

- c) It contains several growth factors e.g., platelet - derived growth factor (PDGF), transforming growth factor β (TGF- β), epidermal growth factor, fibroblast growth factor, endothelial growth factor etc.

Both hormones and growth factors are involved in growth promotion and specialized cell function. They may stimulate growth of one cell type, may have no effect on another and may even be inhibitory to some others.

- d) A major role of serum is to supply proteins e.g., fibronectin which promote attachment of cells to the substrate. It also provides spreading factors that help the cells to spread out before they can begin to divide.
- e) It provides several binding proteins e.g. albumin, transferrin, which carry other molecules into the cell. For e.g: albumin carries into cells lipids vitamins, hormones etc. Transferrin carries Fe.
- f) Protease inhibitors present in the serum protect cells, especially trypsinized cells, from proteolysis.
- g) The serum also provides several minerals e.g., Na^+ , Fe^{2+} , K^+ , Zn^{2+} , Cu^{2+} etc.
- h) It also acts as a buffer.

Disadvantages of using serum in the culture medium are:

- a) Inhibit growth of some cell types e.g., epidermal keratinocytes.
- b) There is a large variation in serum quality from one batch to another; this requires costly and time consuming testing every time a new batch of serum has to be used.

2) Serum-free Media-

The various **advantages of serum free media** are:

- a) Toxic effects of serum are avoided.
- b) Biassays are free from interference due to serum proteins.

c) There is no danger of degradation of sensitive proteins by serum proteases.

Disadvantages of serum-free media are:

- a) Specific to one cell type so different media may be required for different cell types.
- b) A greater control of pH, temperature etc. is necessary as compared to that with serum containing media.
- c) Growth rate and the maximum cell density attained are lower than those with serum containing media.

3) **Chemically Defined Media-** These media contain contamination free ultrapure inorganic and organic and many pure additives like insulin, epidermal growth factor, etc.

• **Protein-free Media-** They do not contain any protein; they only contain non-protein constituents necessary for culture of the cells.

COMPONENTS OF A SUITABLE ANIMAL CELL CULTURE MEDIA-

2) BASIC MEDIA-

The most basic media are balanced salt solutions i.e; phosphate buffered saline PBS which may be used for growing cells and for short incubations in suspension. More complex defined media are used for growth and maintenance. Defined media can also vary in complexity by the addition of a number of constituents for ex- minimum essential medium (MEM) which contains essential amino acids, vitamins and salts and also other extra metabolites such as nucleosides.

3) BUFFERING CAPACITY-

A number of supplements to the basic media are necessary to enable them to be used for cell culture. Cell cultures have an optimum pH for growth which is generally between pH 7.4 to 7.7. A Bicarbonate- CO_2 buffering system is most commonly used due to its low toxicity towards the cell. HEPES a much stronger buffer may also be used. However in this case much greater concentrations of HEPES than bicarbonate are required when used in a CO_2 atmosphere. Each type of media has a recommended bicarbonate concentration and CO_2 concentration to achieve the correct pH and osmolality.

3) ANTIBIOTICS AND ANTIMICOTICS-

Sometimes it becomes necessary to incorporate antibiotics and antimicrobics in the medium. A wide range of suitable preparations are available from relatively specific antibiotics i.e. penicillin, streptomycin solution to broad spectrum antibacterial or antimicrobial agents such as Kanamycin or Amphotericin B etc. The antibiotics chosen should clearly not be toxic to the cells in culture and may depend on the type of contamination experienced in the individual laboratory.

4) SERUM- Although there is much research in attempting to reduce the requirement of cells for serum by alternative to reduce the requirement of cells for serum by alternative. Supplementation of the media, it is apparent that most cell lines still require serum for adequate growth. Various sources of serum may be used such as calf and horse. Many continuous cell lines utilize calf serum but