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# TERMINOLOGIES

**ALLELES:**

The two partners of gene pair or gene located on corresponding loci of two homologous chromosomes.

**ANTIBODY:**

A Y-shaped protein on the surface of B-cell that is secreted into the blood or lymph in response to an antigen stimulus such as bacterium, viruses, parasites or transplanted organs and that neutralize the antigen by binding specifically to it.

**ANTIGEN:**

A foreign substance that stimulate the production of an antibody by immune system when introduced into the body. Antigen includes toxin, bacteria, virus and other foreign substances.

**ANTICODON:**

A triplet of nucleotides t RNA which is associated by complementary base pairing with specific triplet (codon) in mRNA during protein synthesis.

**BIOASSAY:**

Determination of relative strength of a drug by comparing its effects on a test organism with that of standard preparation.

**BACTERIOPHAGE:**

A virus infecting bacterium that replicate with cells of bacteria.

**BIOSENSOR OR ENZYME ELECTRODE:**

Refers to sub devices that sense and analyze biological information, namely; BP, temperature, heartbeat, and determination of enzymes or chemicals in the body.

**BIOTECHNOLOGY:**

Biotechnology can be defined as the use of biological organisms (such as viruses, prokaryotes and eukaryotes) or their components (such as systems and processes) to generate products services useful to human beings.

or

Biotechnology is the means or ways of manipulating life form (organism) to provide multiple products for men's use. e.g. Insulin

or

Any technological application that uses biological system living organism or derivatives thereof to make or modify products or processes for specific use.

or

Application of scientific and technical advances in life science to develop commercial product.

The term 'biotechnology' was coined by a Hungarian engineer Karl Ereky (1917)to describe a process for large scale production of pigs using sugarbeet as food.



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## CARRIER MATRICES:

The substance that are solely employed for the immobilization of enzyme are known of carrier matrices e.g. inorganic material (salt) and inert polymer.

## CHIMERIC GENE:

AN artificial gene produced by combining by DNA sequences from several difference sources.

## CLONE:

A group of genetically identical cells of organisms descended asexually from a common ancestor. All cells in the clone have same genetic material and are exact copies of the original.

## CARRIER:

A protein or polypeptide or inert matrix that is coupled to the hapten to form an antigen.

## CHROMOSOMES:

The deoxyribonucleic acid (DNA) bearing structure that carries the inheritable characteristic of an organism diploid organism.

## CROSS OVER:

The process where by a definite cleavage take place in each of the two adjacent DNA strands so that there exists of homologues regions of DNA precisely.

## CODON:

A sequence of three adjacent nucleotides in mRNA, constituting in genetic code that determines the insertion of a specific amino acid in a polypeptide chain during protein synthesis or the signal to stop protein synthesis.

## COMPLEMENTRY DNA (cDNA):

DNA synthesized from a mRNA rather than a DNA template .this type of DNA is used for cloning or as a DNA probe.

## DIPLOID CHROMOSOMES:

Chromosome having homologues pair and does having to distinct copies of each autosomal genetic locus.

## EPITOPES:

Antigenic determinants or specific antibody binding sites on the surface of antigen.

## GENE:

Any of the units occurring at specific points on the chromosomes, by which the heredity characteristics are transmitted and determined.

or

Sequence of the nucleotides that specifies a particular polypeptides or RNA sequences.

## GENOME:

Total amount of genetic information in the chromosomes of an organism, including its gene and DNA sequences.

## GENOMICS:

The effective utilization Computer based study and designing of genome is called genomics.

The term genomics was coined recently in 1986 by Thomas Roderick to describe the scientific discipline of mapping, sequencing and analyzing genomes.

Branches of genomics are:

Pharmacogenomics, Toxicogenomics and proteogenomics.

Achievements of genomics are:

1. Availability of recombinant proteins such as insulin (called humulin)
2. Production of Monoclonal antibodies.

## GENE EXPRESSION:

The effective utilization of information in a gene by a transcription and translation ultimately giving rise to the generation of protein and therefore, the appearance of the Phenotype determined by that gene.

