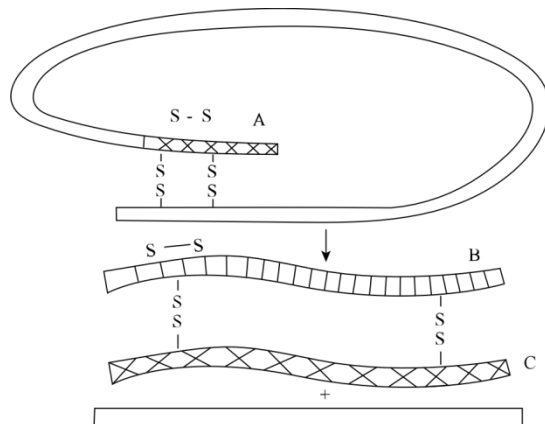


Shiksha Classes, Bhandara

Biology

Biotechnology And Its Applications

- (1.) Biotechnology deals with industrial scale production of biopharmaceuticals and using genetically modified
- (a.) microbes only (b.) fungi only
(c.) plants and animals only (d.) all of these
- (2.) The application of biotechnology includes all except
- (a.) therapeutics (b.) diagnostics
(c.) conventional hybridization (d.) bioremediation
- (3.) Which of the following is not a critical research area of biotechnology?
- (a.) Providing the best catalyst in the form of improved organism usually a microbe or pure enzyme (b.) Creating optimal conditions through engineering for a catalyst to act
(c.) Creation of fermented food (d.) Downstream processing technologies to purify the protein/organic compound
- (4.) Which of the following can be thought for increasing food production?
- (I) Agrochemical based agriculture
(II) Organic agriculture
(III) Genetically engineered crop based agriculture
(IV) Conventional methods based agriculture
- (a.) I and IV (b.) I, II and III
(c.) II and IV (d.) II, III and IV
- (5.) Green revolution during 1960
- (a.) succeeded in tripling the food supply (b.) used agrochemicals based practices
(c.) used improved crop varieties (d.) all of these
- (6.) Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called



- (a.) genetically modified organisms (GMO) (b.) hybrid organisms
 (c.) pest resistant organisms (d.) none of these
- (7.) Genetically modified plants are useful in increasing
 (a.) crop yield (b.) reduce post-harvest loss
 (c.) make crops more tolerant to stresses (d.) all of these
- (8.) Which of the following is true for Golden rice?
 (a.) It is the best resistant, with a gene from *Bacillus thuringiensis*. (b.) It is drought tolerant, developed using *Agrobacterium* vector.
 (c.) It has yellow grains, because of a gene introduced from a primitive variety of rice. (d.) It is vitamin-A enriched with a gene from daffodil.
- (9.) Golden rice can be identified as
 (a.) a variety of rice grown along the yellow river in China (b.) a long stored rice having yellow colour tint
 (c.) a transgenic rice having gene for beta-carotene (d.) a wild variety of rice with yellow coloured grains
- (10.) Consider the following statements. Statement I: In some countries, the problem of night blindness is solved by using GM plants. Statement II: GM plants can carry gene for the biosynthesis of vitamin A.
 (a.) Statement I is true, but II is false (b.) Statement I is false, but II is true
 (c.) Both Statements I and II are true (d.) Both Statements I and II are false
- (11.) Golden rice was created by transforming rice with two beta carotene biosynthesis genes namely
 (a.) psy and crtI gene (b.) LCY - e
 (c.) CHY - I (d.) CHY -2
- (12.) Cultivation of Bt cotton has been much in the news. The prefix Bt means
 (a.) barium treated cotton seeds (b.) bigger thread variety of cotton with better tensile strength
 (c.) produced by biotechnology using restriction enzymes and ligases (d.) carrying an endotoxin gene from *Bacillus thuringiensis*
- (13.) Proteins produced by *Bacillus thuringiensis* kill
 (a.) lepidopterans (b.) coleopterans
 (c.) dipterans (d.) all of these

(14.) Match the following columns.

Insects pest class

(A) Lepidopterans

(B) Coleopterans

(C) Dipterans

Insects

(1) Tobacco, budworm and armyworm

(2) Beetles

(3) Flies and mosquitoes

Codes

	A	B	C
(a.)	1	2	3
(b.)	3	2	1
(c.)	2	3	1
(d.)	3	1	2

(15.) Which one is not a feature of Bt cotton?

