


**TET 103: CHILD DEVELOPMENT
(0–3 YEARS)**

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Definition of Genetic Counselling

Genetic counseling 

Genetic counseling is a process by which patients or relatives, at risk of an inherited disorder, are advised of the consequences and nature of the disorder, the probability of developing or transmitting it and the options open to them in management and family planning in order to prevent or avoid it.

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Lecture 6: Genetic Counselling

Objectives

- At the end of this lecture the learner should be able to:
 - a) Define genetic counselling
 - b) Highlight characteristics of people who need genetic counselling
 - c) Explain the procedure for detecting genetic disorders
 - d) Describe new reproductive technologies

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Importance of Genetic Counselling

Aims of genetic counseling

- The genetic counseling aims to provide the family with complete and accurate information about genetic disorders.
 1. Promoting informed decisions by involved family members
 2. Clarifying the family's options available treatment and prognosis
 3. Explaining alternatives to reduce the risk of genetic disorders
 4. Decreasing the incidence of genetic disorders
 5. Reducing the impact of the disorders

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Definition of Genetic Counselling

- Genetic counseling is the means by which people can obtain valuable information about their genetic inheritance and that of their potential partners.
- Genetic counseling helps potentials parents evaluate their genetic risk factors i.e. their likelihood of giving birth to a baby with hereditary disorders before risking pregnancy and enable them make intelligent decisions
- Genetic counseling is important for both men and women since one of all birth defects are caused by genetic factors and helps them to make decisions based on genetic knowledge

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Characteristics of people who should seek genetic counselling

- i. Those who are aware of an existence of genetic disorder in their families or a couple who have had one child with a genetic disorder
- ii. Parents of a child who has a serious congenital abnormality or defect
- iii. A couple who have experienced difficulties in having children: No conception or have had more than three miscarriages - or a miscarriage where the fetal tissue analysis indicated chromosome abnormality

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Characteristics of people who should seek genetic counselling

- iv. A pregnant woman of over 35 years or a father of over 44 years (Down syndrome)
- v. Prospective parents belonging to certain racial or ethnic groups that are at high risk for a certain genetic disorder
- vi. A couple who are aware of prenatal exposure to an excessive dose of radiation, drugs or other environmental agents that can result in birth defects.

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Procedures For Detecting Genetic Disorders

- When all the relevant genetic information about potential parents is with the counselor, the genetic counselor helps the couple consider choosing appropriate options.
- These include:-
 - Taking a chance and conceive
 - Choose from among a variety of reproductive technologies
 - Adopting a child

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Procedures For Detecting Genetic Disorders

- Predicting a baby's vulnerability to genetic defects can be a complicated procedure.
- This is however done by first and foremost to:-
 - Examine complete medical records of potential parents to uncover any diseases which could have a genetic origin.
 - Each parent is given a complete physical medical examination including biochemical and blood tests
 - Preparation of a family pedigree to show which members of the family have been afflicted by any disorder and whether the inheritance pattern is dominant, recessive or x-linked.

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1. Taking a chance to conceive

- If a couple who have genetic disorder and might bear an abnormal child, decide to conceive, several prenatal diagnostic methods or medical procedures can be carried out to detect the problems before birth
- Some of the prenatal diagnostic methods and medical procedures include:

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Procedures For Detecting Genetic Disorders

- If an inheritable genetic abnormality is found a genetic counselor evaluates a couple's risk of having a baby/child with the genetic disorder, puts the risk in perspective and suggests reproductive alternatives such as adoption or artificial insemination of donor (egg or sperm) if the couple decides that the risks are too great.
- The risk of bearing a child with an abnormality has however been reduced considerably by prenatal testing.

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1. Taking a chance to conceive

a) Treatment before birth.

- Improvements in prenatal diagnosis have led to new advances in fetal medicine - thus today some medical problems are being treated before birth. Eg.
 - •Drugs can be administered to the fetus by inserting a needle into the uterus
 - Surgery has been performed to repair such problems as urinary track, intestinal obstruction and neural defects.