### GENE THERAPY / GENE DELIVERY :

The process of insertion of normal DNA directly into host cells to correct genetic defects. Gene delivery is necessary for gene therapy and for genetic modification of crops.

### GENE ISOLATION:

The meticulous removal of genetic information, in the form of a DNA sequence, from a selected organism in order to study its structure or insert it into a vector in the course of gene manipulation.

## GENE CLONING:

Insertion of DNA sequence into a vector that may eventually be propagated in a host organism, there by producing a huge no of copies of sequence.

## GENE SPLICING:

A technique of genetic engineering in which phenotype characteristics produced in an organism by introducing DNA from another organism into its genetic material.

## HAPTEN:

A substance that normally does not act as an antigen or stimulate an immune response but that can be combined at a later time initiate a specific antibody response on its own.

or

A small molecule that can elicit an immune response only when attached to large carrier such as protein, the carrier may be one that itself does not elicit response. E.g. Hydralazine BP lowering product SLE.

## HUMAN GENOME IS MADE UP OF ABOUT 35000 GENES:

Total genetic information contained in a haploid set of chromosomes in eukaryotes, in a single chromosomes in bacteria or in DNA or RNA virus.

## HYBRIDOMA:

The cell produced by the fusion of an antibody producing cell and a multiple myeloma cell.

## HAPLOID CHROMOSOMES:

A single set of the homologues chromosomes that have half of the normal diploid number of chromosomes.

## MONOCLONAL ANTIBODY:

Any of the highly specific antibody produced in a large quantity by the clones of a single hybrid cell formed in the laboratory by the fusion of a beta ceii with the tumor cell.

## NANOTECHNOLOGY:

A branch of science and engineering developed to design and production of extremely small electronic device and circuits built from individual atoms and molecules. So development of atomic, molecular or microscope technology under 100 nanometer.

## NUCLEIC ACID:

Refers to linear polymer of nucleotides usually linked together by 3, 5 phosphodiaster. Bonds. In DNA the sugar moiety is deoxyribose and corresponding bases of the nucleotides are adenine, guanine, cytosine and thymine while in ribonucleic acid (RNA) sugar moiety is ribose and uracil replaces thymine amongst the four bases.

## NUCLEOLIDE:

Building blocks of the nucleic acid each nucleotides is composed of sugar phosphate and nitrogen base.

## Probe-DNA:

A radioactively labelled, (Usually p 32) DNA polymer is used to detect complementary sequence nucleic acid molecule by molecular hybridization.

## POLYCLONAL ANTIBODY:

A group of antibody by the different B – lymphocytes response to same antigen different antibody in the group recognized different part of the antigen.

## PLASMID:

An extracellular double strands unit of DNA that replicate within the cell independent of chromosomal DNA .plasmid are most often found in bacteria and used in recombinant DNA research transfer gene between cell.

## PHARMACEUTICAL TECHNOLOGY:

The application of scientific knowledge or technology to pharmacy, pharmacology, and the pharmaceutical industry. It includes methods, techniques, and instrumentation in the manufacture, preparation, compounding, dispensing, packaging, and storing of drugs and other preparations used in diagnostic and determinative procedures and in the treatment of patients.

## RECOMBINANT DNA TECHNOLOGY:

Study of all the proteins present on genome of an organism using computer is called proteomics.

## RECOMBINANT DNA TECHNOLOGY:

The technology by which hybrid DNA generated specifically by joining pieces of DNA from various sources under certain condition , a recombinant DNA molecule can enter a cell and replicate there autonomously (on its own) or after it has been integrated into chromosomes .

## REPLICATION:

The process of making an identical copy of section of double stranded DNA, using existing DNA as template for the synthesis of new DNA strands.

## TRANSCRIPTION:

A process by which the DNA changed into mRNA.

## TRANSLATION:

A process by which the information on a mRNA molecule is used to direct the synthesis of protein.

