

## Unit V

### *Biopiracy*

- It can be defined as an unauthorized appropriation of genetic resources.
- Commercial exploitation of genetic resources in developing countries by others.
- It's an unfair, unethical and a threat to the existence of indigenous cultures
- Example : Neem, turmeric ad basmati rice
- In 1994 the multinational corporation W.R. Grace and the US Department of Agriculture was granted a patent by the EPO “covering a (special) method for controlling fungi on plants by the aid of a hydrophobic extracted neem oil” that is diluted with a certain percentage of water.
- This patent was challenged by the Indian Council for Scientific and Industrial Research (CSIR) in 1996 on the ground of prior art.
- In the re-examination process the CSIR claimed “that turmeric has been used for thousands of years for healing wounds and rashes and therefore its medicinal use was not novel”.

### *Reproductive cloning*

- The generation of a new animal that has the same nuclear DNA as a previously existing animal.
- Artificial Embryo Twinning: A blastomere is induced to split, forming identical twins.
- Nuclear Somatic Transfer: The nucleus of an adult body (somatic) cell is transferred into an egg which has had its nucleus removed.
- After treatment to make it begin dividing, the embryo is transplanted into a host uterus.
- Dolly was created using nuclear somatic transfer
- Extremely inefficient, most eggs do not develop into an organism

### *Therapeutic cloning*

- Uses the process of nuclear somatic transfer to create an embryo.
- The embryo is destroyed and harvested for stem cells.
- Stem cells are undifferentiated and retain the ability to develop into many cell types depending on their potency.
- Totipotent cells can develop into any tissue in the human body, plus tissues needed for development such as placental cells.
- Pluripotent cells can develop into almost all cells, but cannot produce a new organism.

### *Bioethics Involved in Animal Cloning*

Different Bioethics involved in cloning described below:

- Survival rate of cloned embryos low
- Over weighing of calves at birth
- Breeders may want to keep their animal unique
- Breeders may want to create better offspring
- Poor development of heart, lung and immune system
- Might have genetic disorder

### **Why humans cloning is ethically unacceptable**

**1. Controlling someone else's genetic makeup** - Child can reject any aspect of its upbringing, but it could never reject the genes that were chosen for it. Such control by one human over another is incompatible with the ethical notion of human freedom, in the sense of that each individual's genetic identity should be inherently unpredictable and unplanned.

**2. Instrumentality** - Cloning raises a number of concerns arising from its consequences, of which instrumentality and risk are of especial importance.

**3. Infertility - an exception to instrumentality** - An exception to this objection would be the idea of producing a child from an infertile couple by cloning one of them. But this raises other problems. Instead of being the unique genetic product of both parents, the child is a copy of one of them. It would not be the biological child of both parents in the normal sense.

**4. Psychological effects - identity and relationship** - Would the clone feel that he or she was just a copy of someone else who's already existed and not really themselves?

**5. Physical risk** - To repeat the same thing on humans would be giving both the mother and the potential fetus an unacceptably high risk of damage. Experiment that could be done to prove the safety of human cloning without causing serious risk to humans in the process.

**6. Social risk** - Human cloning would bring grave risks of abuses to human dignity and exploitation by unscrupulous people.

#### **Law's that Control Cloning**

- There have been numerous bills that have been introduced into Congress to prohibit or control cloning practices.
- Congress explains that cloning is illegal in the following terms:
- It shall be unlawful for any person or entity
- To perform or attempt human cloning
- To participate in an attempt to perform human cloning
- To ship or receive the product of human cloning for any purpose.

#### ***Ethical implications of cloning***

- **Value** - when doing experimentation with cloning, we must first decide whether or not the conclusions will lead to some sort of improvement in health and well-being.
- **Scientific Validity** – there must be a clear objective for cloning. Cloning research must be based on proven scientific knowledge and methods.
- **Fair Subject Selection** - In choosing subjects to take part in cloning, there mustn't be any biases or discrimination.

- **Favorable risk-benefit ratio** – to minimize the risk and maximize the benefits of cloning.
- **Independent Review** – A board reviews the topics and ethical issues of cloning.
- **Consent** – When human cloning begins it will be relevant that the subject give consent to the experimentation.
- **Respect for Enrolled Subjects** – Those who take place in cloning research or processes must be guaranteed their human rights and be given the proper respect.

### *Legal and socioeconomic aspects of gene therapy*

- Gene therapy involves making changes to the body's set of basic instructions, it raises many unique ethical concerns. The ethical questions surrounding gene therapy include:
- Should people be allowed to use gene therapy to enhance basic human traits such as height, intelligence, or athletic ability?
- Current gene therapy research has focused on treating individuals by targeting the therapy to body cells such as bone marrow or blood cells.
- This type of gene therapy cannot be passed to a person's children.
- Gene therapy could be targeted to egg and sperm cells (germ cells), however, which would allow the inserted gene to be passed to future generations. This approach is known as germline gene therapy.
- The idea of germline gene therapy is controversial. It could spare future generations in a family from having a particular genetic disorder, it might affect the development of a fetus in unexpected ways or have long-term side effects that are not yet known.
- Because people who would be affected by germline gene therapy are not yet born, they can't choose whether to have the treatment.

