“Genetic Education for Native Americans” (GENA®) EXCERPTS from objectives 2, 5, 7, 8, 16, 26, 29 and overviews of ongoing federal initiatives)

“Genetic Education for Native Americans” (GENA®) (objectives 2, 5, 7, 8, 14 (epigenetics), 16 and update of new initiatives

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Web Page: http://NatAmCancer.org

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In honor of our brother, friend, colleague

Frank C. Dukepoo, Ph.D.
Hopi and Laguna Pueblo Nations

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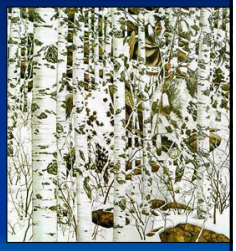
Introduction to GENA®

3

Genetics is not new information for AIANs

- Our ancestors knew how to
  - Breed horses (Pintos, Appaloosa) so that their coloring blended with rocks, ground or aspens during the winter
  - Grow stronger, more disease-resistant crops (e.g., corn and squash)



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Genetics is not new information for AIANs

- The concept of genetics is not new, but:
  - How genetics is being used today
  - New words created to describe genetic science today
  - New cultural issues for protecting privacy of individual and tribal Nations today
  - New science that can be generated to help address common health problems (diabetes, cancer) among Natives today...
- Those are new ideas and concepts for AIANs

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QUESTION: Why is this important for AI/AN communities?

- Cancer = increased among AI/ANs
- People may learn their cancer risk, but:
  - Is there an effective cure or treatment?
  - Are there people trained to explain the cancer risk (is the risk real?)
- New treatments are at the genetic and molecular level and the information may impact patient care.

Burhansstipanov & Bemis: GENA® excerpt
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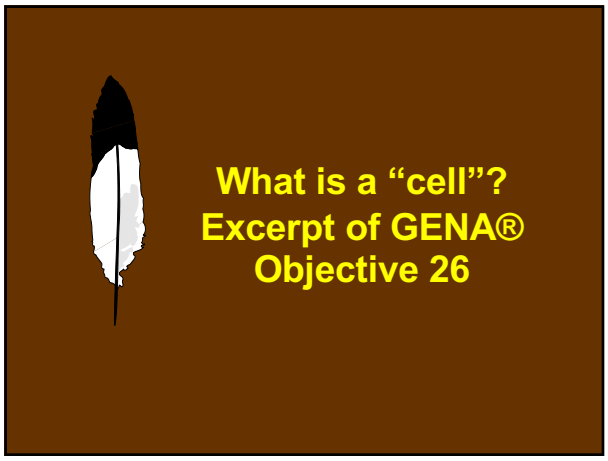
What is a "cell"?
Excerpt of GENA®
Objective 26

7


Examples of Inheritance in Everyday Native American Life
New grandparents
Indian corn(s)
Sheep
Indian paint horse
Tribal "rules" or morals related to marriage and childbearing
When hunting, saving the strongest looking male rather than killing him
Burhansstipanov & Bemis: GENA® excerpt
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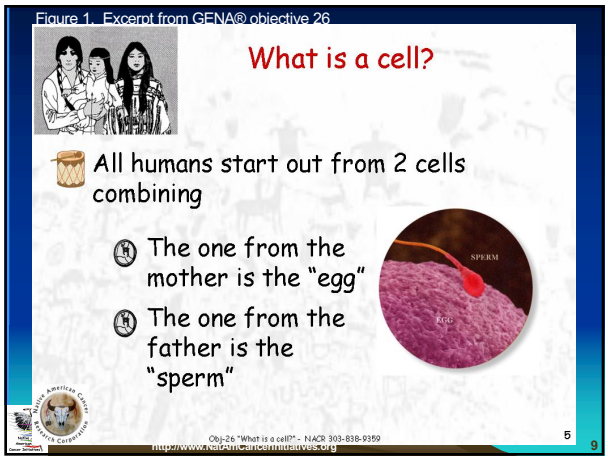
Figure 1. Excerpt from GENA® objective 26
What is a cell?
All humans start out from 2 cells combining
The one from the mother is the "egg"
The one from the father is the "sperm"
SPERM
EGG
Obj-26 "What is a cell?" - NACR 303-838-9359
http://www.NatAmCancerInitiatives.org
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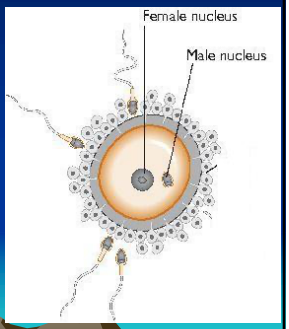
Sperm and Egg: the Beginning