## RETROVIRUS:

An animal virus that contain the reverse transcriptase, this enzyme convert the viral RNA into DNA that can combine with the DNA of the host cell to produce more viral particles.

## REVERSE TRANSCRIPTION:

Mechanism for RNA synthesis in which the RNA viruses use their RNA genome as a template for DNA synthesis.

## ELECTROPORATION:

The legitimate introduction of DNA in the Cells by exposing them critically for specific, very short duration, directly to the electrical pulses of high voltage field-strength which perhaps induced transient pores in the plasma lemma.

## ELECTROPHORESIS:

A technique used for separating different types of molecules based on their pattern of movement in an electrical field.

## MICROINJECTION:

Injection of plasmid DNA (or uncloned native DNA) right into the lumen of developing inflorescence using a hypodermic syringe.

## LIPOFECTION:

It is defined as introduction of DNA into cells via liposomes.

## ENYZEME:

Specialized protein, produced in living cell, which particularly speed up, augment and catalyzed, the rate of specific chemical reaction, even act an extremely low conc. But is not consumed in the reaction.

## SENZYME IMMOBILIZATION:

Refers to confining the enzyme molecule to a distant phase from the one within the substrates and products are present.

Or
The process whereby an enzyme is converted from a homogenous catalyst into a heterogeneous catalyst.

**ENZYME LINKED IMMUNO-SORBENT ASSAY (ELISA):**

The excellent technique invariably applied for detecting and qualifying specific serum antibodies as well as antigens exclusively based upon tagging the antigen antibody complex with a specific substrate that may be enzymatically converted to readily quantifiable product by a specific enzyme.

**RESTRICTION ENZYME:**

An enzyme that breaks DNA in highly specific locations, creating groups, into which new gene can be inserted.

**IMMUNO ASSAY:**

A laboratory technique that make uses of the binding between an antigen and its homologous antibody in order to identify and quantify the specific antigen or antibody in a sample.

**IMMUNOTOXIN:**

Toxin agent that may be attached to the antibody molecule and because of this enhanced toxicity use to combat tumor cells.

**VECTOR:**

A genetic element able to incorporate DNA and cause it to replicate in another cell.

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**Note: This terminology is for compulsory question [redacted]**

[redacted]

⇒ Pharmacogenomics: It is the study of the role of the genome in the drug response. Its name reflects its combining of Pharmacology & genome. Pharmacogenomics analyses how the genetic make up of an individual affects his/her response to drugs.

⇒ DNA SEQUENCING: Determination of the nucleotide sequence of a DNA fragment is called DNA sequencing.

⇒ Gene Chip: Gene chips are devices not larger than postage stamps. They are based on a glass substrate wafer & contain many tiny cells about 400,000 in common. These are also called DNA chips, Biochips, microarray.

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For Question No 1 (Compulsory)

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The purpose of this chapter is to provide a general overview and describe some of the fundamentals of advanced drug delivery and targeting, prior to going into specific detail on advanced drug delivery and targeting technologies, and specific routes of delivery, in the subsequent chapters.

## 3.1 Terminology of Drug Delivery and Targeting

The terminology describing drug delivery and targeting is extensive and ever-growing. Systems are diversely referred to as "controlled release", "sustained release", "zero-order", "reservoir", "monolithic", "membrane-controlled", "smart", "stealth" etc. Unfortunately, these terms are not always used consistently and, in some cases, may even be used inaccurately. For clarity and consistency, some common terms used in this book are defined as follows:

