There is a 1 out of 4 chance that *Staphylococcus aureus* may be living in your nasal cavity right now.

**Methods of Testing**

1. **Isolate Swabs**
   - **Nasal Swab**
   - **Grow Isolated swabs onto TSA Plate**
   - **Isolate bacteria into MA Plate**
   - **Grow fresh bacteria on MA plate**
   - **Use bacteria to perform Catalase Test**
   - **Do a Gram stain on bacteria**
   - **Positive Gram Stain: Purple, Gram positive bacterium in cocci/clusters**
   - **Negative Gram Stain: Grey, Gram negative bacterium, in rods and chains orientation**

2. **Isolate Swabs**
   - **Negative MSA Plate: No yellow color change of medium surrounding colonies & smear of bacteria**
   - **Positive MSA Plate: Yellow color change of medium surrounding colonies & smear of bacteria**
   - **Negative CNA Test: No hemolysis on CNA plate**
   - **Positive CNA Test: No hemolysis on CNA plate**
   - **Negative Catalase Test: no presence of catalase enzyme—no bubbles of O2 gas**
   - **Positive Catalase Test: Presence of catalase enzyme—bubbles of O2 gas**

**TEST SIGNIFICANCES**

- Manitol Salt Agar (MSA) plate contains a high salt concentration and mimics what it would be like for a bacterium to grow on human skin. *S. aureus* can grow on this plate because it can thrive under high salt conditions. When it grows, it causes the fermentation of manitol, which gives it the yellow color change on the plate (2).

- Deoxyribonuclease (DNase) plate looks for the presence of DNase enzymes. The plate’s medium contains DNA in it that can be broken down by a *S. aureus* enzyme called deoxyribonuclease, which you can see by the halo color change. The deoxyribonuclease catalyzes the hydrolytic cleavage of phosphodiester linkages in DNA backbone. This gives the bacteria nutrients and helps to support its growth (3).

- Coagulase test is done to see if the bacterium has the coagulase enzyme, which will cause aggregation of red particles on the blue background. The coagulase enzyme converts fibrinogen to fibrin which gives *S. aureus* the ability to clot blood/plasma. Fibrin also can coat the bacteria and prevent it from getting phagocytosed (4).

- Columbia Nalidixic Acid Blood agar (CNA) plate contains two antibiotics that don’t allow gram-negative organisms to grow on it. It also contains blood which allows for beta hemolysis to be seen. In order for the yellow glow to occur, the bacterium must possess hemolysins that cause blood cell lysis. *S. aureus* use their hemolysins to lyse RBC, which causes hemostatic disturbances (1).

- Catalase test is looking for the presence of a catalase enzyme, and when it comes into contact with hydrogen peroxide, will cause O2 gas to be released (bubbles). *S. aureus* uses catalase enzyme to protect itself from oxidative damage (5).

- Gram stain is done in order to look at the bacterium under the microscope to make sure that it looks like a *S. aureus* bacterium. Typical *S. aureus* bacterium are Gram Positive (Purple color) and in cocci shape and grape like orientations.