

GROUP 02

23 – AUG - 2021



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MEDICAL BIOTECHNOLOGY



Biotechnology

- Applications of biotechnology

- Medical
- Agricultural
- Microbials
- Environment
- Molecular
- Industrial
- Marine

Medical Biotechnology

- Types of medical biotechnology:

- ❖ Plants
- ❖ Animals
- ❖ Microbials

- Applications of medical biotechnology:

- Pharmacology
- Diagnosis
- GM Insects
- Personalized Medicine

Biotechnology

Blue	Marine Biotechnology
Brown	Desert Biotechnology
Dark	Bioterrorism
Gold	Bioinformatics
Green	Agricultural Biotechnology
Grey	Classic Biotechnology
Purple	Patents, IPR
Red	Medical Biotechnology
White	Industrial Biotechnology
Yellow	Nutritional Biotechnology



PHARMACOLOGY

Pharmacology

Pharmacology

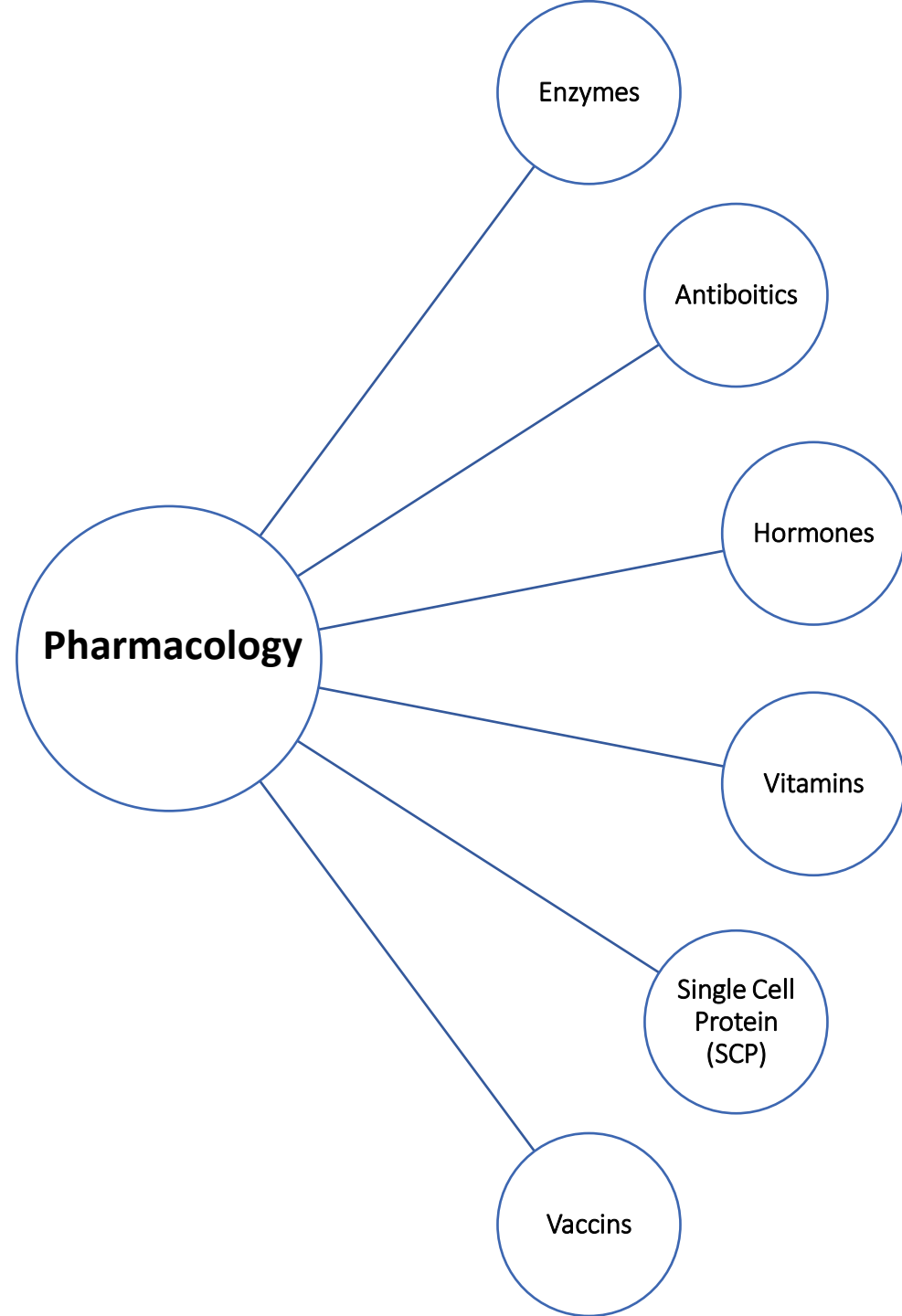
Pharmacology the branch of medicine concerned with the users, effects & modes of action of drugs.

Pharmacokinetics

The activity of drugs in the body over a period of time.