(a.) A GM plant

(b.) Insect resistant

(c.) A bacterial gene expressing system

(d.) Resistant to all pesticides

(16.) Bt toxin is

(a.) intracellular lipid

(b.) intracellular crystalline protein

(c.) extracellular crystalline protein

(d.) intracellular polysaccharide

(17.) Bt toxin protein crystals present in bacterium *B. thuringiensis* do not kill the bacteria even though it is produced in them because

(a.) bacteria are resistant to the toxin

(b.) bacteria enclose toxins in a special sac

(c.) toxins occur as inactive protoxin in bacteria

(d.) none of these

(18.) Choose the correct option for a protoxin.

(a.) It is a primitive toxin

(b.) It is a denatured toxin

(c.) This toxin is produced by protozoans

(d.) It is an inactive toxin

(19.) In Bt cotton, the Bt toxin present in the plant tissue as pro-toxin is converted into active toxin due to

(a.) acidic pH of stomach

(b.) high temperature

(c.) alkaline PH of gut

(d.) mechanical action in the insect gut

(20.) Bt toxin kills insects by

(a.) inhibiting protein synthesis

(b.) generating excessive heat

(c.) creating pores in the midgut epithelial cells, leading to cell swelling and lysis

(d.) obstruction of biosynthetic pathway

(21.) Consider the following statements. Statement I: The Bt toxin is not toxic to human beings. Statement II: The Bt toxin only recognizes insect specific targets.

- (a.) Statement I is true but II is false (b.) Statement I is false but II is true
(c.) Both statements I and II are true (d.) Both statements I and II are false

(22.) Match the columns.

Column-I

Column-II

(A) Cotton bollworms

(1) Cry I Ac

(B) Corn borer

(2) Cry I Ab

(3) Cry II Ab

- A B C
(a.) 1 2 3
(c.) 1 3 2

- A B C
(b.) 2 1 3
(d.) 1 2 3

(23.) Main objective of production/use of herbicide resistant GM crops is to

- (a.) eliminate weeds from the field without the use of manual labour (b.) eliminate weeds from the field without the use of herbicides
(c.) encourage eco-friendly herbicides (d.) reduce herbicide accumulation in food articles for health safety

(24.) The crops engineered for glyphosate are resistant/ tolerant to

- (a.) fungi (b.) bacteria
(c.) insects (d.) herbicides

(25.) Which part of the tobacco plant is infected by *Meloidogyne incognita*?

- (a.) Leaf (b.) Stem
(c.) Root (d.) Flower

(26.) A novel strategy was adopted to prevent *Meloidogyne incognita* in tobacco plants that was based on the process of

- (a.) DNA interference (b.) RNA interference
(c.) RNA initiation (d.) DNA initiation

(27.) Retrovirus is

- (a.) a RNA virus that can synthesis DNA during infection (b.) a DNA virus that can synthesis RNA during infection
(c.) a ssDNA virus (d.) a dsRNA virus

(28.) In RNAi, the genes are silenced using

- (a.) ssDNA (b.) dsDNA
(c.) dsRNA (d.) ssRNA

- (29.) We cannot achieve silencing of a gene by using
- (a.) short interfering RNA (RNAi) (b.) antisense RNA
- (c.) both (a) and (b) (d.) none of these

- (30.) Match the following columns.

Column-I

Column-II

(A) Bt cotton

(1) Vitamin A enriched

(B) Golden rice

(2) High yield and pest resistant

(C) Bt tobacco

(3) Gene silencing

(D) RNAi

(4) Cry protein

	A	B	C	D
(a.)	4	1	2	3
(b.)	1	2	3	4
(c.)	4	3	2	1
(d.)	3	1	2	4

- (31.) Transposons are also known as

- (a.) silenced genes (b.) jumping genes
- (c.) mobile genes (d.) both (b) and (c)

- (32.) Antisense RNA is

- (a.) RNA that makes opposite sense (b.) RNA that investigators find confusing
- (c.) the non-coding strand of DNA molecule (d.) RNA that is complementary to certain mRNA

- (33.) Read the following statement about RNAi silencing.

(I) RNAi takes place in all eukaryotic organisms as a method of cellular defence.

(II) RNAi involves silencing of a specific mRNA due to a complementary ds RNA molecule.

