV Infection." We regret the error.