- All humans start out from 2 cells combining
  - The one from the mother is the "egg"
  - The one from the father is the "sperm"



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The Fertilized Cell

- Cells (all are exactly the same) [blastocyst]

Two cell stage just after fertilization

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The Fertilized Cell

- It is now called a "fertilized cell"
  - The fertilized cell begins to duplicate its cells (all are exactly the same)
  - Eventually these cells begin to look and act differently from one another (within the mother's womb)

Multi-cellular Blastocyst

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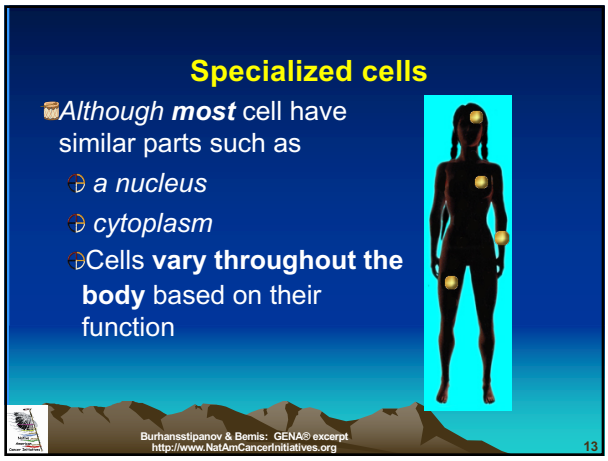
Specialized cells
Although most cell have similar parts such as
a nucleus
cytoplasm
Cells vary throughout the body based on their function
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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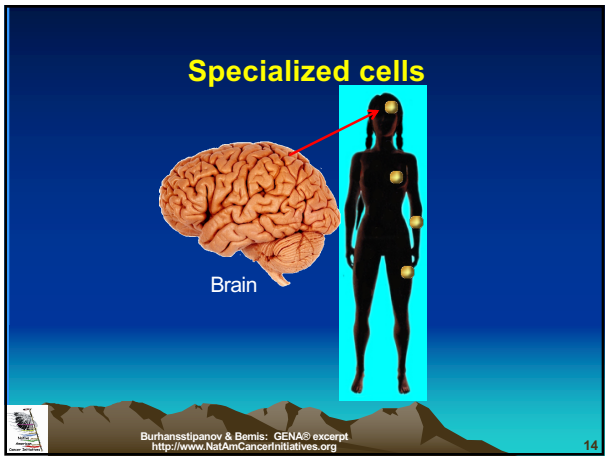
Specialized cells
Brain
Burhansstipanov & Bemis: GENA® excerpt
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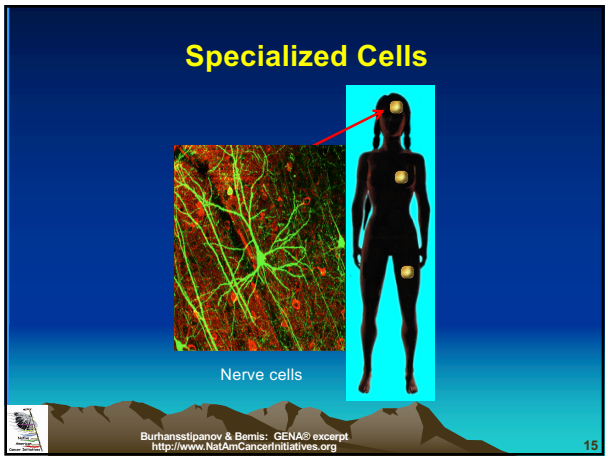
Specialized Cells
Nerve cells
Burhansstipanov & Bemis: GENA® excerpt
