



DEPARTMENT OF MICROBIOLOGY

INFECTIOUS DISEASE BULLETIN

VOLUME 1 ISSUE 2

FEBRUARY 2022

SNIPPETS FROM HISTORY

Agar's journey from kitchen material to Microbiology laboratory is a great story to read

Agar, a jelly like substance derived from sea weeds can be found in all the microbiology labs as it is an important ingredient to solidify the media and isolate pure cultures. But it was not always that easy as it sounds before its discovery. In a quest to isolate bacterial colonies Robert Koch tried a lot of things including potato and gelatin; nevertheless had limited success.

All this changed in 1881, when Walter Hesse and his wife Fanny Angelina Hesse joined Koch's lab in Germany. Walter Hesse also faced the same problem and as the fate had it, he shared the issue with his wife Angelina over a picnic lunch. Walter observed that jellies and puddings made by Angelina tend to remain gelled even in warm weather and asked about the reason. She told him she has used agar for solidifying it. Walter suggested this idea to Robert Koch and the **rest is HISTORY**. Using agar to solidify media Koch identified 21 diseases including TB, Plague and Cholera, achieving biggest advances in Clinical Microbiology.



Fanny Angelina Hesse & Walter Hesse

PHOTO QUIZ

A 50 year old man K/C/O diabetes and hypertension presented with dry cough, intermittent fever, progressive dyspnea on exertion and fatigue since 1 week. He was diagnosed with Covid-19 five days prior to presentation by RT PCR. A chest radiograph taken is shown in Fig 1. He was admitted for supportive care and monitoring. On day 5 of hospitalization he developed progressive hypoxic respiratory failure requiring mechanical ventilation. A follow up chest radiograph revealed worsening infiltrates bilaterally. He was given tocilizumab IV at 600 mg every 8 hours for a total of 3 doses and 200 ml of convalescent plasma. His sputum culture obtained at the time of intubation grew methicillin sensitive *Staphylococcus aureus* for which IV cefazolin was started. After extubation on hospitalization day 14, he developed a new fever - 101.3 deg. F, elevated WBC - 25,010 cells/ml and absolute neutrophils 15,780 cells/ml. His platelet count was 282,000 cells/ml and HbA1c was 9.9%. RFT and LFT were normal. A CT angiography of thorax revealed findings as in Fig 2. A sputum culture was obtained and he was continued on cefazolin with no significant change in clinical status. Two days later his sputum culture grew the organism shown in Fig 3.

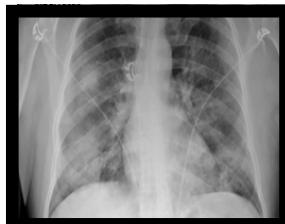


Fig 1: Chest Radiograph single view shows patchy infiltrates in the bilateral perihilar region and bases, right greater than left

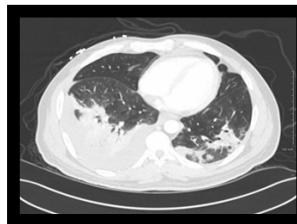


Fig 2: CT Angiography of the Thorax shows dense consolidation in the superior segments of bilateral lower lobes with bubbly appearance on the right concerning for necrotizing pneumonia

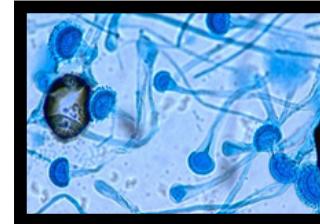


Fig 3: Lactophenol cotton blue stain (40X)

KNOW YOUR BUGS

Newly discovered species of Enterococcus : *Enterococcus innesii*



Enterococcus, a gram positive bacteria is a well-known cause of nosocomial infections worldwide. It is the second most common cause of UTI and third most common cause of bacteremia in hospital settings. The major concern involving this bacteria is its natural-intrinsic resistance to several antimicrobials and capacity to quickly acquire virulence and multidrug resistance determinants. Among various known species; *E.faecalis* and *E.faecium* are responsible for majority of infections. More recently, there is discovery of a new species of *Enterococcus* called *E.innesii* that has been named after the Academic Institute where it was identified — the John Innes Centre. Researchers made this discovery while investigating the gut microbiome of the Greater Wax Moth, *Galleria mellonella*.