- *Prolonged/sustained release*: the delivery system prolongs therapeutic blood or tissue levels of the drug for an extended period of time.
- *Zero-order release*: the drug release does not vary with time; thus the delivery system maintains a (relatively) constant effective drug level in the body for prolonged periods (see Section 1.5.1).
- *Variable release*: the delivery system provides drug input at a variable rate, to match, for example, endogenous circadian rhythms, or to mimic natural biorhythms.
- *Bio-responsive release*: the system modulates drug release in response to a biological stimulus (e.g. blood glucose levels triggering the release of insulin from a drug delivery device).
- *Modulated/self-regulated release*: the system delivers the necessary amount of drug under the control of the patient.
- *Rate-controlled release*: the system delivers the drug at some predetermined rate, either systemically or locally, for a specific period of time.
- *Targeted-drug delivery*: the delivery system achieves site-specific drug delivery.
- *Temporal-drug delivery*: the control of delivery to produce an effect in a desired time-related manner.
- *Spatial-drug delivery*: the delivery of a drug to a specific region of the body (thus this term encompasses both route of administration and drug distribution).
- *Bioavailability*: the rate and extent at which a drug is taken up into the body (see Section 1.2).

In this book, the term "drug delivery system" (DDS) is used as a general term to denote any type of advanced delivery system. Conventional drug delivery systems are simple oral, topical or injection formulations. A DDS, as used here, represents a more sophisticated system which may incorporate one, or a combination, of advanced technologies such as rate-control, pulsatile release or bio-responsive release to achieve spatial and/or temporal delivery. A drug delivery and targeting system (DDTS) specifically describes an

# PHARMACEUTICAL TECHNOLOGY

**PLA:** Poly lectic acid

**PGA:** Poly glycolic acid

**PLGA:** Poly lactic glycolic acid ( Poly lactide-co-glycolic acid)

**HPMA:** Hydroxy propyl methyl acrylate

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**NIOSOMES & LIPOSOMES:**

| NIOSOMES | LIPOSOMES |
|---|---|
| • Niosomes are non-ionic surfactant vesicles obtained on hydration of synthetic nonionic surfactants, with or without incorporation of cholesterol or other lipids, formed by organization of surfactant macro-molecule as bilayers. Less expensive<br>• More stable<br>• Easy to handle<br>• Prepared from uncharged single-chain<br>• surfactant and cholesterol<br>• Prolong the circulation of entrapped drug and altering its organ distribution and metabolic stability<br>• The entrapment efficiency increases with increase in the concentration and lipophilicity of surfactant<br>• Less toxic | • Liposomes are concentric bilayered nano size spherical vesicles consisting of an aqueous core enclosed in one or more phospholipid layers, used to deliver vaccines, drugs, enzymes, or other substances to target cells or organs. More expensive<br>• Less stable<br>• Difficult to handle<br>• Prepared from double-chain<br>• phospholipids (neutral or charged)<br>• The properties of liposomes depends both on the composition of the bilayer and on method of their production |

**GENES & ALLELE:**

| GENES | ALLELE |
|---|---|
| A specific sequence of nucleotides in DNA or RNA that is located on a chromosome and that is the functional unit of inheritance controlling the transmission and expression of one or more traits by specifying the structure of a particular polypeptide. | One of number of different forms of a gene. Each person inherits two alleles for each gene, one from each parent. These alleles might be the same or might be the different from one another. |

## SPATIAL DRUG DELIVERY & TEMPORAL DRUG DELIVERY:

| SPATIAL DRUG DELIVERY | TEMPORAL DRUG DELIVERY |
|---|---|
| The delivery of a drug to a specific region of the body thus this term encompasses both route of administration & drug distribution. | The control of delivery to produce an effect in a desire time related manner. |

## 1ST ORDER RELEASE APPROXIMATION:

When the rate of reaction depends on 1st power of concentration of a single reactant is called 1st order release approximation.