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1. Taking a chance to conceive

- These practices, however, remain controversial since most of them are highly experimental. Although some babies have been saved the techniques frequently result in complications or miscarriage.
- Parents however when informed that their unborn baby has serious defect, they are willing to try almost any option, even if there is only a slim chance of success.

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1. Taking a chance to conceive

- Although tremendous advances are being made in human genetic engineering many old ethical issues remain to be solved.

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1. Taking a chance to conceive

b) Advances in genetic engineering

- This offer new hope for correcting hereditary defects
- The possibility of **genetic repair or substitution** of individual genes to correct certain defects of the prenatal organism is at an advanced stage now than before
- Researchers map out human chromosomes find the precise location of genes for specific traits and **clone** (copy) these genes using chemical techniques in the laboratory.

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2. The alternative of abortion

- If prenatal diagnosis shows that the fetus has an abnormal condition that cannot be corrected parents are faced with the difficult choice of whether or not to have an abortion
- The decision to terminate a desired pregnancy is a painful one for the parents who have to make it such as;-
 - Dealing with the emotional shock of the news and decide within a very short period of time.
 - Possible guilt about the abortion itself
 - The grief of losing a wanted child be and worries of future pregnancies

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1. Taking a chance to conceive

- Scientists hope to use this information to identify abnormal conditions with greater accuracy before birth. Common genetic engineering techniques are:
 - **Gene cloning** - duplicating animals in the laboratory using just one somatic or body cell.
 - **Gene splicing** - is another process of replacing a harmful gene with a good one in the early zygote or in cells in the affected part of the body. This may make it possible for defects to be permanently corrected before symptoms appear. the term is used to refer to the process by which the DNA of an organism is cut and a gene, perhaps from another organism, is inserted. Gene splicing is often used in industry to allow single-celled organisms to produce useful products, such as human insulin.

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2. The alternative of abortion

- Other causes of abortions:
 - Women who become accidentally pregnant
 - Adolescents who conceive before they are mature enough to raise a child have the highest rate of abortion.
- Unwanted children who are born have been observed to have serious developmental problems both from mothers and adolescent girls
- Develop less favourably - less physically healthy and less emotionally stable and achieved less in school

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2. The alternative of abortion

- By young adulthood they were less satisfied with their lives and blamed their unhappiness on a poor relationship with their parents
- **Ethical issues about abortion**
 - Science cannot inform pregnant women or society as a whole whether abortion is a morally justifiable act or not.
 - This is because there are too many questions to ask regarding the justification for and abortion ranging from individual, social economic and religious
 - Legalization of abortion by states still remains a major ethical issue.

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3. New reproductive technologies

a) Artificial insemination by a donor (AID)

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3. New reproductive technologies

- The high incidence of reproductive problems such as infertility for a variety of reasons and avoiding to risk pregnancy because a family history of genetic abnormalities has led to alternative methods of conception and pregnancy
- Such methods are:

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3. New reproductive technologies

a) Artificial insemination by a donor (AID)

- AID is also called heterologous insemination.
- AID is distinguished from homologous insemination, that is **artificial insemination by husband (AIH)**.

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3. New reproductive technologies

a) Artificial insemination by a donor (AID)

- This is a process of injecting sperms from an **anonymous** man into a woman whose husband has reproductive difficulties. In the M.S.A about 20,000 children are conceived this way each year.
- A procedure in which a fine catheter (tube) is inserted through the cervix (the natural opening of the uterus) into the uterus (the womb) to deposit a sperm sample from a donor other than the woman's mate directly into the uterus.
- The purpose of this procedure is to achieve fertilization and pregnancy.

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3. New reproductive technologies

b) In-vitro-fertilization (test tube baby)

- In this method, hormones are given to a woman to stimulate ripening of several ova.
- These are removed surgically and placed in a dish of nutrients to which sperm are added.
- Once an ovum is fertilized and begins to divide into several cells it is injected into the mothers uterus, where, hopefully it will implant and develop
- In-vitro fertilization is used to treat infertility in women whose fallopian tubes are permanently damaged (blockage) this method is successful for 20% of those who try it.

