Lecture-1: purpose and philosophy

Manifestations of Infection

The clinical presentation of an infectious disease reflects the interaction between the host and the microorganism. This interaction is affected by the **host immune status and microbial virulence factors**. Signs and symptoms vary according to the site and severity of infection. Diagnosis requires a composite of information, including history, physical examination, radiographic findings, and laboratory data.

Microbial Causes of Infection

Infections may be caused by bacteria, viruses, fungi, and parasites. The pathogen may be **exogenous** (acquired from environmental or animal sources or from other persons) or **endogenous** (from the normal flora).

Diagnostic Microbiology is the tool that makes it possible to identify the exact pathogens of infectious diseases and the most optimal therapy at the level of individual patients.

Conventional methods require time to grow the microbes in vitro under specific conditions and not all microbes can easily be cultured. This is followed by biochemical methods for identification which further makes the process lengthy. Transport of the specimens under less than ideal conditions, prior use of antibiotics and small number of organisms are among the factors that render culture-based methods less reliable.

Newer methods depend on amplification of nucleic acids

followed by use of probes for identification. This mitigates the need for higher microbial load, presence of metabolically active viable organisms and shortens the time. These methods can be used to detect antibiotic resistance genes directly from the specimen and help direct targeted therapy with efficacy. Since these methods will not

fulfill all the diagnostic needs, a second approach is being used to shorten the time to identification after the organism has already grown.

Microbial colonization

Microbial colonization may result in:

1) **Elimination** of the microorganism without affecting the host.

2) Infection in which the organisms multiply and cause the host to react by making an immune or other type of response.

3) A transient or prolonged carrier state.

Infectious disease occurs when the organism causes tissue damage and loss function of body systems. So that the purpose and the philosophy of diagnostic bacteriology is depending on **identifying the causative microorganism by different laboratory methods which is usually essential for effective antimicrobial and supportive therapy**. Through that initial treatment may be empiric, based on the microbiologic epidemiology of the infection and the patient's symptoms. However, **definitive microbiologic diagnosis of an infectious disease usually involves one or more of the following five basic laboratory techniques,** which guide the physician along a narrowing path of possible causative pathogens:

1. **Morphologic identification** of the agent in stains of specimens or sections of tissues (light and electron microscopy).

2. **Cultivation and identification** of the organisms.

3**. Detection of microbial antigens by immunologic assay (latex agglutination, enzyme immunoassay [EIA].**

4. **Detection of microbial DNA or RNA.**

5- **Detection of an inflammatory or host immune response** to the pathogenic agents as shown in figure-1.

After **obtaining the proper specimens** and informing the laboratory of the careful clinical diagnosis, **the clinician should begin treatment with drugs** aimed at the organism thought to be responsible for the patient's illness.

As the laboratory staff begins to obtain results, they inform health care providers, who can then reevaluate the diagnosis and clinical course of the patient and perhaps make changes in the therapeutic program. This "**feedback**" information from the laboratory consists of earliest reports of the results of individual steps in the isolation and identification of the causative agent.

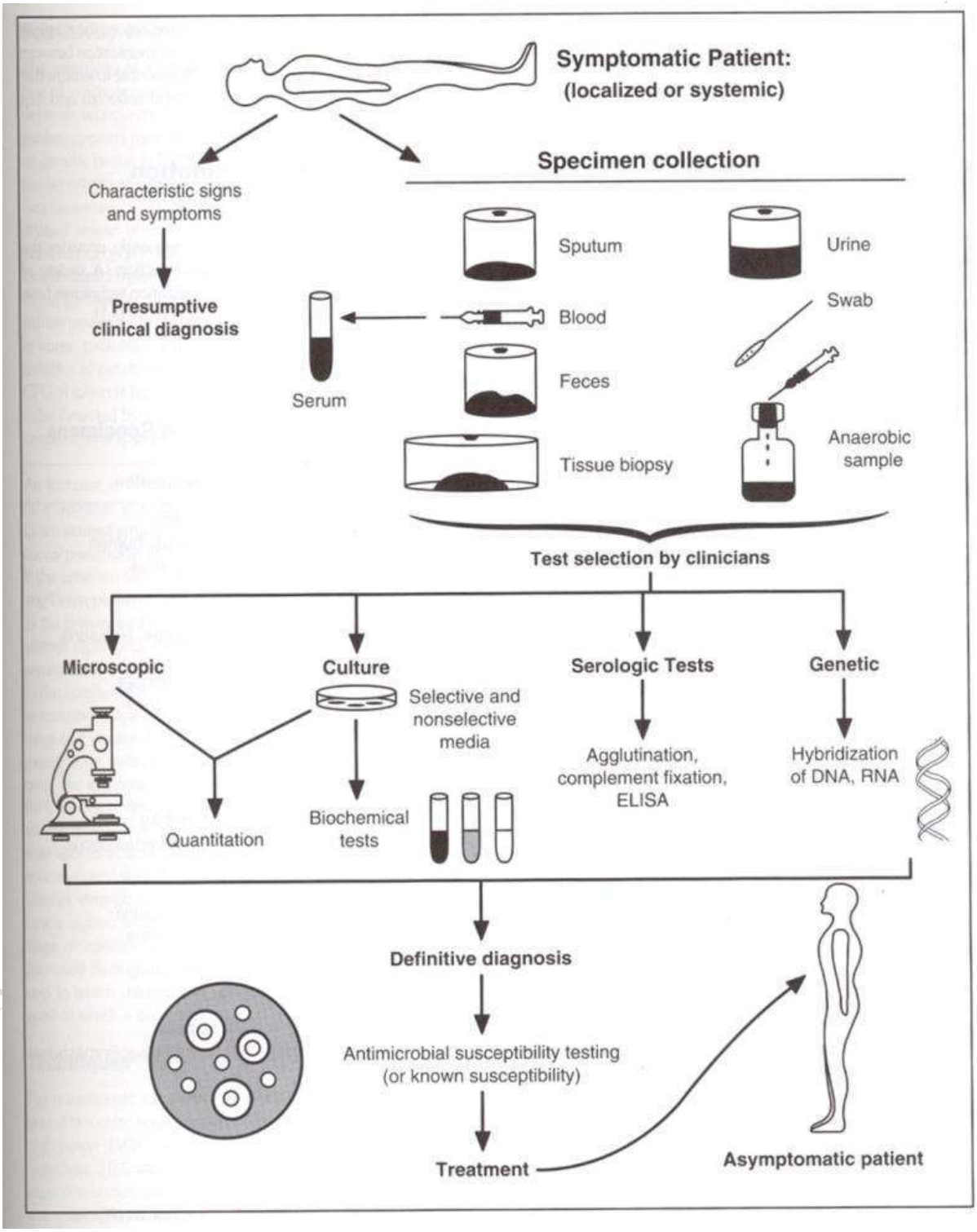

Figure (1): Represent human specimens collection and diagnoses.