Pharmacodynamics

Concerned with the effect of drugs and the mechanism of their action.





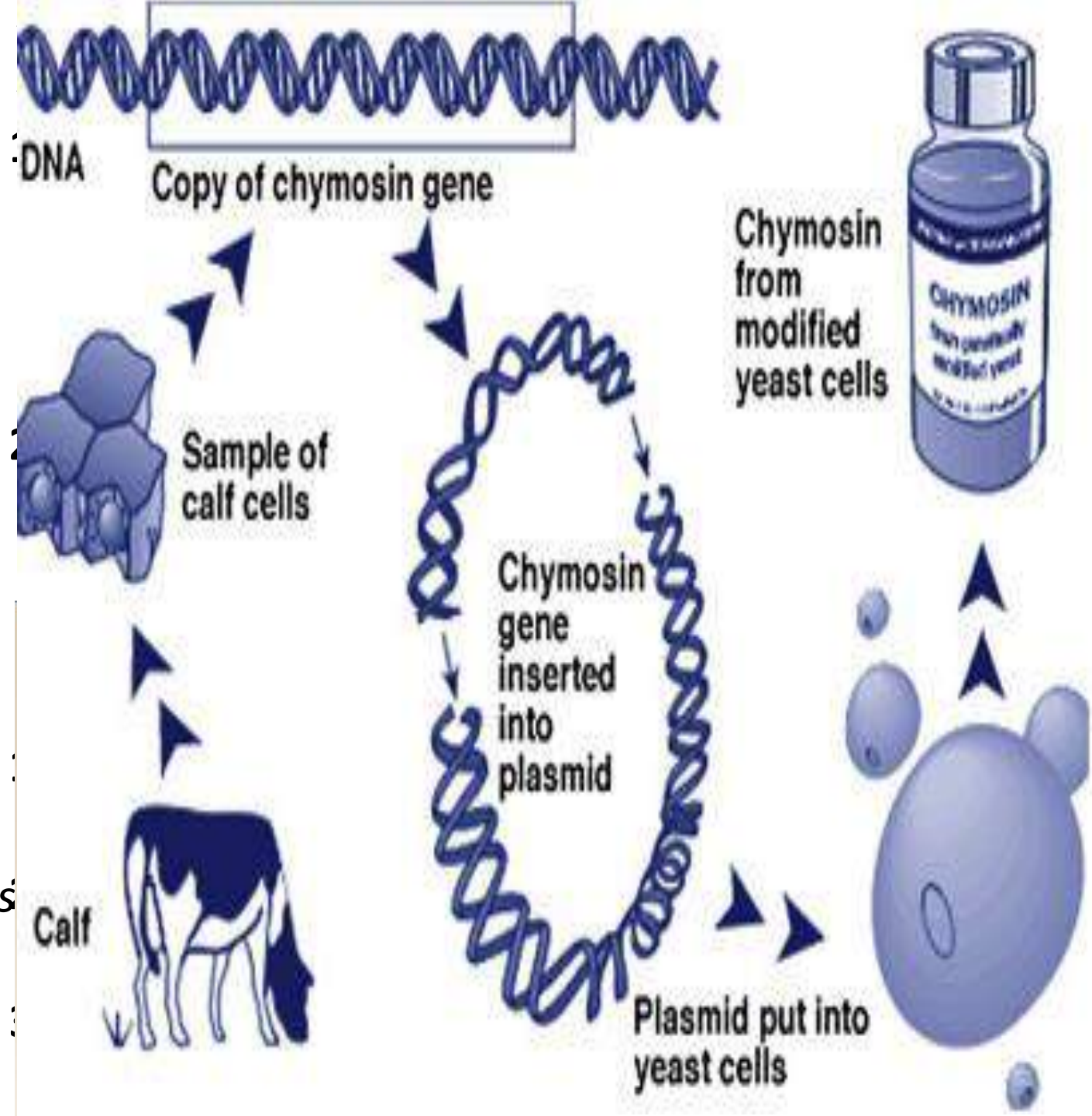
Enzymes

1. **Amylase** - *Aspergillus niger*, *Aspergillus oryzae*, *Bacillus subtilis*
2. **Protease** - *Aspergillus oryzae*
3. **Cellulase** - *Aspergillus niger*
4. **Lipases** - *Rhizopus oryzae*
5. **Invertase** - *Saccharomyces cerevisiae*
6. **Renin** - *Saccharomyces cerevisiae*



Antibiotics

1. **Penicillin**- *Penicillium chrysogenum*
2. **Tetracycline**- *Streptomyces aureofaciens*
3. **Streptomycin**- *Streptomyces griseuse*