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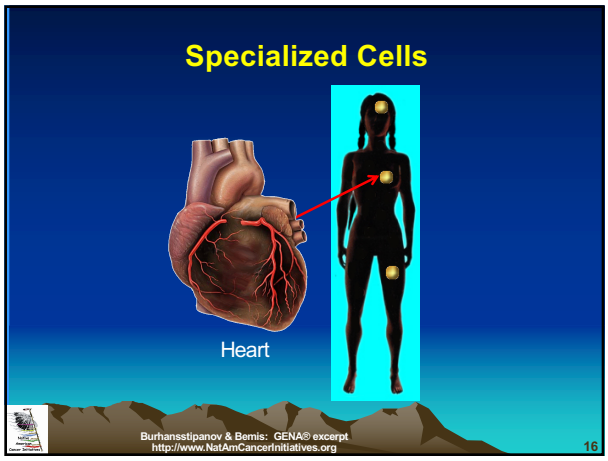
Specialized Cells
Heart
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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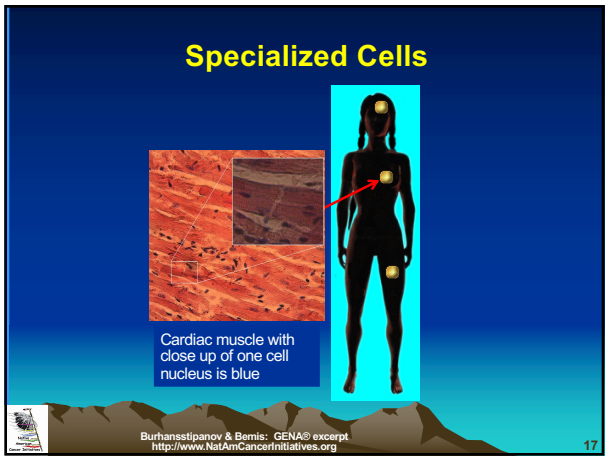
Specialized Cells
Cardiac muscle with close up of one cell nucleus is blue
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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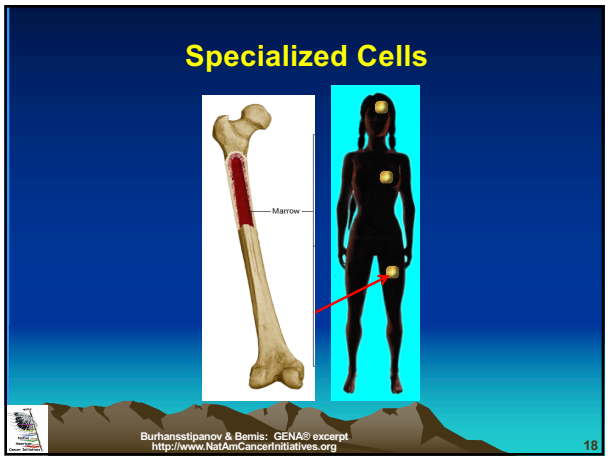
Specialized Cells
Marrow
Burhansstipanov & Bemis: GENA® excerpt
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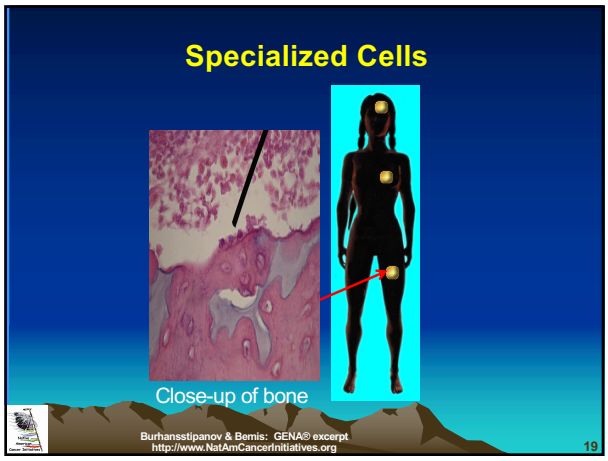
Specialized Cells
Close-up of bone
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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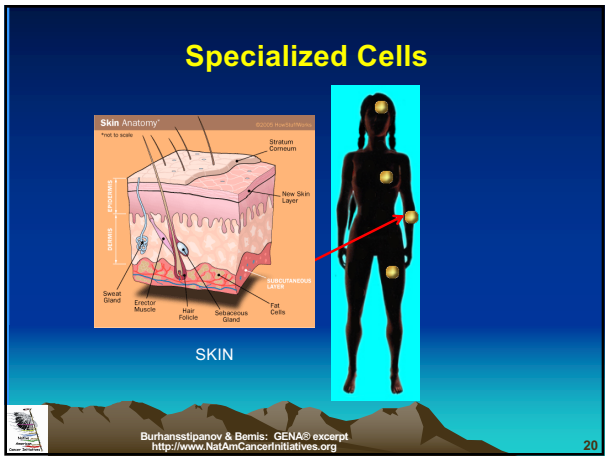
Specialized Cells
Skin Anatomy
Stratum Corneum
New Skin Layer
Sweat Gland
Erector Muscle
Hair Follicle
Sebacious Gland
Fat Cells
SKIN
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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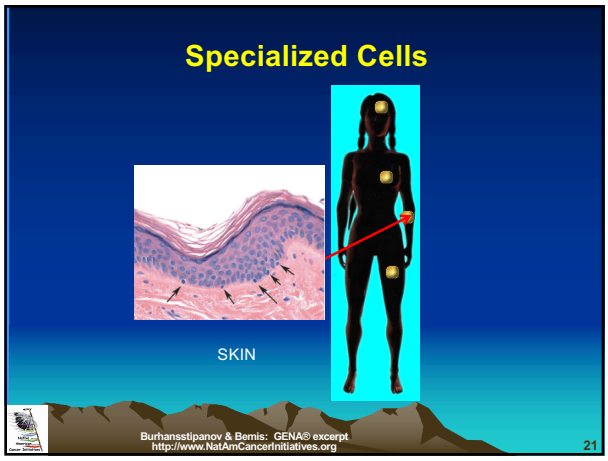
Specialized Cells
SKIN
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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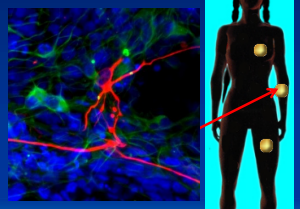
Specialized Cells