With this finding, *Enterococcus innesii* joins 59 species of *Enterococci* already known to science. As it has genetic similarity to *E.gallinarum* and *E.casseliflavus*, it may be a cause of hospital – acquired infections in future. The threat lies in the fact that that *E.innesii* carries a gene that makes the bacterium resistant to the antibiotic vancomycin.



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KNOW YOUR DRUGS

LINEZOLID



- Linezolid, a synthetic oxazolidinones, a bacteriostatic antibiotic : inhibits protein synthesis
- So, what are they good for : Infections caused by resistant gram positive organisms : MRSA, VRE and penicillin resistant S.pneumoniae
- No activity against gram negative bacteria
- Have activity against Mycobacterium tuberculosis and a variety of NTM like M.abscessus complex and M.avium complex. Also has activity for Nocardia species
- Known to suppress bacterial toxins too
- Oral bioavailability is 100% . Available in IV, in tablets and oral suspension formulation
- Dual hepatic and renal elimination and no dose adjustment needed in cases of renal and hepatic dysfunction
- Good tissue penetration. Penetrates well into most body compartments (including bone, alveoli and CSF)
- Useful for pneumonia, skin and skin structure infections , UTIs
- Dosing : Approved dose for adults and adolescents is 600mg IV or orally every 12 hours for serious infection and for uncomplicated skin and skin structure infection :400 mg every 12 hours
- Pediatric :10mg/kg IV or orally either every 8 hours (<= 12 years of age) or every 12 hours >=12 years of age)
- Duration of therapy : 10-14 days for skin and skin structure infections and pneumonia. In VRE infections it is prolonged therapy for 14-28 days
- Licensed for a max treatment duration of 28 days
- BE CAREFUL:
 - *Usually well tolerated but can cause bone marrow suppression, most commonly thrombocytopenia
 - *Bone suppression tends to occur after 2 or more weeks with therapy and warrants monitoring.....
 - For patients receiving linezolid for >7 days, routine lab monitoring includes weekly CBC, basic metabolic panel and LFT
 - *In addition, with linezolid, peripheral neuropathy or lactic acidosis may occur after even more prolonged therapy

If possible, avoid concurrent use of it with SSRIs because of fear of serotonin syndrome. Though this reaction is uncommon but it is there. Patient taking SSRI should discontinue them atleast 2 weeks prior to beginning therapy

FDA Approved for adults and children

1. Nosocomial pneumonia - MRSA/MSSA or S.pneumoniae
2. Community acquired pneumonia by S.pneumoniae including cases with concurrent bacteremia or MSSA
3. Complicated skin and skin structure infections including diabetic foot without concomitant osteomyelitis caused by MRSA/MSSA, S.pyogenes or S.agalactiae
4. Uncomplicated skin and skin structure infections caused by MSSA or S.pyogenes
5. Vancomycin resistant E.faecium infections including those with concurrent bacteremia

COVID CORNER

Researchers find a powerful antiviral combination to treat COVID-19

A newly discovered experimental drug brequinar which when combined with either of the two FDA approved drugs remdesivir or molnupiravir can inhibit the growth of the SARS-CoV-2 virus in human lung cells and in mice. These findings suggest that these drugs are more potent when used in combination than individually. Though no clinical trials of combination have been done yet, it seems it has potential to substantially reduce hospitalizations and deaths as it could work synergistically to create a more potent effect against the virus. Looking at on-going scenario, there remains an urgent need for newer therapeutics to treat COVID-19 as there is an ongoing threat of new variants that may evade vaccines. Now, the next move is to test these therapeutics in clinical trials keeping in view the on-going scenario where COVID-19 threat has been amplified by new variants that may evade vaccines.



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ANSWER

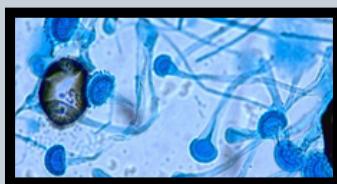
Probable Invasive Pulmonary Aspergillosis in a Person with Covid-19

A diagnosis of probable invasive pulmonary aspergillosis was made based on CT findings, microbiological data and positive galactomannan antigen. [Serum Aspergillus galactomannan antigen resulted with an index value of >1.110 (reference range >0.5 – patients with an index value of ≥ 0.5 are considered to be positive for galactomannan antigen) while Beta-D Glucan was negative]

He was started on oral voriconazole with initial loading dose of 400 mg twice a day followed by maintenance dosing of 200 mg twice a day. Voriconazole was planned to be continued for a total of 12 weeks. He remained afebrile and was completely weaned off of oxygen at the time of discharge.