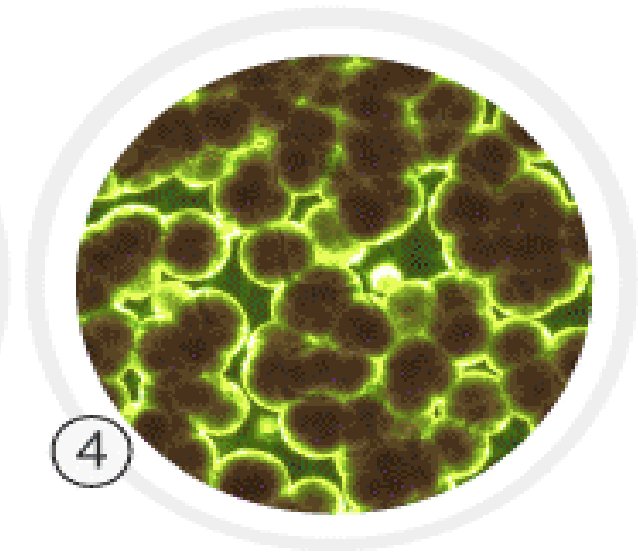
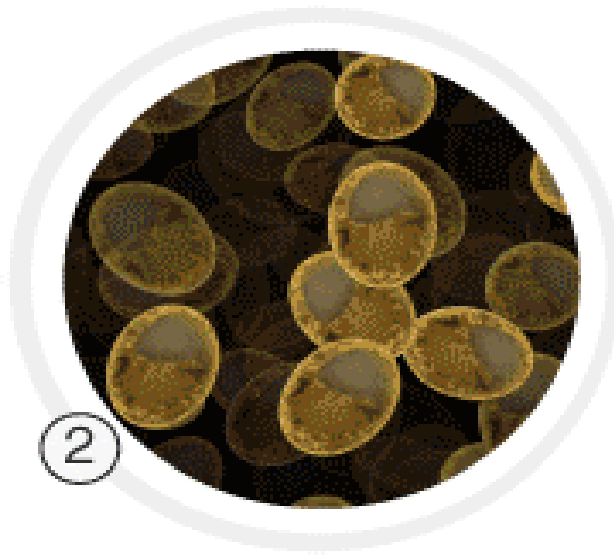


➤ Single cell protein

1. *Saccharomyces cerevisiae*
2. *Sprulina maxima*
& *Spirulinm pletensis*
3. *Chlorella sp.*



MICROORGANISMS USED FOR THE PRODUCTION OF SCP



1 Fungi

2 Yeast

3 Algae

3 Bacteria

Live - Attenuated Vaccines

- Varicella / Chickenpox
- Smallpox
- MMR
(Measles, Mumps, Rubella)
- Yellow Fever
- Influenza (Nasal Spray)

Inactivate Vaccines

- Hepatitis A
- BCG (Bacillus Calmette-Guérin)
- IPV / Polio (Oral)
- Rabies
- Cholerae
- Sinovac / CoronaVac
- Sinopharm

Toxoid Vaccines

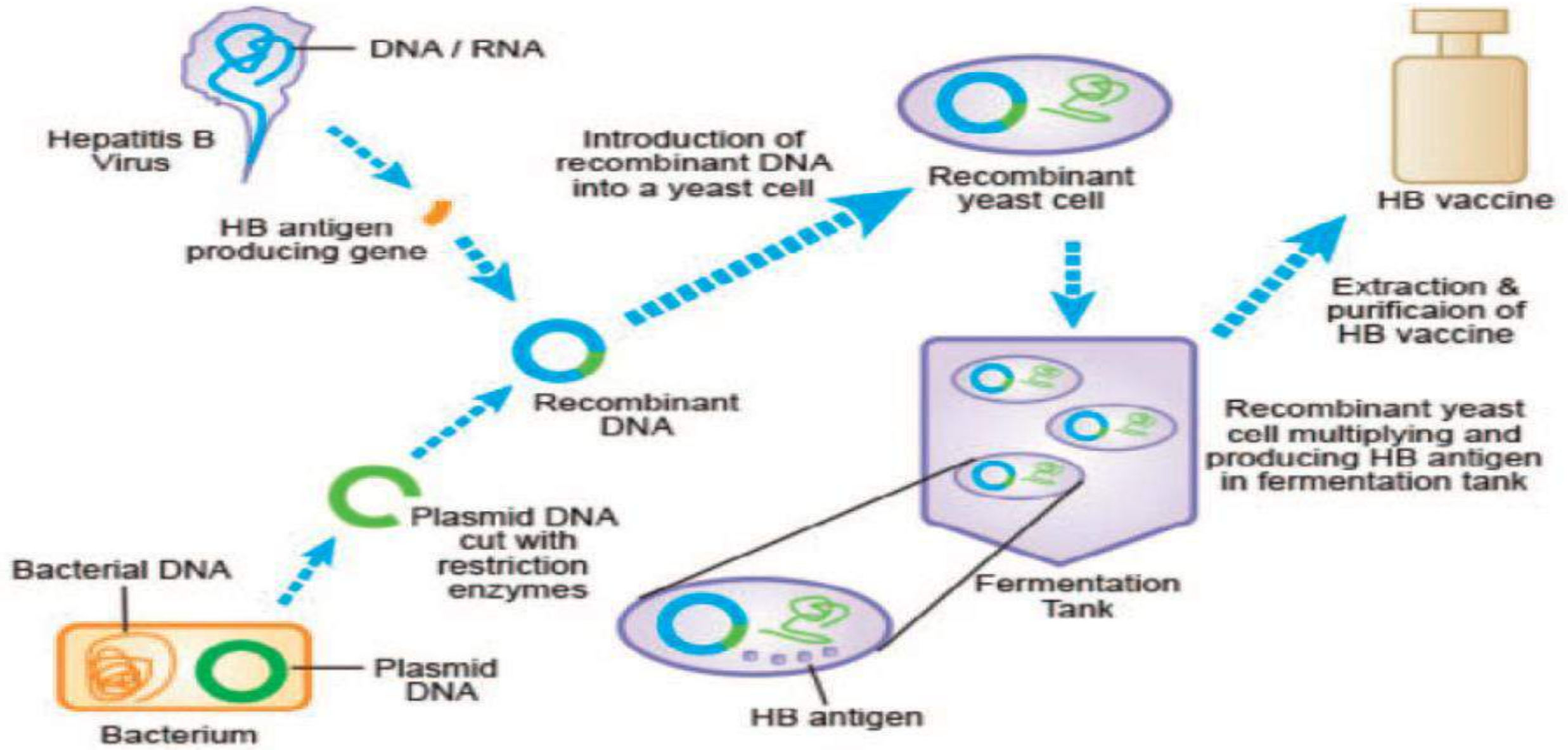
- Tetanus
(DTaP)
- Diphtheria
(DTaP)

