

INTRODUCTION TO MICROBIOLOGY



MICROBIOLOGY

- Study of microorganisms
- Normal flora
- Pathogenic
- Medical Assistant's role
 - obtain / assist in specimen collection
 - preparation of specimens
 - examination
 - transport



How do microorganisms cause disease?

- Utilize body nutrients
- Damage body cells
- Autoimmune reactions
- Produce toxins
- Direct contact
- Indirect contact:
 - fomites
 - vectors



CLASSIFICATION / NAMING MICROORGANISMS

- Classification based upon structure:
 - Subcellular
 - Prokaryotic
 - Eukaryotic
- Types of microorganisms:
 - Viruses: smallest, live / grow only within living cells
 - Bacteria: reproduce quickly, major cause of disease
 - Protozoans: larger than bacteria, origin soil & water
 - Fungi: budding reproduction, yeasts & molds
 - Multicellular parasites: live on or in another organism, worms, insects



BACTERIA CLASSIFICATION

- Shape:
 - cocci: spherical, round, ovoid
 - bacilli: rod-shaped
 - spirilla: spiral-shaped
 - vibrios: comma-shaped
- ability to retain dyes, aerobic, anaerobic, (facultative) & biochemical reactions



BACTERIA IDENTIFICATION

- Cocci:
 - Staphylococci: grapelike clusters, common on skin
 - Diplococci: pairs, gonorrhea, meningitis
 - Streptococci: grow in chains, strep throat
- Bacilli: gastroenteritis, TB, pneumonia, UTI, botulism, tetanus
- Spirilla: syphilis, Lyme disease
- Vibrios: cholera, food poisoning



HOW INFECTIONS ARE DIAGNOSED

- Examine patient: signs & symptoms
- Obtain specimen(s)
- Examine specimen directly:
 - wet mount: 0.9% sodium chloride (NaCl)
 - KOH mount: potassium hydroxide, fungi of skin
 - smear: spread thinly & unevenly on slide
- Culture specimen:
 - media (agar), incubator
- Determine culture's antibiotic sensitivity:
 - C & S, sensitivity, resistant
- Treat patient: antimicrobial



SPECIMEN COLLECTION IS THE MOST IMPORTANT STEP!

- Unidentified, misidentified organisms
- Contamination
- Ineffective, harmful therapy
- Common culture specimens:
 - throat
 - sputum
 - stool
 - urine
 - wound



STOOL SPECIMENS

- Culture
- O & P (ova & parasite specimen)
 - fresh: examined macroscopically & microscopically
 - preserved specimen
 - 3 samples
 - medications to be avoided:
 - antidiarrheal compounds, antacids & mineral oil laxatives for at least 1 week before collection



STAINED SPECIMENS

- Dyes enhance visualization of microorganisms
- Prepare smear
- Acid fast stain: bacteria with waxy cell wall, TB
- Gram's stain:
 - crystal violet / wash
 - iodine / wash
 - decolorizing solution (ETOH or acetone-alcohol)
 - safranin: red counterstain
 - Gram positive: appear blue or violet
 - Gram negative: appear red



CULTURE MEDIA

- Media contain nutrients
- Liquid, semisolid & solid forms
- Colony: distinct group of organisms
- Selective media
- Nonselective media: blood agar
- Agar handling guidelines: store agar side up, handle only outside, label bottom only
- Qualitative analysis
- Quantitative analysis



LET'S CULTURE...