In this type of reaction, a substance decomposes directly into one or more products. The rate of reaction is directly proportional to the concentration of reacting substance can be expressed mathematically.

$$K = \frac{2.303}{T} \log \frac{C_0}{C}$$

## CARR'S INDEX & ANGLE OF REPOSE:

| Carr's index | Angle of repose |
|---|---|
| It is the simple test to evaluate flowability of a powder developed by carr & Neumann. It is done by comparing the poured density ($\rho_{poured}$) & tapped density ($\rho_{tapped}$) of a powder at the rate at which it is packed down. Carr's index= $\frac{\rho_{tapped} - \rho_{poured}}{\text{Tapped density}} \times 100$ | The maximum angle that can be obtained between the free standing surface of a powder heap & horizontal base. $\tan \phi = 2h / D$ h = height of powder heap D= diameter of powder heap |

## IN EX-VIVO & IN-SITU GENE THERAPY:

| In EX-VIVO GENE THERAPY | IN-SITU GENE THERAPY |
|---|---|
| • In-vivo gene therapy often uses viruses or liposomes as vectors to deliver the desired genes to cells inside the patient's body; hence called in-vivo gene therapy.<br>• Method:<br>In vivo gene therapy is done by targeting the gene delivery system to the desired cell type in the patient using either physical means such as tissue injection or biolistic (gene gun) or potentially in future, using systemic infusion of cell specific receptor mediated DNA carriers (reconstituted) liposomes or viruses). | • It is the direct administration of a vector carrying the therapeutic genetic material to the affected tissue, such as injection into a tumor nodule or organ.<br>• Method:<br>In this method, the genetic material is directly administered to the desired tissue. A disease that has shown some success with this therapy is Cystic Fibrosis which showed 20-30% improvement. This form of delivery is also used in cancer. |

## COATING MATERIALS USED IN SPRAY CONGEALING: & Spray drying

The coating material can be selected from a variety of natural and synthetic polymers depending on the core material to be encapsulated and the desired characteristics. The amount of coating material used ranges from 3% - 30% of the total weight which gives film thickness range from 1-200 µm.

**Types of Coat material:** ( Spray drying) , See below

Both natural and synthetic colloids can be used for drugs.

- Hydrophobic colloids are used to encapsulate water soluble/hydrophilic drugs.
- Hydrophilic colloids are used to encapsulate water insoluble or hydrophobic drugs.

**Examples**

| SYNTHETIC POLYMERS | NATURAL POLYMERS |
|---|---|
| **Non-Biodegradable**<br>• PMMA<br>• Acrolein<br>• Epoxypolymers | **Proteins**<br>• Albumin<br>• Gelatin<br>• Collagen |
| **Biodegradable**<br>• Lactides, Glycolides and their polymers<br>• Polyanhydrides<br>• Polycyanoacrylates | **Carbohydrates**<br>• Starch<br>• Agarose<br>• Chitosen |

## VARIABLES RELEASE & PROLONGED/ SUSTAINED RELEASE:

| Variables release | prolonged/ sustained release |
|---|---|
| The delivery system provides drug input add a variable rate, to match, e.g endogenous circadian rhythm or to mimic natural bio rhythm. | The delivery system prolongs therapeutic blood or tissue level of the drugs for an extended period of time. |

## SIGNIFICANCE OF TRANSITION TEMPERATURE IN LIPOSOMES:

Transition temperature is important b/c above this temperature ordered form of phospholipids changes to disordered form & gel or solid form is converted to liquid form & drug is released at target site where temperature is high. Tumors are indicated so, as their temperature is high.

Transition temperature is depends upon;

- Chain length i.e it ↑ with ↑ in chain length
- Unsaturation i.e it ↓ with ↑ in no of unsaturation

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Spray Drying Congealing:

The materials for Spray congealing are waxes & Polyalcohols.

## BIOTECHNOLOGY:

The application of biological research techniques to the development of product or processes, using biological system, living organisms or derivatives thereof. It can also be understood as a range of different molecular techniques such as gene manipulation & gene transfer, DNA typing & cloning of microorganisms, plants & animals.

## CARRIER SYSTEMS IN ACTIVE AND PASSIVE DDS:

Carrier systems are broadly divided into two groups:

**Soluble macromolecular carriers:** These includes antibodies & soluble synthetic polymers i.e. hydroxypropyl methacrylate, glycerin, aspartic acid, polyvinyl pyrrolidone.