Viral Vector

- Ebola
- Oxford AstraZeneca
- Sputnik V / Gamaleya
- Janssen / Johnson & Johnson



1. **Hepatitis A** - Ready-made human Serum antibodies.
2. **Hepatitis B** - Capsid protein cultivate in yeast cells.



➤ Modern World Vaccine

❖ Edible vaccine

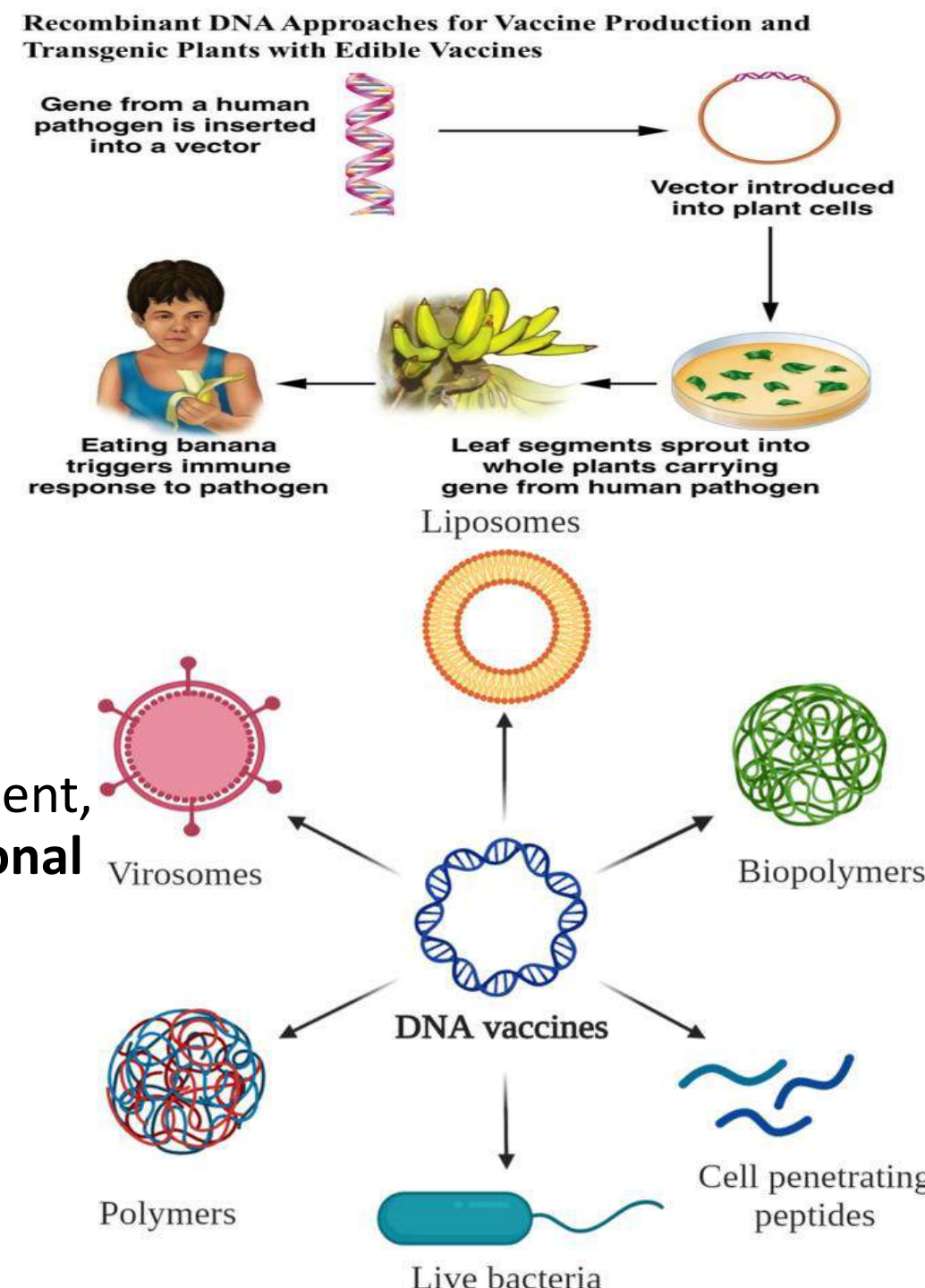
- Vaccines that one can **eat** are called edible vaccines.
- In 1989, the effort to produce a plant – based vaccine was formulated by **Hiatt and co-workers**.
- **Plants using for edible vaccines:**
Tobacco, Potato, Banana, Tomato, Rice, Soyabean, Carrot

