



Henry A. Nasrallah, MD
Editor-in-Chief

doi: 10.12788/cp.0235

Exchange of microbiota via sexual contact may increase the risk of dysbiosis and psychiatric disorders

Sexual activity alters the microbiome, with potential psychiatric implications

Evidence is strong that sexual partners transmit microbiota (bacteria, viruses, fungi, protozoa, and archaea) to each other. While microbial flora are abundant in the gastrointestinal tract, they are also present in the vagina, penis, urethra, mouth, and skin.¹ For better or worse, sexual contact of all types means that participants will acquire each other's microbiota.

The 39 trillion microbiota in the body (which exceed the 30 trillion cells in the body) are commensal and influence both the larger brain in the skull and the smaller enteric brain in the gut. The microbiota and their microbiome genes (1,000 times larger than the human genome) have been linked to depression, anxiety, psychosis, and autism.²⁻⁴ They produce 90% of the body's serotonin, as well as catecholamines (norepinephrine, epinephrine, dopamine), make hormones (eg, cortisol), and modulate the immune system. Microbiota have several important functions, including food digestion, synthesis of vitamins, autoimmunity, hypothalamic-pituitary-adrenal axis regulation, and CNS modulation.

Consequences of dysbiosis

Everyone should be concerned about maintaining a healthy diversity of microbiota in their body, with a predominance of beneficial bacteria such as *Lactobacillus* and *Bacteroides*, and avoiding acquiring pathogenic bacteria such as *Gardnerella*, *Prevotella*, and *Atopobium*. Sexual activity involving a partner with unhealthy microbiota may increase the risk of dysbiosis, defined as a reduction in microbiota diversity, including a loss of beneficial bacteria and a rise in harmful bacteria.

Dysbiosis is associated with multiple symptoms, including⁵:

- brain "fog," irritability, mood changes, and anxiety
- bloating, loss of intestinal permeability, and insufficient reclamation of nutrients
- congestion of certain organs, such as the liver, gallbladder, and pancreas
- production of antigen-antibody complexes in response to chemicals in partially digested food
- aggravation of inflammatory disorders such as migraine, arthritis, and autoimmune disorders.

Apart from intimate sexual contact, simply sharing a household with someone leads to sharing of gut microflora. Persons who live together, whether genetically related or not, have similar microbiota. Compared with people

To comment on this editorial or other topics of interest:

henry.nasrallah

@currentpsychiatry.com

living in separate households, cohabiting human pairs, dog pairs, and human-dog pairs share most of their microbiota (especially in the skin).

A consequence of acquiring pathogenic microbiota in the vagina is bacterial vaginosis (BV), which is not an infection but an ecologic imbalance in the composition of the vaginal microbiota. BV is caused by a significant decline in the beneficial vaginal *Lactobacillus* and a marked increase in the non-*Lactobacillus* taxa (especially *Gardnerella* and *Atopobium*).⁶ It can last for a least 1 week after sexual intercourse. BV is rare or absent among virgins. For a male partner, penile microbiota changes significantly after unprotected sex.⁶

Pathogenic bacteria can be cultivated from the glans, the coronal sulcus, and the prepuce, as well as from the penile skin, semen, urethra, and urine.⁶ Diverse bacteria exist in human semen, regardless if the male is fertile or infertile.⁷ *Anaerococcus* is a biomarker for low sperm quality. Many of the semen bacteria are also found in the vagina of women with BV.⁷ Semen is a medium for the transmission of bacteria and viruses between men and women, and can contribute to sexually transmitted diseases.⁸

There are approximately 21 million cases of BV in the United States each year, and BV can also increase the risk of HIV and poor obstetric outcomes.⁹ The microbiota in the penile skin and urethra in males who have monogamous relationships with females are very similar to the vaginal microbiota of their female partner.

Consequences of BV include:

- decrease in hydrogen peroxide-producing bacilli
- prevalence of anaerobic bacteria (*Prevotella*, *Gardnerella*, and *Atopobium*)
- alkalization, fishy odor, and gray-white vaginal discharge
- increase in the rate of pelvic inflammatory disease, ectopic pregnancy,

endometriosis, preterm birth, and tubal factor infertility.⁹

Circumcision decreases the risk of BV. There is an increased rate of BV bacterial taxa in men with extramarital affairs and in women with multiple partners. Both oral and vaginal sex increase the abundance of *Lactobacillus* in the male oral and penile microbiota. Gingivitis has also been reported after oral sex.¹⁰

A link to psychiatric disorders

Given that all forms of sexual contact (vaginal, oral, anal, or skin) can transmit microbiota bidirectionally between partners, it is vital to practice safe sex and consider a monogamous relationship rather than indiscriminate promiscuity. Unfortunately, certain psychiatric disorders, such as bipolar disorder, are associated with hypersexuality and multiple partners, which may disrupt the microbiota. This can further disrupt the diversity of an individual's microbiome and may put them at risk for mood, anxiety, and other psychiatric disorders. Another problem is sexually transmitted infections such as gonorrhea or syphilis require antibiotic therapy. It is well established that antibiotics kill both the bad pathogenic and the good nonpathogenic microbiota, further exacerbating dysbiosis and leading to disruptions in the microbiota-gut-brain (MGB) axis, which then results in psychiatric disorders.

