GLOSSARY

Adapt - to make fit or suitable.

Base - one of four fundamental molecules from which genes are constructed.

Centenarian - person who is 100 years old or older.

Chromosomes - elongated bodies in a cell that contain the genes.

Degenerate - to decline from a former state.

DNA - nucleic acids in cell nuclei that carry genetic information.

Enzyme - proteins that are produced by living cells and affect reactions between chemicals in the body.

Genes - part of a chromosome that determines an inherited characteristic.

Inherit - to receive from one's parents or ancestors.

Life span - the average duration of life for a species.

Molecule - the smallest part of a substance that has its basic properties.

Mutation - a change in a gene that results in a new characteristic.

Nucleus - the part of the cell containing hereditary material.

Organism - an individual form of life.

Replicate - to copy or duplicate.

Reproduction - the process of bearing offspring.

Telomere - a repetitive sequence at the end of a chromosome.

Tissue - a mass of cells and other matter that perform one or more body functions.

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Genetics & DNA – The Genetic Theories of Aging

K4584DVD

***Advanced* Teachers Guide**

SYNOPSIS:

No organism lives forever. The length of time animals and humans live is influenced by their genes. Scientists have made astonishing discoveries concerning the role of genetics in determining life span and this holds promise of extending the lives of animals and humans. This program explains Genetics, DNA and genetic theories of aging. It illustrates the genetic processes behind cellular aging and shows how genes affect life span. Discover the reasons why cells age and why a certain enzyme can effectively turn back the hands of our “biological clock.”

CURRICULUM UNITS:

- Biology
- Biotechnology
- Genealogy
- Genetic Engineering
- Gerontology

CAREER OPPORTUNITIES:

- Biologist
- Biotechnologist
- Genealogist
- Geneticist
- Gerontologist

PROGRAM OVERVIEW:

This program explores genes, DNA and genetic theories of aging. It takes a look at a fascinating study that was conducted to compare the genes of 800 centenarians with genes of people who lived more normal life spans. Indeed, at least two significant differences in their genetic make-up emerged.

The program also discusses the different ways that researchers study nature to learn about the aging process. While Redwood trees had been thought to live for thousands of years, scientists now know that the actual living part of the tree is just thirty to forty years old.

While experiments like these make it clear that genes are involved in the aging process, one of the most exciting developments in longevity research involves the discovery of the "biological clock" that determines how many times each cell can divide.

Scientists believe that it is a simple matter to turn back the hands of this clock. In reproductive cells and cancer cells, researchers have found an enzyme called telomerase that adds bases back onto the telomere. This makes it possible for the cell to keep on dividing. When researchers turn on the telomerase gene in other normal cells studied in culture, they too continued to divide without any ill effects.

Although there is still a great deal to learn about the complexities of the aging process, it is likely that technology based on this growing knowledge may enable people to live far beyond the present life expectancy.

ISSUES & CRITICAL THINKING:

1. After showing the video, ask your students the following:
   a| Why do we study genetics?
   b| Why do human beings want to live longer, and is that a good thing?
   c| What are telomeres and how do they determine the life span of the cell?
   d| What is telomerase and how does it work?
   e| How do scientists believe telomerase will be used to improve health?

2. Discuss what could happen if people lived longer. How would it affect the environment?

3. Discuss mutations and how they affect the development of a species.

4. Discuss what happens to the body when cells become old, but don't die.

5. See if students can come up with other ways of finding out which genes affect aging.

6. Have students research telomerase and how it may be used to treat cancer.