❖ DNA based vaccine

- Among the technologies available for vaccine development, DNA vaccination is a **promising alternative to conventional vaccines**.

Advantages:

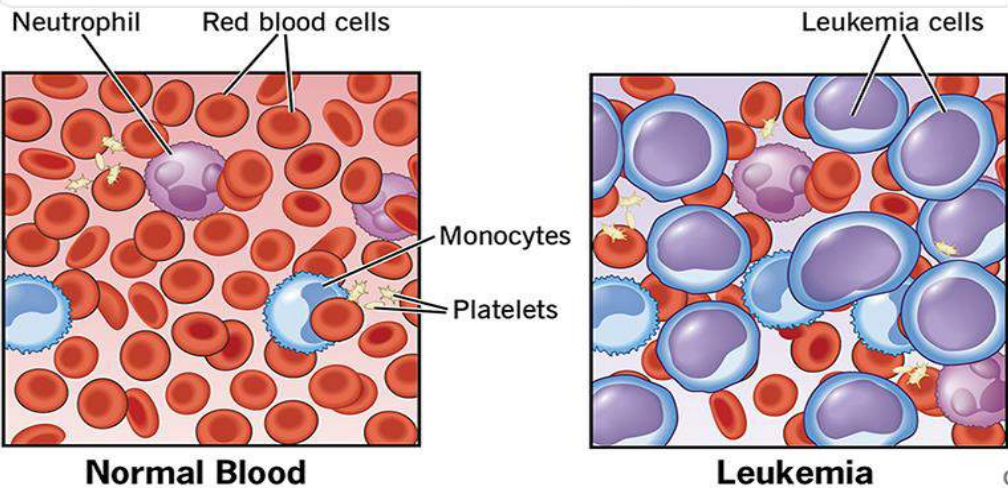
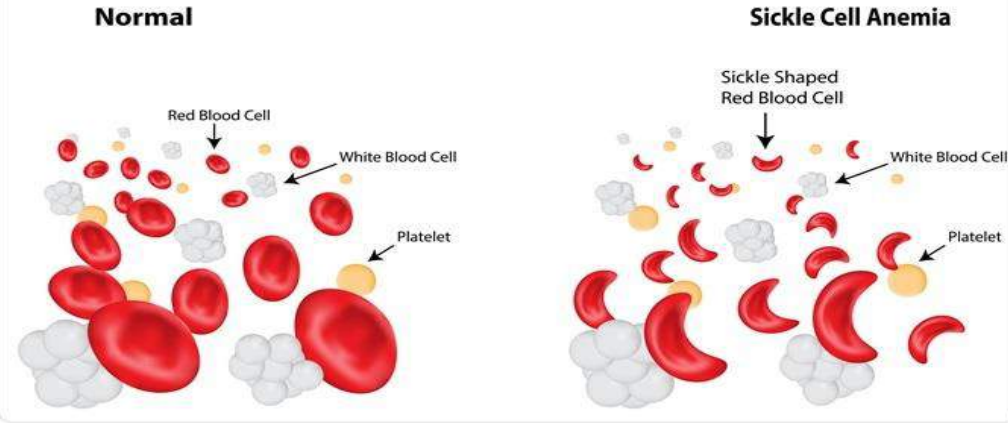
- Producibility
- Stability
- Storage



A collection of medical supplies is arranged on a light-colored surface. In the upper left, a sphygmomanometer with a white face and black markings is visible. To its right is a red stethoscope. A syringe with a blue plunger and a needle is positioned diagonally across the center. Below the syringe is a blister pack containing several white, round pills. To the right of the blister pack is a small vial containing a dark red liquid. The word "DIAGNOSIS" is written in large, bold, red capital letters on the left side of the image.