**Particular carrier system:** Many particulates carrier systems have been designed for drug delivery & targeting purpose. These particulate carriers are liposomes (phospholipids, PEG & polypeptides), nano particles (alkyl cyano acrylates), microspheres (polylectide, oglycolate) & lipoproteins (lipids & proteins).

## HOMING DEVICE AND ITS NEED IN ACTIVE TARGET DRUG DELIVERY SYSTEM:

It is target specific recognition moiety e.g glactose receptors are present in liver, parenchymal cells, so the inclusion of glactose residues on a drug carrier can target to these cells. Target specific recognition moieties are capable of selectively directing the drug to the appropriate target in the body. Different types of homing devices are available in market.

In active drug delivery homing devices is covalently attached to the carrier to affect delivery to specific cell, tissue or organ.

## ZERO ORDER RELEASE APPROXIMATION:

It can be defined as the reaction in which the rate is independent of the concentration of reactant called zero order release. In this, the drug release does not vary with time; thus the delivery system maintain a constant effective drug level in the body for prolong periods.



## AEROSOL AND WRITE THE NAMES OF ITS TYPE:

Pharmaceutical aerosols may be defined as aerosol products containing therapeutically active ingredients dissolved, suspended, or emulsified in a propellant or a mixture of solvent & propellant, & intended for topical administration; for adm. into the body cavities, such as the ear, rectum, & vagina; or intended for adm. Orally or nasally as fine

solid particles or liquid mists via the respiratory system, nasal passage, or sublingually.
Types of aerosols are

- Solution Aerosols
- Suspension System
- Emulsion Aerosols
- Semisolid Aerosol

These may be classified as

- Oral aerosols
- Inhalation aerosols
- Nasal aerosols
- Topical aerosols

## FUSOGENIC LIPOSOMES:

A liposome whose outer wall contains molecules (i.e: the Fusogenic protein) that cause cell fusion, especially fusion between somatic cells.

## LUBRICANT & GLIDING:

| Lubricant | Gliding |
|---|---|
| A lubricant is a substance introduced to reduce friction between moving surfaces. It may also have the function of transporting foreign particles.<br><br>They improve the rate of flow of tablet formulation.<br>It prevents adhesion of tablet material to the surface of ~~dyes~~ die & punches. | A glidant is a substance that is added to a powder to improve its flow ability. A glidant will only work at a certain range of concentrations.<br>Above a certain concentration, the glidant will in fact function to inhibit flow ability.<br>In tablet manufacture, glidants are usually added just prior to compression.<br>Examples of glidants include magnesium stearate, Aerosil (colloidal silicon dioxide), starch and talc. |

## POLYMORPHISM & ITS IMPORTANCE:

A chemical substances / drug may exist in more than one crystal form & crystals may change from one form to other. E.g. In case of cortisone acetate five different crystalline forms have been distinguished by x-ray.
These forms are stable under anhydrous condition & can be used in solid formulations including tablet, capsules & ointments.

## DELAYED RELEASE AND BIO RESPONSIVE RELEASE:

| DELAYED RELEASE | BIO RESPONSIVE RELEASE |
|---|---|
| Delay release dosage form indicates that drug is not been released immediacy following administration but at a later time e.g enteric coated tablets. | The system modulates drug release in response to a biological stimulus e.g blood glucose level triggering the release of insulin from a drug delivery device. |

## SOMATIC & GERM LINE GENE THERAPY:

| Somatic gene therapy | Germ line gene therapy |
|---|---|
| The technique of somatic gene therapy involves inserting a normal gene into the appropriate cells of an individual affected with a genetic disease, thereby permanently correcting the disorder.<br>STRATEGIES:<br>i. IN-VIVO GENE THERAPY<br>ii. EX-VIVO GENE THERAPY<br>iii. IN SITU DELIVERY | In this type of gene therapy, the human eggs and sperms (Germ Cells) are genetically altered. Germ line therapy can change the genetic makeup of an individual descendants also.<br>The two main **methods** of performing germ line therapy would be:<br>i. To treat a pre-embryo that carries a serious genetic defect before implantation into the mother (this requires the use of in vitro fertilization techniques).<br>ii. To treat the germ cells (sperm or egg cells) of the diseased adults so that their genetic defects would not be passed on to their offspring. This approach requires the technical expertise to remove the defective genes and insert a properly functioning replacement. |

## TARGETED DRUG DELIVERY SYSTEM:

The delivery system achieves site specific drug delivery.

