

DOSAGE COMPENSATION:

A lesson plan based on

Lecture 3: Sex and Death: Too Much of a Good Thing

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Goal: To understand the relationship between the number of X chromosomes and dosage compensation.

Learning Outcomes:

- define dosage compensation
- explain dosage compensation in relationship to number of X chromosomes
- define *xol-1* and its role in sex determination in *C. elegans*
- explain briefly the operation of the *sdc* genes
- relate the absence of dosage compensation to the health and survival of *C. elegans*
- discuss gene recruitment to X chromosome and inhibition of gene expression

Assignment:

Complete the following activities:

1. View lecture III and take personal notes.
2. Complete the activity on the DVD related to dosage compensation.
3. Have students research and prepare an oral and written presentation on human trisomy and the accompanying results.
4. Discuss the following concepts:
 - xol-1*, *sdc*
 - hermaphrodite
 - dosage compensation
 - mitosis
 - meiosis
 - lethality
5. Relate the study of *C. elegans* to its applications in human reproduction studies.

References:

HHMI Holiday Lecture Series - The Meaning of Sex Genes & Gender - Lecture III

<http://mcb.berkeley.edu/faculty/GEN/meyerb.html>

<http://www.hhmi.org/news/meyer.html>

<http://www.nyu.edu/classes/hubbard/MolCtrl/sld035.htm>

http://www.nature.com/nrg/journal/v3/n5/slideshow/nrg794_F3.html

<http://www.devbio.com/chap17/link1711a.shtml>

LECTURE 3 Key

Concepts Defined:

1. **Xol-1** is the master switch that controls sex determination. The amount of xol-1 is controlled by genes located on the X chromosome.
2. **Sdc genes** are those that interact with the X chromosome forming a huge complex that inhibits gene expression.
3. **Hermaphrodites** in *C. elegans* are those organisms that are XX .
4. **Dosage compensation** is the regulatory process that controls the amount of protein produced by the X chromosome.
5. **Mitosis** is the process of asexual cell division that produces identical daughter cells.
6. **Lethality** is the result of too much of a specific complex of proteins that is produced by the lack of dosage compensation resulting in death of the organism.

Relate the study of *C. elegans* to its application in human reproduction.

The study of the reproductive process in *C. elegans* has helped reveal a similarity and application to the reproduction of more complex organisms including humans. Remember that animals share much of the same genetic information or closely related forms of those genes.