DIAGNOSIS

Sickle Cell Anemia



Diagnosis

○ Sickle cell anemia

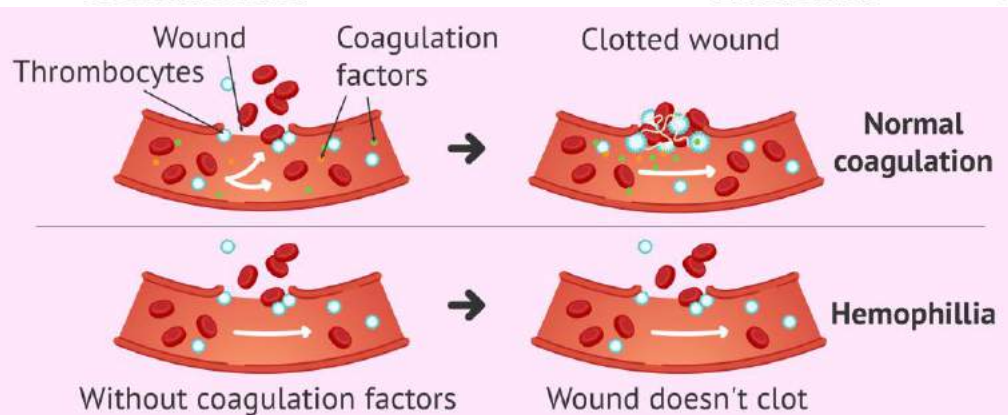
- A disorder in the red blood cells causing them “sickle” shaped.
- Prevent oxygen from reaching certain organs and blood cells going through blood vessels.
- Symptoms; frequent infections, anemia, crises, delayed growth, strokes, jaundice.

○ Leukemia

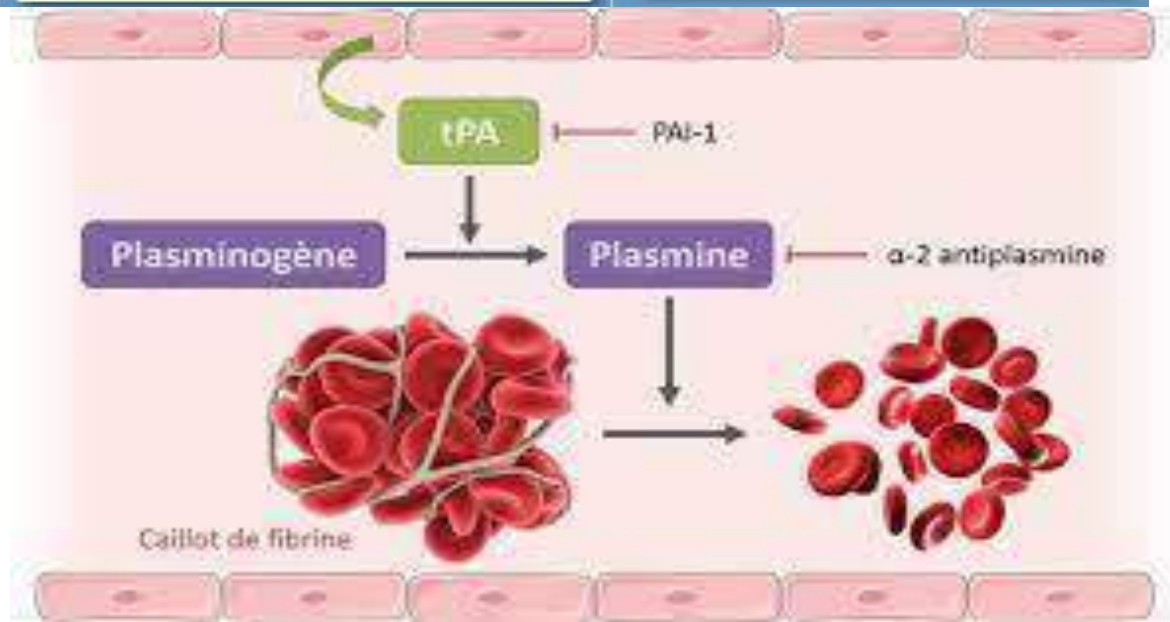
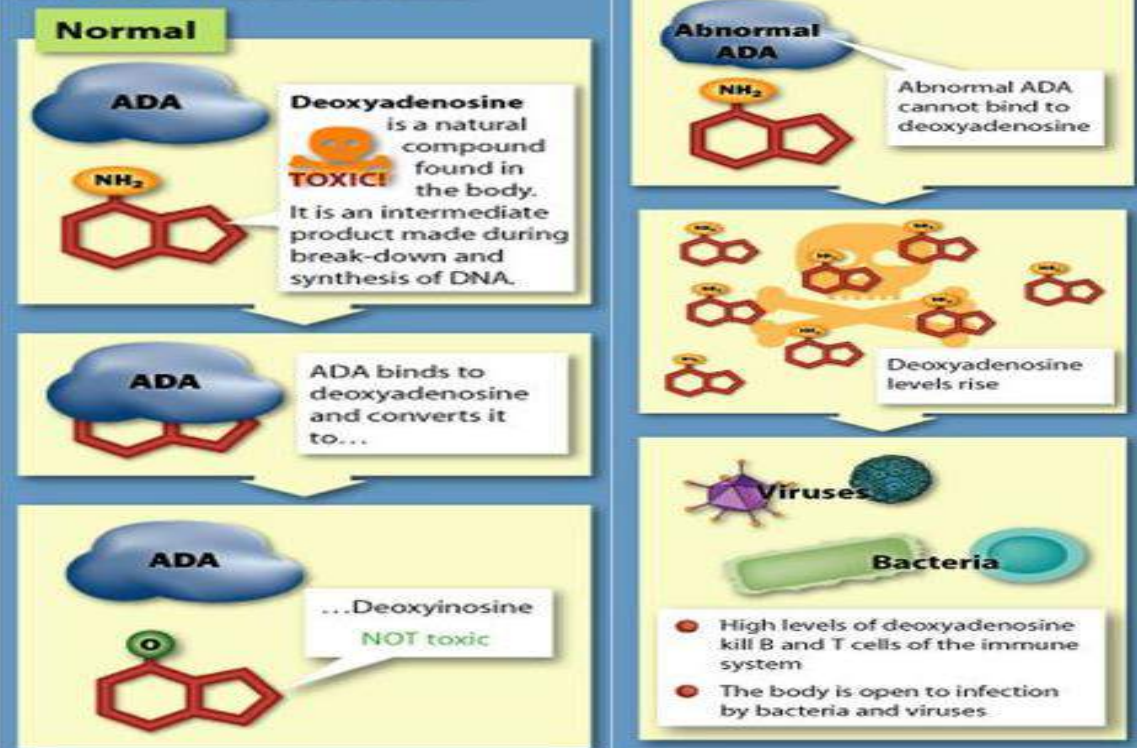
- Acute myeloid leukemia (AML) is a cancer of the bone marrow that produces (WBC)s and results in a proliferation of nonfunctional leukocytes that interfere with normal blood cell function.

