

WHY BIOLOGY MATTERS TO HIGH SCHOOL STUDENTS



Fellow: Mary Boggs
Teacher: Phyllis Meyer
Biology



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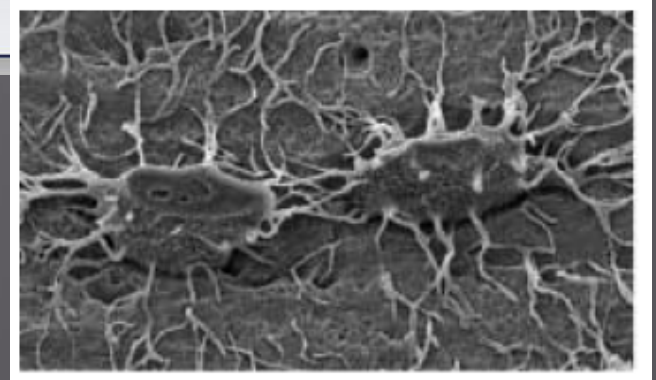
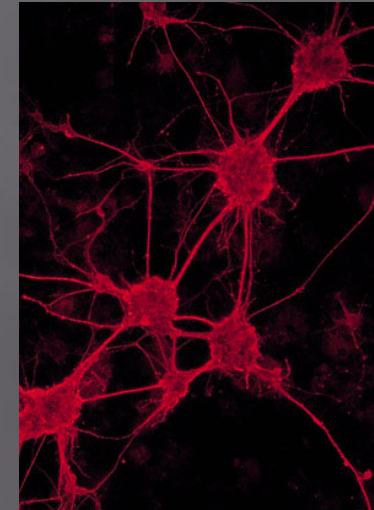
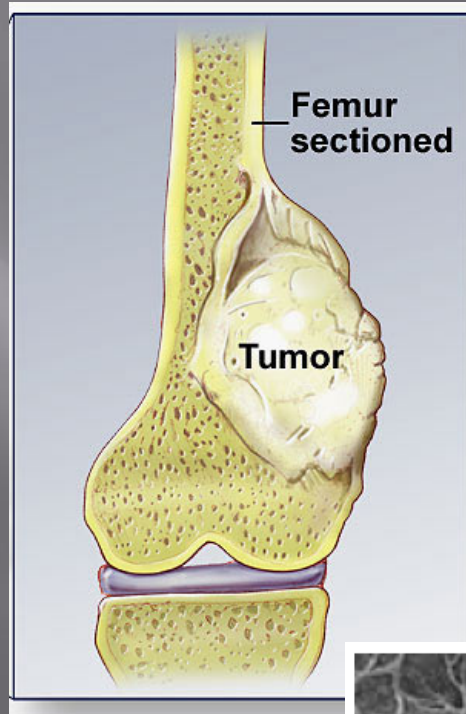


Goals

- ▣ Aid students and teachers in obtaining a better understanding of biology and how it relates to their life/career
- ▣ Develop a project based on cancer to help students understand and appreciate how biological processes are involved in this disease
- ▣ Target this activity to the Delaware State Standards

Cancer Presentation

- ▣ Introduced students to the field of cancer and informed them of how cancer progresses as well as all of the different sites cancer can be found



Cancer Pamphlets

EMORY UNIVERSITY

English | Español | 中文简体字 | Русский | Italiano

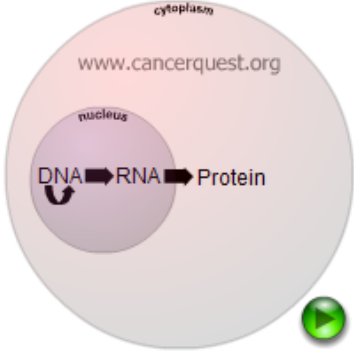
CANCERQUEST

Patients Educators Students Health Professionals Home

CancerQuest >> Information Flow >> The Central Dogma

DNA, RNA, and Protein

The [chromosomes](#) within our cells contain an enormous amount of information. It is estimated that humans have somewhere around 30,000 [genes](#). Each gene codes for an [RNA](#) molecule that is either used directly or used as a guide for the formation of a [protein](#) such as the [insulin](#) shown earlier. Information in our cells generally flows in a predictable order from the storage form of the information (DNA) through the working form (RNA) into the final product (protein). This pathway is used by all organisms and is diagrammed below.