(III) The source of CRNA could be from an infection by viruses having transposons.

- (a.) Statements I and II are true but III is false (b.) Statements II and III are true but IV is false
- (c.) Statement II is true but I and III are false (d.) All statements are true

- (34.) During development of pest resistant plant against *Meloidogyne incognita*, the nematode specific genes were introduced into the host plant by

- (a.) Bam HI (b.) pBR322
- (c.) Agrobacterium vector (d.) Hind III

- (35.) **Assertion:** Lepidopterans die when they feed on Bt cotton plant
Reason: Bt cotton plants are transgenic plants.
- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion. (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
- (c.) Assertion is true, but Reason is false. (d.) Assertion is false, but Reason is true.
- (36.) **Assertion:** RNAi technique helps to prevent the infestation of roots in tobacco plants by *Meloidogyne incognita*.
Reason: RNAi takes place in all eukaryotic organisms as a method of cellular defence.
- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion. (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
- (c.) Assertion is true, but Reason is false. (d.) Assertion is false, but Reason is true.
- (37.) **Assertion:** Green Revolution was not enough to feed the growing human population.
Reason: Green Revolution succeeded in tripling the food supply.
- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion. (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
- (c.) Assertion is true, but Reason is false. (d.) Assertion is false, but Reason is true.
- (38.) Recombinant therapeutics are advantageous because
- (a.) they are very easy to produce (b.) they do not induce unwanted immunological response
- (c.) they are safe and more effective (d.) both (a) and (b)
- (39.) The recombinant therapeutics approved for human use in the world and marketed in India are
- (a.) 30 and 12, respectively (b.) 10 and 5, respectively
- (c.) 50 and 40, respectively (d.) 20 and 20, respectively
- (40.) The first human hormone produced by recombinant DNA technology is
- (a.) insulin (b.) oestrogen
- (c.) thyroxin (d.) progesterone
- (41.) What was the disadvantage of using insulin extracted from pancreas of slaughtered cattle and pigs?
- (a.) It leads to hyper calcemia (b.) It is expensive
- (c.) It may cause allergic reactions (d.) It may lead to mutations in human genome

- (42.) The two polypeptides of human insulin are linked together by
- (a.) phosphodiester bonds (b.) covalent bonds
(c.) disulphide bridges (d.) hydrogen bonds
- (43.) The diagram shows the maturation of pro-insulin into insulin. Identify A, B and C.
- (a.) A – A peptide, B – B peptide, C – proinsulin (b.) A – proinsulin, B – A peptide, C – B peptide
(c.) A – Free C peptide, B – A peptide, C – B peptide (d.) A – A peptide, B – proinsulin, C – C peptide
- (44.) Choose the correct option for C peptide of human insulin.
- (a.) It is a part of mature insulin molecule. (b.) It is responsible for the formation of disulphide bridges.
(c.) It is removed during maturation of proinsulin to insulin. (d.) It is responsible for its biological activity.
- (45.) Genetically engineered human insulin (humulin) was launched by American Drug Company on
- (a.) 5th July 1998 (b.) 5th July 1993
(c.) 5th July 1973 (d.) 5th July 1983
- (46.) Choose the correct sequence of steps involved in the production of humulin.
(I) Synthesis of gene (DNA) for human insulin artificially
(II) Recombinant E. coli culture in bioreactor
(III) Humulin purification
(IV) Insertion of human insulin gene into plasmid
(V) Recombinant plasmid introduction into E. coli (VI) Extraction of recombinant gene product from E. coli
- (a.) II → I → IV → III → V → VI (b.) I → III → V → VI → II → IV
(c.) I → IV → V → II → VI → III (d.) III → V → II → I → VI → IV
- (47.) A collection of methods that allows correction of a gene defect that has been diagnosed in a child/ embryo is
- (a.) rDNA technology (b.) embryo transfer
(c.) gene therapy (d.) all of these
- (48.) Which kind of therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency?
- (a.) Gene therapy (b.) Chemotherapy
(c.) Immunotherapy (d.) Radiation therapy

(49.) Gene therapy was done for the first time in the treatment of

- (a.) AIDS
- (b.) cancer
- (c.) cystic fibrosis
- (d.) SCID (severe combined immuno deficiency) resulting from the deficiency of ADA.