○ Hemophilia

- Factor 8 is an essential blood clotting protein, also known as anti-hemophilic factor (AHF).
- In humans' factor 8 is encoded by the F8 gene.
- Defect in this gene results in hemophilia A, a recessive X linked coagulation disorder



ADA Converts Deoxyadenosine to a Non-toxic Substance



○ Gene Therapy

- Corrective therapy for hereditary disease in which normal gene are insert into cells and tissues to treat the diseases.
EX: ADA Deficiency
- First clinical gene therapy was done in 1990.
- To 4 years girl with DNA deficiency due to delectation of gene for Adenosine deaminase.
- Introduce ADA , c - DNA into lymphocyte of the patient (temporary solution.)

○ Cardiology

- Tissue plasminogen activator(tPA)
- It is also called alteplase in a medication made of a protein can dissolve blood clots.
- This is called as “**clot – buster**”
- Lifesaving treatment for stroke and heart attack.

○ Human Genome Project

- The international collaborative research program whose goal was the complete mapping and understand of all genes of human beings.
- Very useful for the understanding of human evolution and human migration.

GM INSECTS



GM Insects

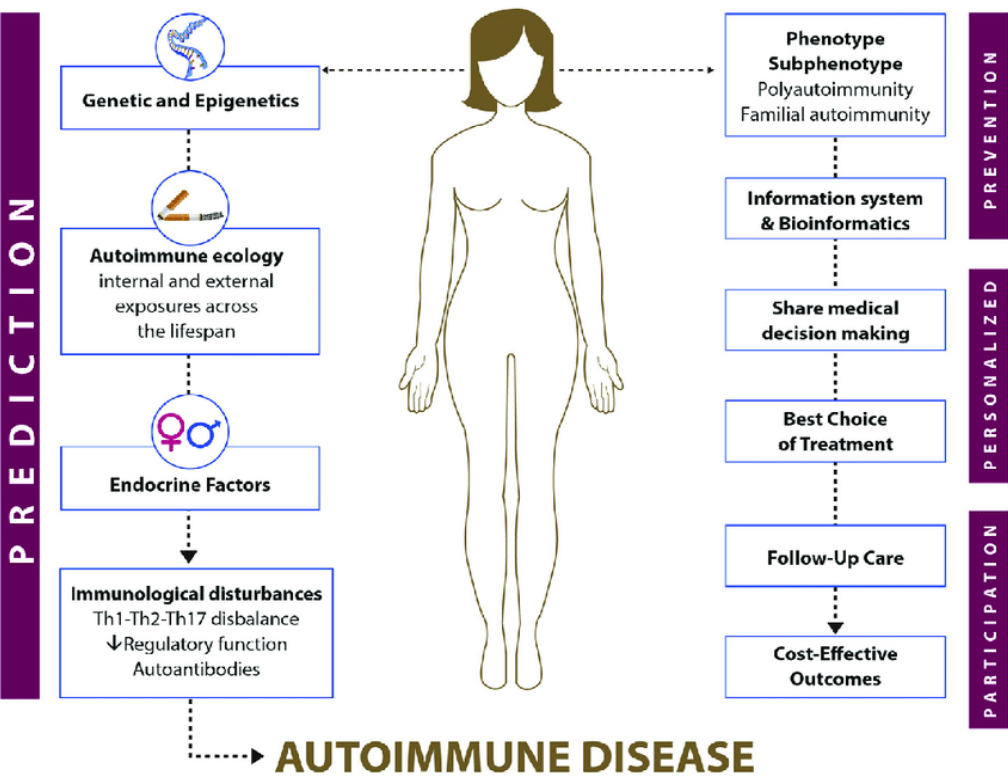
- Some **Lepidoptera** (e.g. monarch butterflies and silkworms) have been genetically modified in nature by the **wasp bracovirus**.
- Genetic modification of mosquitoes was thus looked at **since 1955**.
- Mosquitoes are vector of serious human infection.
 - ***Anopheles gambiae* & *Anopheles stephensi* mosquito**
 - These GM mosquitoes have been developed that express a small protein called **SM1**.
 - ***Aedes aegypti* mosquito**
 - Invented by **Edward F Kipling**.
 - **SIT**
 - Reduce competition in mating.
 - Sterile progeny
 - Reduce lifespan.