To discuss, critically ill patients with Covid-19 have a high risk of secondary infections. Invasive pulmonary aspergillosis (IPA) has been increasingly reported as a co-infection in people with Covid-19 pneumonia. Since mortality rates are higher in untreated IPA, early diagnosis and treatment is warranted in patients with high suspicion for IPA. Voriconazole is the first line antifungal and the recommended dosing regimen is 6mg/kg IV every 12 hours on day 1 followed by 4mg/kg IV every 12 hours thereafter. Once the patient can take oral medications, can be switched to an oral form. The currently recommended dose is 200mg orally every 12 hours. The dose of oral voriconazole can be increased in patients with disease progression. The minimum duration of therapy is 6-12 weeks with adequate follow up with serum galactomannan and imaging. But for most immunosuppressed patients, antifungal therapy will continue for months or even years in some cases.

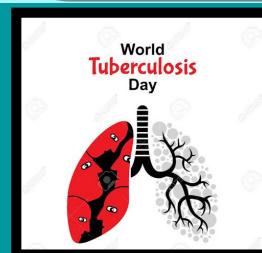
Posaconazole and isavuconazole are preferred alternatives for patients who cannot tolerate voriconazole or when it is advisable to avoid its side effects.



Lactophenol cotton blue stain from sputum culture shows Aspergillus fumigatus (40X)

[Reference for diagnostic criteria of probable IPA: Revision and update of the consensus definitions of invasive fungal disease from the European Organization for Research and Treatment of Cancer and the Mycoses Study Group Education and Research Consortium. Clinical Infectious Diseases]

Source : Case #20002: New Fever and Consolidation in a patient recovering from Covid-19 [Internet]. Partners Infectious Disease Images. Available from: <http://www.idimages.org/idreview/case?caseid=584>.



UPCOMING EVENTS

24 March 2022

'Invest to End TB. Save Lives....'

OUR TEAM

Dr. (Col) A. Agrawal	Dr. Twinkle Parmar
Dr. Navneet Kaur	Dr. Riddhi Panchani
Dr. Anil Chaudhary	Dr. Harvi Ardeshana
Dr. Mayuri Bhise	Dr. Prakash Parmar

Investigations Available at AIIMS OPD

Serology:

- 1.RA Factor
- 2.ASO test
- 3.TPHA test
- 4.Widal test
- 5.Typhi dot
- 6.Leptospira IgG/IgM

Bacteriology:

- 1.Gram staining
- 2.ZN staining
- 3.Modified ZN staining for Lepra bacilli
- 4.Modified ZN staining for Nocardia
- 5.Montoux test
- 6.Albert Stain for Corynebacterium diphtheriae

KNOW YOUR LAB



Virology:

- 1.Dengue NS1/IgG/IgM
- 2.Chikungunya IgM
- 3.Hepatitis A IgM
- 4.Hepatitis E IgM
- 5.HBsAg rapid test
- 6.Hepatitis C Ab test
- 7.HIV 1&2 Ab test
- 8.Covid Rapid Ag

Parasitology:

- 1.Stool R&ME
- 2.Stool for occult blood
- 3.Modified ZN Staining for coccidian parasites
- 4.Malaria rapid card test

Mycology:

- 1.KOH Examination for fungal elements
- 2.India Ink for Cryptococcus

IN THE NEWS

1. Forgotten antibiotic may be useful in treating severe febrile urinary tract infections
<https://www.newsmedical.net/news/20211029/Forgotten-antibiotic-may-be-useful-in-treating-severe-febrile-urinary-tract-infections.aspx>
2. Disseminated infection remains 'infrequent but serious' complication of gonorrhea
<https://www.healio.com/news/infectious-disease/20220218/disseminated-infection-remains-infrequent-but-serious-complication-of-gonorrhea>
3. New method can disarm antibiotic resistance in deadly bacteria
<https://phys.org/news/2022-02-method-antibiotic-resistance-deadly-bacteria.amp>
4. Immunoglobulin-free strategy prevents mother-to-child HBV transmission
<https://www.healio.com/news/primary-care/20220216/immunoglobulinfree-strategy-prevents-mothertochild-hbv-transmission>
5. Wild polio detected in Africa for first time in more than 5 year
<https://www.healio.com/news/infectious-disease/20220218/wild-polio-detected-in-africa-for-first-time-in-more-than-5-years>