(50.) ADA (an enzyme) which causes genetic disorder SCID

- (a.) Adenosine Deoxy Aminase
- (b.) Adenosine Deaminase
- (c.) Aspartate Deaminase
- (d.) Arginine Deaminase

Shiksha Classes, Bhandara

ANSWER

(1.)	d	(2.)	c	(3.)	c	(4.)	b	(5.)	d
(6.)	a	(7.)	d	(8.)	d	(9.)	c	(10.)	c
(11.)	a	(12.)	d	(13.)	d	(14.)	a	(15.)	d
(16.)	b	(17.)	c	(18.)	d	(19.)	c	(20.)	c
(21.)	b	(22.)	c	(23.)	d	(24.)	d	(25.)	c
(26.)	b	(27.)	d	(28.)	c	(29.)	c	(30.)	a
(31.)	d	(32.)	d	(33.)	d	(34.)	c	(35.)	b
(36.)	b	(37.)	b	(38.)	d	(39.)	a	(40.)	a
(41.)	c	(42.)	c	(43.)	b	(44.)	c	(45.)	d
(46.)	c	(47.)	c	(48.)	a	(49.)	d	(50.)	b

Shiksha Classes, Bhandara

EXPLANATION

(1.) (d) Biotechnology deals with industrial scale production of biopharmaceuticals and biological using genetically modified microbes, fungi, plants and animals.

(2.) (c) The application of biotechnology include therapeutics, diagnostics, genetically modified crops for agriculture, processed food, bioremediation, waste treatment and energy production.

(3.) (c) There are three critical research areas of biotechnology as follows:

(I) Providing the best catalyst in the form of improved organism usually a microbe or pure enzyme.

(II) Creating optimal conditions through engineering for a catalyst to act.

(III) Downstream processing technologies to purify the protein/organic compound.

(4.) (b) The three options that can be thought for increasing food production are

(I) Agrochemical based agriculture

(II) Organic agriculture

(III) Genetically engineered crop based agriculture

(5.) (d) The development of several high yielding varieties of wheat and rice in 1960 increased yields per unit area. This phase is called Green Revolution. It succeeded in tripling the food supply but yet it was not enough to feed the growing human population. The increased yield during green revolution was due to use of agrochemicals and improved crop varieties.

(6.) (a) Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called genetically modified organisms.

(7.) (d) Genetically modified plants have been useful in many ways. Genetic modification has:

(I) made crops more tolerant to abiotic stresses (cold, drought, salt, heat)

(II) reduced reliance on chemical pesticides (post-resistant crops)

(III) helped to reduce post-harvest losses

(IV) increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soils)

(V) enhanced nutritional value of food, e.g., vitamin A enriched rice.

(8.) (d) Statement that Golden rice is vitamin-A enriched, with a gene from daffodil is true. Golden rice is genetically engineered variety of rice to biosynthesis β -Carotene which is a precursor of vitamin-A. It contains psy gene (Phytoene Synthase) which is derived from daffodil. Other statements are not true for golden rice. The correct information about the statements is as follows:

The grains of golden rice appear yellow due to high level of β -carotene in it. Golden rice is neither drought tolerant nor pest resistant.

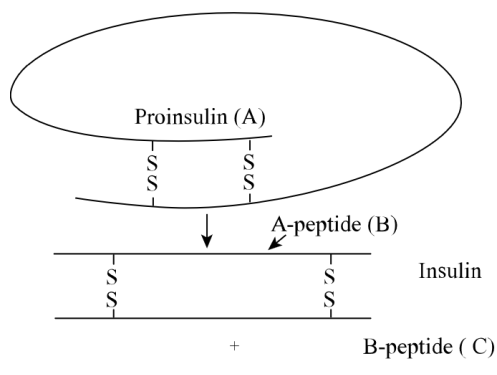
(9.) (c) Golden rice is rich in vitamin-A (Retinol) as it has the gene for β -Carotene.

(10.) (c) Golden rice is a genetically modified variety of rice containing good quantities of β -carotene (provitamin A is inactive state of vitamin A). β -Carotene is converted into vitamin-A. Deficiency of vitamin-A causes night blindness and skin disorder. Thus, golden rice may help in solving the problem of night blindness in developing countries.