Close-up of skin (epithelial cells)

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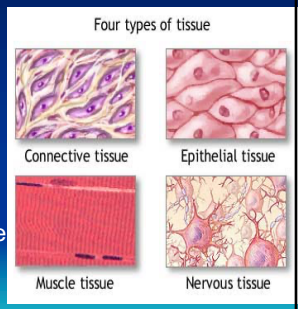
Cells group together into tissues

- Tissue:
  - Cells **work together** as a group
  - They may work in single layers (like the lining of the blood vessels)
  - They can work in large groups, like your muscles or your bones.



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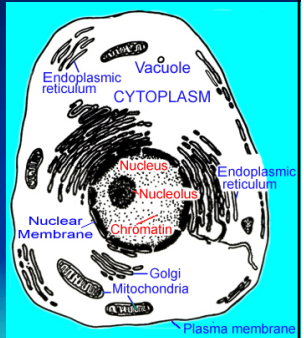
The Cell

- Cartoon of a "cell"
  - This is what a cell looks like under the microscope
  - These are the parts of MOST cells.



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What is in a cell?

- Another way to think of a cell is to look at each of its parts
- Pretend that you are on top of a mountain looking down on a village or … looking down on the world
- In a village you would see things like buildings, roads, trees, gardens

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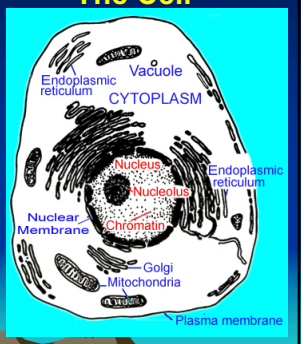
The Cell

- Cartoon of the Cell
  - Here is the cell under the microscope
  - Now we are going to look at the parts in depth
  - Remember that not all cells have all of these parts



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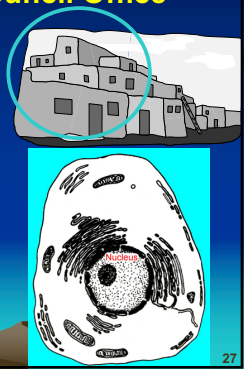
The Nucleus: Similar to Tribal Council Office

- The central building, Tribal Council Office, would be the central nucleus that holds all of the information about the village.



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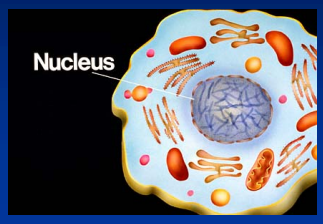
Nucleus

- This information is stored in the chromosomes (which are made of DNA).
  - Note: In real life, your cell holds 46 chromosomes.



