Per-act Risk of Sexual HIV Transmission

Key Points

- Certain sexual activities generally carry a greater risk of HIV transmission than others.
- Receptive anal sex is associated with the highest risk of HIV transmission while oral sex is associated with the lowest.
- Each exposure to HIV is unique and carries its own unique risk for HIV infection, based on many factors.

Several research studies have attempted to calculate the risk of HIV transmission associated with one act of unprotected sex (for example, if a condom or PrEP is not used) with a person who is HIV positive. These have found that certain types of sex generally pose a greater risk of HIV transmission than others.

The following table shows estimates for the average transmission risk from one exposure to HIV through different sexual activities:

<table>
<thead>
<tr>
<th>Sexual activity (according to position of HIV-negative partner)</th>
<th>Average risk estimate</th>
<th>Rate of transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive anal sex</td>
<td>1.4%</td>
<td>1 transmission per 71 exposures</td>
</tr>
<tr>
<td>Insertive anal sex</td>
<td>0.11%</td>
<td>1 transmission per 909 exposures</td>
</tr>
<tr>
<td>Receptive vaginal sex</td>
<td>0.08%</td>
<td>1 transmission per 1,250 exposures</td>
</tr>
<tr>
<td>Insertive vaginal sex</td>
<td>0.04%</td>
<td>1 transmission per 2,500 exposures</td>
</tr>
</tbody>
</table>

Receptive anal sex (where an HIV-negative person receives a penis into their anus), carries the highest risk of HIV transmission. Research suggests the risk may be 10 to 20 times higher than that for vaginal or insertive anal sex (where an HIV-negative person inserts their penis into an anus). This is partly because the epithelial cell layer lining the rectum is only one layer thick, making it more susceptible to tearing and inflammation, which can facilitate HIV transmission. In contrast, the epithelial cell layers in the vagina, penis, and mouth are several layers thick.

Studies suggest that receptive vaginal sex is approximately two times riskier than insertive vaginal sex. This is partly because the vagina has a greater surface area than the penis and remains in contact with infected fluids for a longer time.

The HIV risk for oral sex is not zero but it does carry a much lower risk than anal or vaginal sex. There are several biological reasons for this. Saliva contains enzymes that can inactivate HIV, the mouth and throat have multiple layers of epithelial cells, and fluids that contain HIV do not stay in prolonged contact with possible routes of infection.
The per act risk estimates are based on research studies that look into average rates of transmission. They do not consider the effect of specific biological factors that can impact risk, such as viral load. Because risk involves multiple factors, it is very difficult to accurately quantify the risk from one act of unprotected sex with someone who is HIV positive. Each exposure to HIV has a unique risk of transmission, determined by the complex interplay of the various biological factors involved.

Resources

Putting a number on it: the risk from an exposure to HIV – Prevention in Focus

HIV Risk Behaviors – U.S. Centers for Disease Control and Prevention

Sources

Disclaimer

Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV- and hepatitis C-related illness and the treatments in question.

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