(11.) (a) Transgenic golden rice was created by transforming rice with the genes psy (Phytoene synthase) from daffodil (*Narcissus pseudonarcissus*) and gene from the soil bacterium *Erwinia uredovora*.

- (12.) (d) The prefix Bt in Bt cotton means *Bacillus thuringiensis*. It is a soil bacterium which carries an endotoxin gene (cry gene) for the production of insecticidal protein, i.e., Cry protein.
- (13.) (d) Some strains of *Bacillus thuringiensis* produce proteins that kill certain insects such as lepidopterans, coleopterans and dipterans.
- (14.) (a) A-1, B-2, C-3
- (15.) (d) Bt cotton is a genetically modified plant whose genes have been altered to make it insect resistant through the introduction of Bt toxin gene. It is resistant to some specific pesticides not to all pesticides.
- (16.) (b) Bt toxin is an intracellular crystalline protein produced by *B. thuringiensis* during particular stage of their growth.
- (17.) (c) Bt toxin protein crystals present in bacterium *Bacillus thuringiensis* do not kill the bacteria because toxins occur as inactive protoxin in bacteria.
- (18.) (d) A protoxin is an inactive toxin. The word 'pro' in protoxin means inactive form. *B. thuringiensis* forms protein crystals which contain a toxic insecticidal protein (Bt toxin).
- (19.) (c) Bt toxins are initially inactive protoxins, but after ingestion by the insect these inactive toxins become active due to the alkaline pH of the gut which solubilize the crystals.
- (20.) (c) Bt toxin kills insect by creating pores in the midgut epithelial cells leading to cell swelling, lysis and ultimately death of the insect.
- (21.) (b) Statement I is true but II is false. Conversion of proBt toxin to active Bt toxin takes place in highly basic/alkaline conditions which are not present in human stomach, because human stomach is acidic in nature due to HCl secretion.
- (22.) (c) The protein encoded for the genes Cry IAc and Cry II b control the cotton bollworms that of cry IAb controls corn borer.
- (23.) (d) Main objective of production/use of herbicide resistant genetically modified crops is to reduce herbicide accumulation in food articles for health safety. These plants have been developed in such a way that they continue to produce normal crop yield, while remaining unaffected by activity of herbicides.
- (24.) (d) Glyphosate (N-phosphonomethyl glycine) is systemic broad spectrum herbicide used to kill weeds especially broad leaves and grasses. It is used to engineer new crops for having herbicides tolerance (resistant).
- (25.) (c) A nematode *Meloidogyne incognita* infects the roots of tobacco plants and causes a great reduction in yield.
- (26.) (b) To prevent infestation of *Meloidogyne incognita* in tobacco plant, the plant has adopted RNA interference (RNAi) process.
- (27.) (d) A retrovirus is a single stranded RNA virus that stores its nucleic acid in the form of mRNA molecule. Retrovirus shows reverse transcription.
- (28.) (c) Double stranded RNA is used to silence genes during RNA interference. It takes place in all eukaryotic organisms as a method of cellular defence. This method of RNAi involves silencing of a specific mRNA due to a complementary ds RNA molecule that binds to and prevents translation of the mRNA (silencing).
- (29.) (c) Silencing of a gene can be done by using short interfering RNA (RNAi) or antisense RNA. Eukaryotic organisms as a method of cellular defence. This method involves silencing of a specific mRNA due to complementary dsRNA molecule that binds to and prevents translation of mRNA (silencing). The source of this complementary RNA could be from an infection by viruses having RNA genomes or mobile genetic elements (transposons) that replicate via an RNA intermediate.