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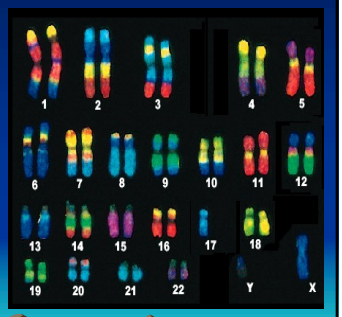
Chromosomes

- Chromosomes are packed with thousands of genes
  - Genes tell our cells what to be and how to act



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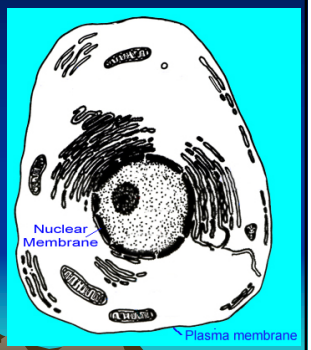
Cell Membrane

- The cellular membrane is the barrier that holds the cell contents together



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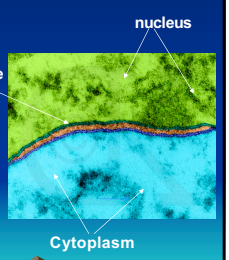
Cell Membrane & Cytoplasm

- The cellular membrane is the barrier that holds the cell contents together
- The cytoplasm contains many proteins and chemicals that are needed by the cell to function.



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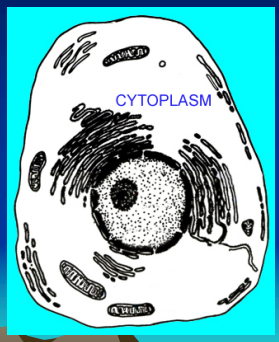
Cytoplasm

- The cytoplasm contains many proteins and chemicals that are needed by the cell to function.



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Cytoplasm

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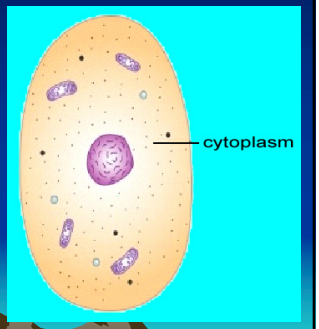

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Endoplasmic Reticulum

- The parts of the cell talk with one another by sending messages through the endoplasm reticulum
  - The roads and paths around the village are like the "endoplasmic reticulum"

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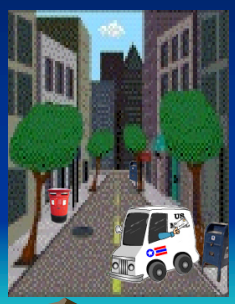
34

Endoplasmic reticulum

- The parts of the cell talk with one another by sending messages through the endoplasm reticulum
  - The roads and paths around the village are like the "endoplasmic reticulum"



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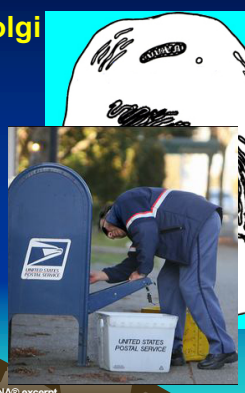
Golgi

- The golgi are at the ends of the roads (endoplasmic reticulum).
- Along the way, many messages (proteins – like the postman picking up letters) are collected by the golgi.