PERSONALIZED MEDICINE

PERSONALIZED MEDICINE



Personalized Medicine

Personalized medicine is an emerging practice of medicine that uses an individual's genetic profile to guide decisions made regarding the prevention diagnosis and treatment of disease.

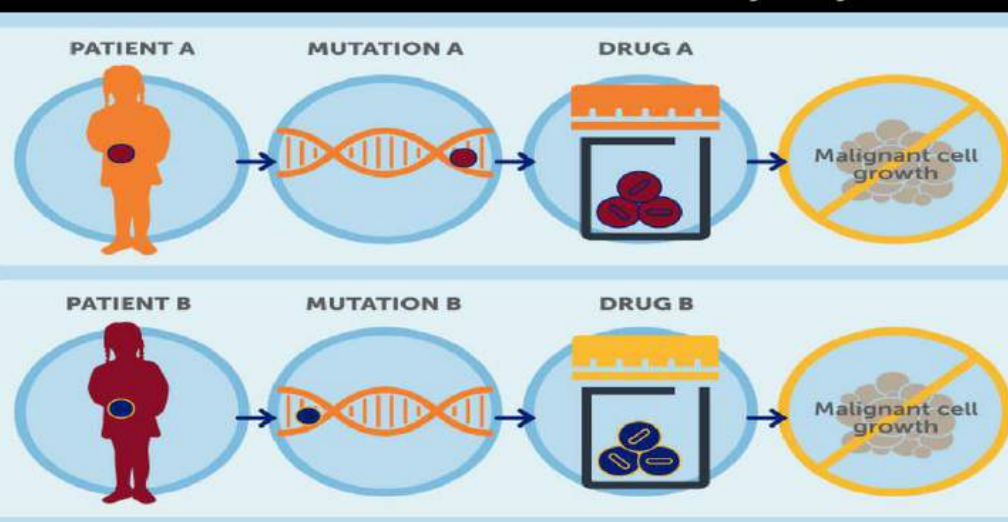
Examples:

- Using targeted therapies to treat specific types of cancer cells such as **HER2** positive breast cancer cells.
- Using tumor marker testing to help diagnose cancer.

Advantages:

- Customize disease-prevention strategies
- Prescribe more effective drugs
- Avoid prescribing drugs with predictable side effects
- Reduce time, cost and failure rate of pharmaceutical clinic trials

Precision vs Personalized Medicine...synonymous?



CONCLUSION

A top-down view of a desk with a spiral notebook, a pen, a coffee cup, and crumpled paper. The notebook is open to a grid-lined page with the word "Conclusion" written in cursive and underlined in red. A silver pen lies diagonally across the bottom right of the page. To the left of the notebook is a white ceramic coffee cup. Several pieces of crumpled white paper are scattered around the notebook and cup. In the top right corner, there are green leaves. The background is a dark wooden surface.

Conclusion

Conclusion

- GM mosquitoes are successful in reducing mosquito population and disease spread.
- These trials have shown to reduce mosquito population from 80%-95%.
- Vaccines produce high levels of immunological protection that are enough to prevent diseases in most vaccinated individuals.
- GM bacteria is cheaper- than when insulin used to be extracted from dead pigs and cows.
- Review all requested diagnostic tests, include the results in your examination report, and correlate them with clinical findings before assigning disability patterns



A photograph of a classroom where several students are raising their hands. The focus is on a student in the foreground wearing a blue and white plaid shirt, with their hand raised high. In the background, another student with blonde hair is also raising their hand. The scene is brightly lit, likely from a window on the right. The text "Question Time" is overlaid on the left side of the image.

Question Time

Thank You!

THANK YOU
FOR YOUR
TIME

