Urease-positive Organisms

Urease-positive organisms are a group of organisms that can convert urea to ammonia and carbon dioxide. This will result in increased urine pH. These organisms include Proteus, Nocardia, Ureaplasma, Helicobacter Pylori, Klebsiella, Cryptococcus, Staphylococcus Epidermidis, and Staphylococcus Saprophyticus.

PLAY PICMONIC

Characteristics

Converts Urea to Ammonia and CO₂
U-Rainbow, Ammo, and CO2-molecules
Urease-positive organisms are microorganisms containing the enzyme urease, which enables them to hydrolyse urea. This results in the production of ammonia and carbon dioxide.

Increases Urine pH
Up-arrow Urinal pH-scale
The production of ammonia will result in alkalinization (increased pH). As this most often occurs in urine, the presence of these organisms will result in an elevated urine pH.

Organisms

Helicobacter Pylori
Helicopter-bacteria
H. pylori is a gram-negative, oxidase positive curved rod. It is characterized by its triple positivity: the organism is catalase positive, oxidase positive, and urease positive. Urease provides a suitably basic environment for H. pylori to live in the acidic mucosa in the antrum of the stomach.

Klebsiella
Clubbing-sea-lion
Klebsiella is the third leading cause of urinary tract infection. It has a large mucoid capsule and viscous colonies. Nosocomial infection due to urinary catheterization can be caused by this pathogen. “Currant jelly” sputum can be present in patients infected by Klebsiella.

Cryptococcus
Crippled-cock
Cryptococcus is the only fungus that is urease positive. It can be seen clearly on histology with an India ink stain as well as with mucicarmine. A patient can be infected by this pathogen through inhalation, resulting in hematogenous dissemination to the meninges. Cryptococcal disease is primarily seen in immunocompromised patients.

Ureaplasma
U-rainbow-plasma-TV
Ureaplasma is a pleomorphic bacteria without a cell wall which can cause urinary tract infection. Immunocompromised patients and those with multiple sexual partners are most at risk of being infected with this pathogen.

Proteus
Prometheus
Proteus mirabilis is a gram-negative, oxidase negative bacilli that does not ferment lactose. It produces hydrogen sulfide (H2S) on triple sugar iron (TSI) agar. It is associated with the development of renal struvite stones. Nosocomial infection due to urinary catheterization can occur due to this pathogen.

Nocardia

Note-card

Nocardia is gram-positive aerobic bacteria with branching filaments. It is also characterized by catalase-positivity and urease-positivity. Infected patients can present with lung cavitation, brain abscesses, and/or kidney abscesses. Immunocompromised patients such as those with HIV/AIDS are most at risk of developing this infection.

Staphylococcus Epidermidis

Staff on Epidermis histology

S. epidermidis is a gram-positive cocci that is catalase positive, coagulase negative, and novobiocin sensitive. It is a part of the normal flora of the skin and can contaminate blood cultures. Infection occurs due to adherent biofilms which are created by the pathogen in prosthetic devices and IV catheters.

Staphylococcus Saprophyticus

Staff Sapphire

S. saprophyticus is a gram-positive cocci with catalase positivity, coagulase negativity, and novobiocin resistance. It is the second leading cause of urinary tract infection, and is especially common in sexually active women.