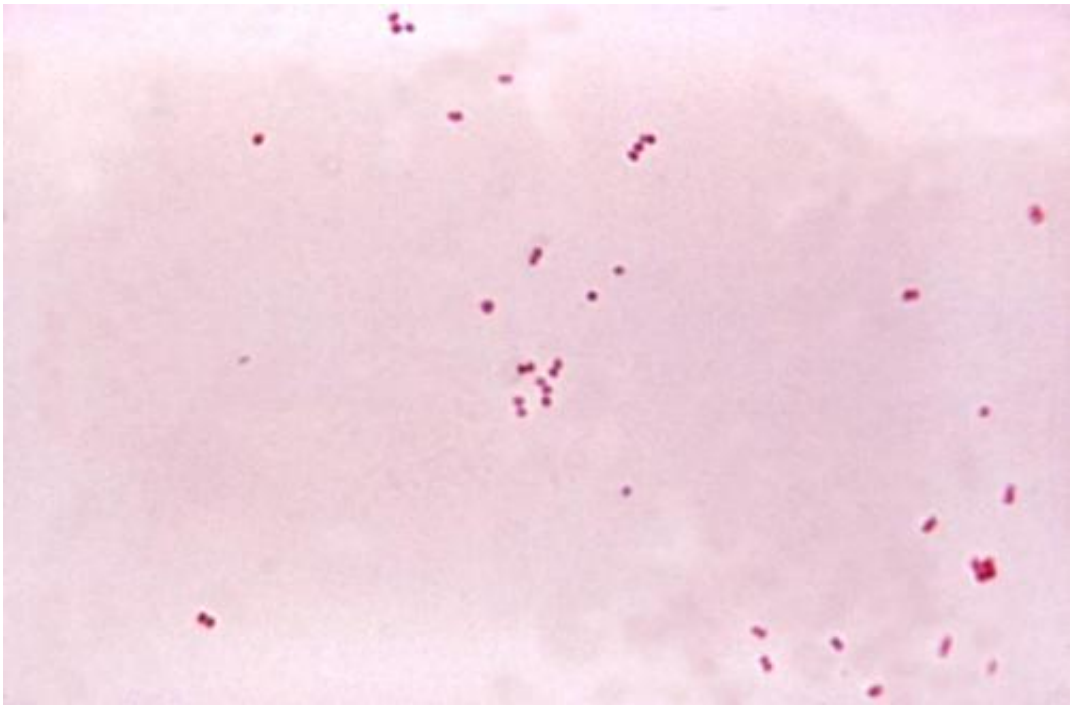
MedicalXpress

Antipsychotic meds found to be effective against bacteria that cause meningitis

March 26 2019, by Bob Yirka



Gram stain of meningococci from a culture showing Gram negative (pink) bacteria, often in pairs. Credit: public domain

A team of researchers affiliated with multiple institutions in France has found that a class of antipsychotic drugs known as phenothiazines was successful in treating a form of meningitis in mice when used with antibacterial agents. In their paper published in the journal *Nature Microbiology*, the group describes experiments they conducted with meningitis mouse models and what they found.

Meningitis is not a disease, but a condition caused by viral, bacterial or fungal infections. The condition occurs when infections result in swelling of the meninges (membranes that cover the brain and spinal column). Different types of infectious agents can result in different degrees of danger to a patient. One agent, a kind of bacteria called Neisseria meningitidis, is well known for the severity of its infections—typically, 10 percent of people die from it. In this new effort, the researchers report on experiments they conducted with a class of antipsychotic medicines that allowed antibacterial agents to perform better against Neisseria meningitidis.

Neisseria meningitidis is notoriously difficult to treat because of the way it behaves inside blood vessels. Each bacterium is covered with sticky, hair-like appendages called type IV pili. The pili allow the bacteria to group together into a clump and adhere to the walls of blood vessels. The clumps prevent antibacterial agents from killing most of the bacteria, allowing the infection to continue. In this new effort, the researchers found that phenothiazines work against the stickiness of the pili, preventing the bacteria from clumping. This allows antibacterial agents to do their job.

The researchers tested the combination of drugs in test mice with meningitis. They report that the combination resulted in a reduction of existing clumps, a reduction in the development of new clumps and increased survival rates.

It is not yet known if it would be safe to treat humans with the same drugs because they have not been tested in patients with a severe inflammatory infection. The researchers describe their work as proof of concept and suggest much more work will need to be done to find out if phenothiazines can be used to treat meningitis patients. They note that other pathogens also use Type IV pili as a defense mechanism, which suggests that if phenothiazines pan out as a human treatment, they might

be useful for more than just combating Neisseria meningitidis.

More information: Kevin Denis et al. Targeting Type IV pili as an antivirulence strategy against invasive meningococcal disease, *Nature Microbiology* (2019). DOI: 10.1038/s41564-019-0395-8