### *Bioethics in Medical*

- Bioethics is the study of the ethical issues emerging from advances in biology and medicine.
- It is also moral discernment as it relates to medical policy and practice.
- Medical ethics is the study of moral values and judgments as they apply to medicine.
- The four main moral commitments are respect for **autonomy, beneficence, nonmaleficence, and justice**
- **Autonomy** - The patient has the right to refuse or choose their treatment.
- **Beneficence** - Beneficence is a concept in research ethics which states that researchers should have the welfare of the research participant as a goal of any clinical trial
- **Non-maleficence** - non-harming or inflicting the least harm possible to reach a beneficial outcome.
- **Justice** - justice could be described as the moral obligation to act on the basis of fair adjudication between competing claims.

### *Ethical issue in gremlin and somatic cell gene therapy*

Gene therapy involves making changes to the body's set of basic instructions, it raises many unique ethical concerns. The ethical questions surrounding gene therapy include:

- How can “good” and “bad” uses of gene therapy be distinguished?
- Who decides which traits are normal and which constitute a disability or disorder?
- Will the high costs of gene therapy make it available only to the wealthy?
- Could the widespread use of gene therapy make society less accepting of people who are different?
- Should people be allowed to use gene therapy to enhance basic human traits such as height, intelligence, or athletic ability?

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### *GMO's and its ethical issues*

Foods produced from or using GM organisms are often referred to as GM foods. GM foods are developed – and marketed – because there is some perceived advantage either to the producer or consumer of these foods. This is meant to translate into a product with a lower price, greater benefit (in terms of durability or nutritional value) or both. Initially GM seed developers wanted their products to be accepted by producers and have concentrated on innovations that bring direct benefit to farmers (and the food industry generally).

- **Health Risks: Animals** - Many scientific data indicate that animals fed by GM crops have been harmed. E.g. rats exposed to GM potatoes and soya had abnormal young sperm. Cow, goats buffalo, pigs & other livestock grazing on Bt-maize & certain biotech corn showed complications including early delivery, abortions, infertility & many more died
- **Health Risks: Human** - Many companies do not accept the direct link between GMF consumption & human health problems. E.g. Foodborne diseases such as soya allergies have increased over past 10 years in UK. Many villagers & cotton handlers have developed skin allergies in India.
- **Environmental Risk** - Genes may escape & find their way into other members of species or other species. Imagine the trouble if herbicide resistant genes found their way into weeds. GM crops could compete or breed with wild species threatening

biodiversity. Monogenetic crops may not react sufficiently to environmental stresses, posing danger of reenactment of Ireland's potato famine. Unintended harm to other species.

- **Economic Issues** - Risk of patent enforcement which may oblige farmers may to depend on giant engineering companies such as Monsanto for strains when their crops are pollinated. Patenting new plant varieties will raise the price of seeds so high that small farmers will not be able to afford seeds for GM crops, thus widening the gap between the wealthy and poor.

### ***GMO and Ethical Issues***

Genetic modification of organisms can have unpredictable results when such organisms are introduced into the ecosystem. Therefore, the Indian Government has set up organizations such as **GEAC (Genetic Engineering Approval Committee)**, which will make decisions regarding the validity of GM research and the safety of introducing GM-organisms for public services. The modification/usage of living organisms for public services (as food and medicine sources, for example) has also created problems with patents granted for the same. There is growing public anger that certain companies are being granted patents for products and technologies that make use of the genetic materials, plants and other biological resources that have long been identified, developed and used by farmers and indigenous people of a specific region/country.

Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organizations without proper authorization from the countries and people concerned without compensatory payment. Most of the industrialized nations are rich financially but poor in biodiversity and traditional knowledge. In contrast the developing and the underdeveloped world is rich in biodiversity and traditional knowledge related to bio-resources. There has been growing realization of the injustice, inadequate compensation and benefit sharing between developed and developing countries. Therefore, some nations are developing laws to prevent such unauthorized exploitation of their bioresources and traditional knowledge. The Indian Parliament has recently cleared the second amendment of the Indian Patents Bill, that takes such issues into consideration, including patent terms emergency provisions and research and development initiative.

***Ethical implications of human genome project***

- Fairness in the use of genetic information
- Psychological impact – due to an individual genetic information
- Reproductive issues – includes adequate and informed consent and use of genetic information
- Clinical issues – include the education of doctors and other health service providers
- Health and environmental issue – concern genetically modified food and microbes
- Commercialization of products - including property rights and accessibility of data and materials