As shown, [DNA](#) is used as a model or template for the production of more DNA. This process, known as [replication](#), will be addressed in the next chapter on cell division.

- Different types of cancer
- Symptoms
- Cell cycle involvement
- Alteration of DNA, RNA, Protein
- Treatment
- Prevention

Risk Factors for Skin Cancer

Skin cancer is caused by the following:

- Ultraviolet Radiation
 - Skin Color
 - Sun Sensitivity
 - Prior Diagnosis
 - Family History
- Radiation Therapy
 - Smoking
- Chemical Exposure
 - Injury
- Where You Live



Types and Symptoms

Types:

- Basal Cell Carcinoma
- Squamous Cell Carcinoma
- Melanoma

Symptoms:

- A mole with a non-circular shape (Asymmetry)
- Raised or flushed or not regular borders.
- A melanoma may be tan, black, or brown, and contain regions of red, white, and blue.
- The mark is larger than 6 mm in diameter.
- The physical appearance changes over time.

How Cancer Works

- Skin cancer occurs when skin cells reproduce uncontrollably.
- A Cell goes through the stages of G₁, Synthesis, G₂, and Mitosis. During these stages, DNA copies itself, and the cell divides into two.
- When there is skin cancer, the skin cells reproduce uncontrollably because there are no checkpoints to make sure that the cells are growing correctly, like normal cells do. This irregular growth is caused by gene mutations.



THE BASICS



Prostate cancer with multiple other cancer involvement.

Prostate Cancer is the most commonly

diagnosed cancer. There is only one type of prostate cancer and it is the second leading cause of death in men. In 2007, 234,460 men were expected to be diagnosed with prostate cancer and 27,350 patients were expected to die from the disease.

What you need to know

- Age, family history, race, and dietary factors are all risk factors for prostate cancer
- Symptoms include inability, difficulty or frequent problems with urination and back, pelvis, or upper thigh pain.
- This cancer is detected with a pathology report on a sample of tissue and its appearance cellular make up and state of disease.
- Is not specifically preventable and is treated by watchful waiting, radical prostatectomy, TURP, external beam radiation, internal radiation, cryosurgery, hormone therapy, orchiectomy, antiandrogens, and chemotherapy.

What you might want to know

- The tumor is a cancerous growth of cells that survives in the body by causing the formation of local blood supplies and tricking the body into feeding them.
- Tumors develop when there is a problem with the cell cycle.
- Stages of the cell cycle are G1 and G2, where the cell is growing and preparing to divide, synthesis when DNA is

copied and mitosis where the cell divides. A cell must go through this so it can divide before it gets too big

- Cancer cells can divide without appropriate external signals, they do not exhibit contact inhibition, and they can divide even with genetic damage. In other words, in cancer cells the cell cycle is not completed correctly, because the check points in the cell division process (to see if DNA is fully replicated, to see if DNA is damaged, and to see if there are enough nutrients) malfunction because of a mutation.
- Point mutations that affect DNA on the genetic level can be nonsense mutations, missense mutations, and frame shift mutations.
- Genetic changes can be caused by spontaneous mutation, induced mutations, viruses, and aberrant (damaged) cell division. Prostate cancer in particular is most likely caused by induced mutations or aberrant cell division.
- To treat prostate cancer, doctors try to either directly kill (remove) the cancer cells or to lead to their eventual death by depriving them of signals needed for cell division.

Perspectives

- ▣ Gained a great appreciation for what teachers have to achieve in a high school classroom
- ▣ Learned many different techniques in communicating science to students to aid in their understanding of the material
- ▣ Realized the extreme difficulties in getting students to remain engaged in the sciences

Acknowledgments

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