## ANGLE OF REPOSE:

The maximum angle that can be obtained between the free standing surface of a powder heap & horizontal base. This angle is in the range 0°–90°.

$$\tan \phi = 2h / D$$

h = height of powder heap

D= diameter of powder heap.

MDR is started by giving an initial dose to achieve a plasma concentration within the therapeutic window and then maintain this concentration by replacing the amount of drug lost with time.

MDR depends upon the therapeutic objective which may be:

- Cure
- Mitigation
- Prevention of disease

The decision during repetitive therapy depends upon:

- Accurate diagnosis of disease
- Knowledge of the clinical state of patient
- Sound understanding of the pharmacotherapeutics

## RATE CONTROLLED RELEASE DOSAGE FORM:

The system delivers the drug at some predetermined rate, either systemically or locally, for a specific period of time.

## ADVANTAGES OF LUVS:

LUVs provides a number of advantages as compared to MLVs including

- High capsulation of water soluble drugs
- Economy of lipids
- Reproducible drug release rate

## OPHTHALMIC GEL FORMING SOLUTION:

One disadvantage of ophthalmic solutions is their relatively short residence time in the eye. This has been to overcome to some degree by the development of solutions that are liquid in the container & thus can be distilled as an eye drop but gel on contact with tears fluid & provide ↑ contact time with the possibility of improved drug absorption & ↑ duration of therapeutic effect.

**INTRINSIC SOLUBILITY:** Solubility in 0.1N NaoH and $H_2O$ by UV.

**REASONS FOR MULTIPLE THERAPIES**

**MULTI-FACTORIAL DISEASE:** → Polygenic disease → have more than one defective gene. eg; Cancer, DM,

**CO-SOLVENTS IN PARENTERAL:**

**POTENCY OF ANTIBIOTICS:**

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| Angle of repose: | Type of flow |
|---|---|
| <20 | Excellent |
| 20-35 | Good |
| 36-40 | Fair |
| 41-45 | Passable |
| > 45 | Poor |

## PRINCIPLE OF MONOCLINIC ANTIBODIES:

Monoclonal antibodies lies on the principal of producing antibodies and monoclonal means the specificity and avidity for antigen i.e they recognize a single epitope.
Firstly the mouse is inoculated with appropriate antigen and spleen cells are isolated from it. Then the myeloma cells grown in vitro and spleen cells which are isolated are fused in the polyethylene glycol (PEG) and cultured in HAT medium.

## HYPERTONIC SOLUTION:

A hypertonic solution is one with a higher concentration of solutes. A hypertonic cell has a higher concentration of solutes than the surrounding solution, causing water to rush into the cell by osmosis. This results in a higher or hyper/more extreme, osmotic pressure.
A solution that has higher osmotic pressure (or has more solutes) than another solution to which it is compared.

## MICROBIAL ASSAY:

Microbial/microbiological assay is defined as the determination or estimation of concentration or potency of an antibiotic by means of measuring and comparing the area of zone of inhibition or turbidity produced by test substance with that of standard over a suitable microbe under standard conditions. In microbial assay, the measured effect is inhibition of growth of a suitable strain of microorganism, the procedure employed in microbial assay may be divided into two classifications.

- Cylinder plate method
- Turbidimetric method



## MULTIPLE DOSAGE REGIMENS:

A "multiple dosage regimen" is the manner in which the drug is administered in suitable doses, by suitable route, with sufficient frequency that ensures maintenance of plasma concentration within the therapeutic window without excessive fluctuation and drug accumulation for the entire duration of therapy.