UG- 4th sem (Pass)

# DOSAGE COMPENSATION

- The term was coined by Muller, 1932.
- This phenomenon is originally discovered in Drosophila.

Explanation:

- In most organism females have two x ch. and males have only one. So, there is the Potential for expressing twice as much gene products for all x linked genes.
- The compensatory mechanism by which the effective dosage of two sexes is made equal is called dosage compensation

## Dosage compensation in Drosophila :⇒

i> female Drosophila have 2 copies of x linked genes, where in male has only one copy.

ii> Thus RNA production by single x linked genes of males equals RNA production of two x linked genes of female.

iii> This creats a genetic dosage problem in x linked male & female.

iv> In xo cell the x ch. is hyperactive.

v> These dosage compensation ~~is made by~~ genes are called male specific lethal loci (msl)

## conclusion :⇒

Here dosage compensation is made by hyperactivity of one x ch. in male, i.e. transcriptional level of genes on the male's x ch. increased two fold to mated gene expression of x linked gene in female.

## Dosage compensation in mammals :⇒

i) If both of female x ch. are activated then proteins coded by genes on the x ch. might be twice in females as compared to that of males.

ii) So, one x ch. in female is silenced (dosage compensation) and seen as Barr body.

iii) Human males with single x ch. are constitutionally hemizygous. But females are functionally hemizygous by inactivating one of the parental x ch.

iv) The inactivation of x ch. occurs randomly in somatic cell at a point in early embryonic development. once inactivation occurs all progeny cells have the same inactivation x ch.

v) In homogametic xx female individual one x ch. get condensed and inactivated. such chromatin material is called facultative heterochromatin. It is called barrbody.

- ✓ male is sex chromatin negative
- ✓ Female is sex chromatin positive.

vi) The female with two x ch. regulates the enzyme activity will be the same level of male with only one x chromosome.

- conclusion!=>

In mammals * Dosage compensation occurs through x chromosome inactivation while in Drosophila sp. in occurs by hyperactivation of one x ch. in males.