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3. New reproductive technologies

b) In-vitro-fertilization (test tube baby)

1. Stimulation of Ovaries

2. Egg Retrieval from Ovaries Day 0

3. Fertilization of Eggs Day 0

4. Embryo Culture Day 0 - 5

5. Embryo Transfer Day 3 - 5

6. Pregnancy Test (bHCG) 14 days after ET

In Vitro Fertilization-IVF

Freezing excess Embryos

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3. New reproductive technologies

b) In-vitro-fertilization (test tube baby)

– See Kenya’s bill on IVF on http://kenyalaw.org/kl/fileadmin/pdfdownloads/bills/2014/ReproductiveHealthCareBill2014_1.pdf

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3. New reproductive technologies

b) In-vitro-fertilization (test tube baby)

- Since the first "test tube baby" was born in England in 1978, more than 5,000 infants have been created through in vitro fertilization (Ryan 1989)
- In Kenya, the procedure has been performed for some years, see <https://www.nation.co.ke/news/Kenyans-embrace-In-Vitro-Fertilisation/1056-2515898-e2qiihz/index.html> and https://www.the-star.co.ke/news/2016/06/03/in-vitro-fertilisation-kenyas-test-tube-babies-mark-10th-birthday_c1351767

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3. New reproductive technologies

c) Surrogate mother

- In this procedure, sperm from a man whose wife is infertile are used to inseminate a woman, who is paid for her child bearing services
- In return the surrogate mother agrees to give the baby over to the man who is the natural father of the baby.
- The child is then adopted by his wife

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3. New reproductive technologies

b) In-vitro-fertilization (test tube baby)

- Donor insemination and in vitro fertilization appear to be physically safe for the child as natural conception. Serious issues have however arisen about their use.
- Many states have no legal guidelines for these procedures, as a result donors are not screened for genetic disorders or sexually transmitted diseases
- In addition only a minority of doctors keep records of donor characteristics, Yet the resulting children may some day want information about their genetic background.

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3. New reproductive technologies

- This is the most controversial form of the medically assisted arrangements that cannot proceed without problems, a number of them end up in court, thus highlighting the serious risks for all concerned.
- Some of the issues that arise from this arrangement include:
 - a) In one case both parties rejected the handicapped infant that resulted from the pregnancy.
 - b) In several others, the surrogate mother changed her mind and wanted to keep the baby.

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3. New reproductive technologies

- c) Most surrogate mothers already have their own children and husband who may be deeply affected by the pregnancy. The knowledge that their mother would give away a baby for profit threatens these youngsters own security.
- d) Children born through this procedure come into the world in the midst of family conflicts that threaten their lives for years to come.
- e) There is lack of laws to regulate this reproductive technology in some countries

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3. New reproductive technologies

- Selection of adoptive parents is important because sometimes it does not work out well - until the child has to be removed.
- Failure risk is greatest for handicapped children (Aids nowadays) and also youngsters adopted at older ages
- Adoption outcomes are good if careful pairing of children is done for parents and guidance is provided to adopting families by well trained social workers.

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3. New reproductive technologies

- f) There are complex ethical problems which have made many countries to make the practice illegal. This causes psychological consequences of children of such procedures

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3. New reproductive technologies

Problems of adopted children

- Adopted children have more emotional and learning difficulties than occur in the general population of children. Reasons for this trends are:-
 - Natural mothers may not have been able to raise the child because of emotional problems believed to be partly genetic, such as alcoholism and schizophrenia. She may have passed this tendency to her offspring because of poverty (which can be a reason for giving up the child)

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3. New reproductive technologies

d) Adopting a child

- Many parents who cannot have children because of infertility or genetic disorders consider to adopt children.
- Adoption agencies try to find parents of the same race and ethnic and religious background as the child, where possible they also try to choose parents who are the same age as most natural parents
- When these matches cannot be made, agencies place children with adoptive parents having other characteristics rather than delay their entry into a family.

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3. New reproductive technologies

- The mother could have experienced stress, poor diet or inadequate medical care during pregnancy - factors which can affect the child
- Children adopted at older ages often have a history of conflict - ridden family relationship and lack of parental affection.

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