- (30.) (a) A-4, B-1, C-2, D-3
- (31.) (d) Transposons are mobile genetic elements or jumping genes.
- (32.) (d) Antisense RNA is an RNA that is complementary to certain mRNA.
- (33.) (d) All statements are true. RNAi takes place in all.
- (34.) (c) Using Agrobacterium vectors, nematode-specific genes were produced into the host plant.
- (35.) (b) Bt cotton plants are transgenic plants that express a *Bacillus thuringiensis* gene called cry gene. This gene encodes for protein crystals having insecticidal properties against insects of group lepidoptera, diptera and coleoptera. Inside the bacterium, these proteins remain inactive and do not harm the bacteria. However, these inactive crystals can get activated in the alkaline pH of the gut of insects upon ingestion. After activation, these crystals can bind to the receptors present on the membranes of gut epithelial cells. Due to this binding, the membrane swells and pores are created on them. These pores lead to bursting of cell. Hence, soon lepidopterans die due to starvation.
- (36.) (b) A nematode *Meloidogyne incognita* infects the root of tobacco plants, which reduces the production of tobacco. The strategy adopted to prevent this infection is based on the process of RNA interference (RNAi). RNAi takes place in all eukaryotic organisms as a method of cellular defence. This method involves silencing of a specific mRNA due to complementary dsRNA molecule that binds to and prevents translation of mRNA.
- (37.) (b) The Green Revolution succeeded in tripling the food supply but yet it was not enough to feed the growing human population. Increased yields have partly been due to the use of improved crop varieties and use of fertilizers and pesticides. However, for farmers these agrochemicals are too expensive and further increase in yield with existing varieties are not possible using conventional breeding.
- (38.) (d) The recombinant DNA technological process have made immense impact on healthcare by enabling mass production of safe and more effective therapeutic drugs. Further, recombinant therapeutics do not induce unwanted immunological responses as they are common in case of similar products isolated from non-human sources.
- (39.) (a) At present about 30 recombinant therapeutics have been approved for human use in the world over. In India, 12 of these are presently being marketed.
- (40.) (a) Insulin is the first human hormone produced by recombinant DNA technology. It is a peptide hormone, which controls the level of blood sugar.
- (41.) (c) Insulin extracted from pancreas of cattle and pigs caused some patients to develop allergy or other types of reactions to the foreign protein.
- (42.) (c) In humans, insulin is produced by b-cells of pancreas. It is synthesized in prohormone in which two polypeptides are synthesized with an extra stretch of 'C' polypeptide. These two polypeptide chains (A and B) are linked together by disulphide linkages (bridges).

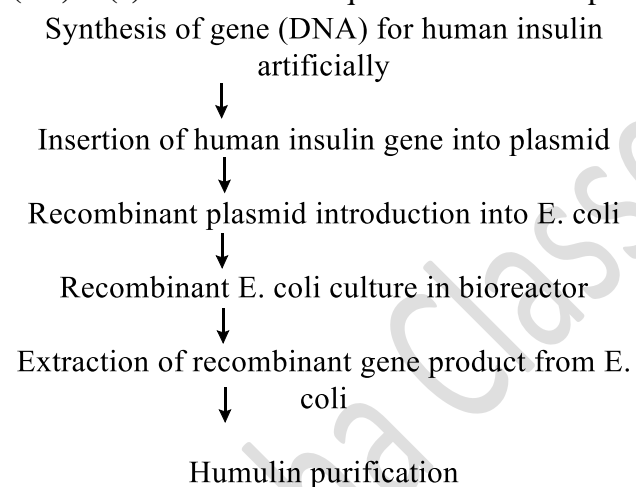


(43.) (b) free C-peptide

(44.) (c) The connecting peptide or C peptide is a short protein containing 31 amino acids. It connects the A and B chain of proinsulin molecule. After the processing of proinsulin molecule, C peptide is removed leaving behind A and B chains which bind together by disulphide bonds to constitute an insulin molecule.

(45.) (d) Genetically engineered human insulin (humulin) was launched by Eli Lilly, an American Drug Company, on 5th July 1983.

(46.) (c) The correct sequence of humulin production is



(47.) (c) Gene therapy is a collection of methods that allows correction of a gene defect that has been diagnosed in a child/embryo.

(48.) (a) Gene therapy was first given in 1990 to a 4-year-old girl with adenosine deaminase (ADA) deficiency. Gene therapy is the technique of genetic engineering that allows correction of a gene defect that has been diagnosed in a child/embryo.

(49.) (d) The first clinical gene therapy was done for the treatment of SCID (severe combined immuno deficiency) resulting from the deficiency of ADA.

(50.) (b) ADA is an enzyme which is deficient in patients of genetic disorder SCID. ADA stands for adenosine deaminase. This enzyme is crucial for the immune system to function.

BECOME AN ACE IN JEE & NEET



SHIKSHA CLASSES
Believe & Achieve

JEE | NEET | Previs (8-10)

📞 8625055707 | 8623085707 🌐 shikshaclasses.co.in

M-19, MHADA Colony, Khat Road, Bhandara



Learn with Jaiswal sir