MOLECULAR BIOTECHNOLOGY (SQG3213)

ETHICAL ISSUES IN BIOTECHNOLOGY

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- Rise from development & application of biotechnology. New genetic knowledge & techniques available nowadays to make / create things which are impossible before.

- Some are beneficial and some causes concern.

- Some are serious, causing public opposition.

- Ongoing debate on ethics & biotechnology.

- Ethical values indicate what is right and, or wrong; a choice from the benefit to disadvantages. Judgments are also based on religious & social attitudes.

- Ethical dilemmas in biotechnology & its implication, which vary between individuals & cultures.

- Distinction between ethics, morals & value.

- Moral values depend on the balance between the perceived good & bad aspects of a decision.

- For difficult decisions, a line usually needs to be drawn as a measure to quantify the extent of applicability of a certain techniques / knowledge.
- From fears & discomfort, especially when discovery exceeds comprehension.
- Ethical issues concern the potential moral outcomes of a certain application or technology.
- The ethical concerns arise from:

HUMAN EMBRYO CLONING

- Some ethical aspects involved:
  - Acceptability of reprogramming human embryo to develop into certain cell types.
  - Acceptability of reproductive human cloning.
  - Permissibility of a creation of cloned human embryo for medical.
  - Acceptability of a transfer of human cells into animals for the animals to produce certain human cells.
  - Acceptability of the risks involved in cell replacement therapy. Some ethical aspects involved:

- The main concerns:
  - A particular gender's zygotes elimination without abortion.
  - Production of human with desirable trait & the production of these human clones.
  - Could lead to a decrease in genetic diversity of a certain trait or eliminate it.
  - During production, the potential killing or injuring or exploitation of embryos.
  - Since human clones do not always require the fusion of eggs & sperms, sperms might not be needed.

- The current cloning technology is also in question.
- Even if cloning a human is a success, the consequence that lay ahead?
- Interference a family's structure of identities & lineage.
- The ambiguities of inheritance.
- Clones – product?
- The change in eugenic movement.

- Cloning destroys individuality.
- Sexing children affects a nation.
- A right to life.
- The right to having children; conceived / cloned.
- The real parent of a clone.
- Challenges of a clone child.
- Human cloning – ‘playing God?’

THERAPEUTIC CLONING

- Questions of harvesting embryos for therapeutic use.

- For therapeutic purposes, the pre-embryo does not reach the embryo stage.

  - From beliefs: which stage the ovum becomes a human.
  - The legality of the process.
  - Different view in outlining legislation.
  - Different opposition to reproductive cloning and therapeutic cloning.

Stem Cell Therapy

- The source of the stem cells.
- Pre-embryo produced will be a human. Murder?
- Immoral to kill a person in order to save another's life.
- The extent of the research.
- Funding: government (public) / private?
- Laws to regulate research.
- The question of life from embryonic stem cells.
- Safety concerns.
- Guarantee of therapy.
- Improper gene regulation?

- The high risk involve if a spread of viruses infect humans.

- Man-made genes are even more dangerous.

GENETICALLY MODIFIED PRODUCTS AND ORGANISMS

- Application of GE to wide range of organisms.
- Changes can be made easily, quickly & directly.
- Plants & animals' natural breeding changed through evolution.
- Interference with nature that could affect the food chain.
- Modified species, is it different from the normal ones?
- Breeding of modified organisms – safe?
- GMO / GMP – a solution or problem?
- GMOs might not benefit the poor.
- IP issues.

Food

- Long term effect of growing & eating GM food.
- Lack of product labeling.
- Affect the environment – food chain.
- Decline in certain species.
- The effect of foreign substances to the ecosystem & food chain.
- Concerns of new strain of bacteria.
- The cost of studying the effect of a product.
- GM food & the poor.
- Concerns of safety:
  - Potential risks
  - Killing of harmless insects
  - Increased resistance in pests
  - Labels
  - Storage & shipping

Animals

- Killing of animals to save a human life.
- Fear of contracting diseases form the animals.
- Cloning endangered & extinct animals:
  - The cost of successful production
  - Endangering the life of the animal
  - Habitat
- Engineered animals as models of human disease – suffering & torture

Pharming

- May shrink livestock genetic variability.
- Donor organs (xenotransplantation) are not always safe.
- The implication of unsuccessful animals

Biological Warfares

- Harness disease-causing capability of disease agents as weapons in a war.
- Constitute to bioterrorism.
- Use of certain natural agents in developing bioweapons.
- Misuse of biotechnology

Reference:

- Thieman, W.J. and Palladino, M.A. (2009) Introduction to Biotechnology. Pearson Benjamin Cummings, US. P. 325-341