The MGB axis modulates neurological processes via the vagus nerve, the major "highway" connecting the gut and brain for bidirectional traffic. The MGB axis produces microbial metabolites and immune factors that can lead to changes in brain neurotransmitters as well as neuroinflammation and psychiatric symptoms such as depression and anxiety.⁵

Many researchers are focusing on how to exploit the microbiome to develop novel therapeutic strategies, and encouraging advances are

continued on page 12

Editorial Staff

EDITOR **Jeff Bauer**
SENIOR MEDICAL COPY EDITOR **Eric Seger**
WEB EDITOR **Alexandra Romano**

Art & Production Staff

CREATIVE DIRECTOR **Louise Koenig**
ART DIRECTOR **Pat Fopma**
DIRECTOR, JOURNAL MANUFACTURING
Michael Wendt
PRODUCTION MANAGER **Donna Pituras**

Publishing Staff

PUBLISHER **Sharon Finch**
DIRECTOR EBUSINESS DEVELOPMENT
Alison Paton
SENIOR DIRECTOR OF SALES
Tim LaPella

Editor-in-Chief Emeritus

James Randolph Hillard, MD

Frontline Medical Communications

VP, SALES **Mike Guire**
VP, DIGITAL CONTENT & STRATEGY
Amy Pfeiffer
PRESIDENT, CUSTOM SOLUTIONS
JoAnn Wahl
CIRCULATION DIRECTOR **Jared Sonners**

In affiliation with Global Academy for Medical Education, LLC

PRESIDENT **David J. Small, MBA**

FRONTLINE | **MDedge**[®]
MEDICAL COMMUNICATIONS

7 Century Drive, Suite 302
Parsippany, NJ 07054
Tel: (973) 206-3434
Fax: (973) 206-9378
www.frontlinemedcom.com

Subscription Inquiries:
subscriptions@mdedge.com

Published through an
educational partnership with

CINCINNATI

From the Editor
continued from page 5

emerging.⁵ But the exact mechanisms by which the gut microbiome can impact mental health is still a work in progress. It is highly likely that dysbiosis is associated with mood and anxiety symptoms.

The bottom line: Sexual activity—whether it is heavy kissing, vaginal intercourse, oral sex, anal sex, or extensive skin contact—can lead to the exchange of microbiota. If an individual has dysbiosis, that could impact the mental health of their sexual partner(s). This raises the question of whether counseling patients about avoiding indiscriminate sex and practicing safe sex is as important for mental health as diet and exercise counseling is for physical health.



Henry A. Nasrallah, MD
Editor-in-Chief

References

1. Reid G, Younes JA, Van der Mei HC, et al. Microbiota restoration: natural and supplemented recovery of human microbial communities. *Nat Rev Microbiol.* 2011;9(1):27-38.
2. Cryan JF, Dinan TG. Mind-altering microorganisms: the impact of the gut microbiota on brain and behaviour. *Nat Rev Neurosci.* 2012;13(10):701-712.
3. Peirce JM, Alviña K. The role of inflammation and the gut microbiome in depression and anxiety. *J Neurosci Res.* 2019;97(10):1223-1241.
4. Yolken R, Prandovszky E, Severance EG, et al. The oropharyngeal microbiome is altered in individuals with schizophrenia and mania. *Schizophr Res.* 2021; 234:51-57.
5. Capuco A, Urits I, Hasoon J, et al. Current perspectives on gut microbiome dysbiosis and depression. *Adv Ther.* 2020;37(4):1328-1346.
6. Zozaya M, Ferris MJ, Siren JD, et al. Bacterial communities in penile skin, male urethra, and vagina of heterosexual couples with and without bacterial vaginosis. *Microbiome.* 2016;4:16. doi:10.1186/s40168-016-0161-6
7. Hou D, Zhou X, Zhong X, et al. Microbiota of the seminal fluid from healthy and infertile men. *Fertil Steril.* 2013;100(5):1261-1269.
8. Gallo MF, Warner L, King CC, et al. Association between semen exposure and incident bacterial vaginosis. *Infect Dis Obstet Gynecol.* 2011;2011:842652.
9. Liu CM, Hungate BA, Tobian AA, et al. Penile microbiota and female partner bacterial vaginosis in Rakai, Uganda. *mBio.* 2015;6(3):e00589. doi:10.1128/mBio.00589-15
10. Carda-Diéguez M, Cárdenas N, Aparicio M, et al. Variations in vaginal, penile, and oral microbiota after sexual intercourse: a case report. *Front Med.* 2019;6:178. doi:10.3389/fmed.2019.00178

**It is highly likely that
dysbiosis is associated
with mood and anxiety
symptoms**