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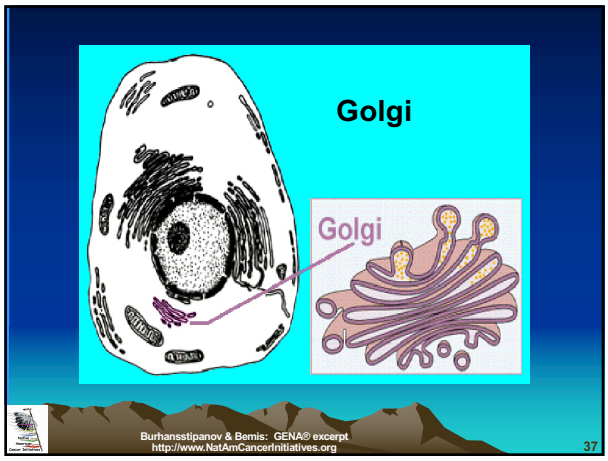
Golgi
Golgi
Burhansstipanov & Bemis: GENA® excerpt
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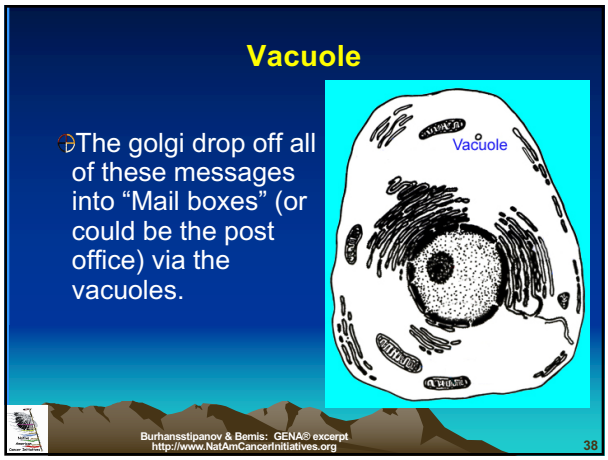
Vacuole
The golgi drop off all of these messages into "Mail boxes" (or could be the post office) via the vacuoles.
Vacuole
Burhansstipanov & Bemis: GENA® excerpt
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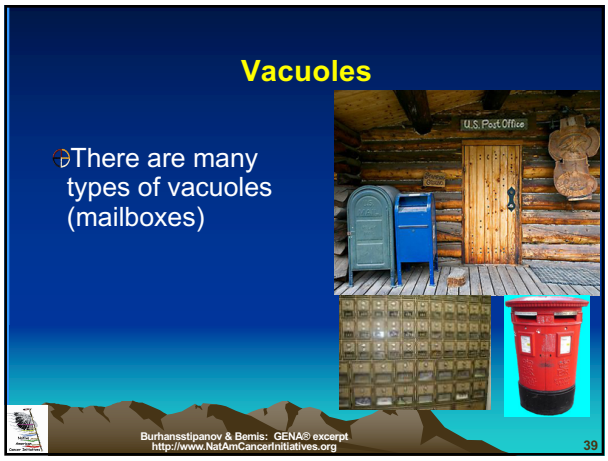
Vacuoles
There are many types of vacuoles (mailboxes)
U.S. Post Office
Burhansstipanov & Bemis: GENA® excerpt
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The Golgi and Vacuoles

- The vacuoles are often sent to the cell membrane
- Their contents are dumped outside the cell as messages to other cells.

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Mitochondria

- The mitochondria are like the Tribal electric generators.
- Mitochondria provide all of the "power" to the cell.

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Mitochondria

- The mitochondria are where the CPT1A action is required.
- When fasting (over night in infants) fatty acids are used by the mitochondria to provide energy.

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Making a Cell
http://www.natamcancerinitiatives.org/TechGENA/GENA_cell.html

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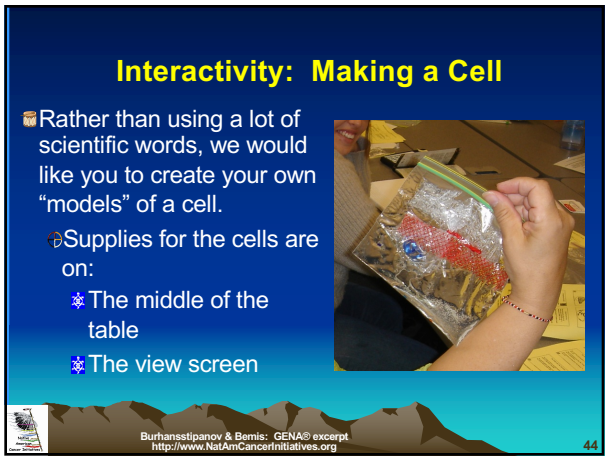
Interactivity: Making a Cell
Rather than using a lot of scientific words, we would like you to create your own "models" of a cell.
Supplies for the cells are on:
The middle of the table
The view screen
Burhansstipanov & Bemis: GENA® excerpt
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Nuclear Membrane
You will use a thin jewelry bag for the nuclear membrane; ribbon pieces will represent the chromosomes
To make the nucleus, you will need:
scissors
plastic jewelry bag
curly ribbon
Jewelry/Bead bag or Snack bag
Burhansstipanov & Bemis: GENA® excerpt
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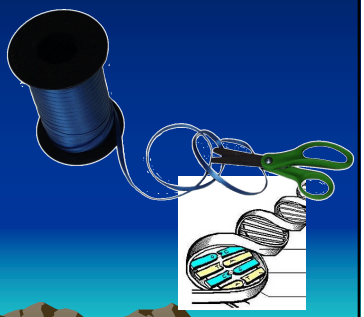
Chromosomes/DNA

- Make 5-10 chromosomes using curly ribbon
  - Cut the ribbon into different lengths (2", 4", 10")
  - Using the scissors, curl the ribbon



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Making the Nucleus

- Take a small plastic bag (bead jewelry bag or snack bag size) for the nuclear membrane
  - Put your chromosomes inside.
  - Seal the bag

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Making the Cell

- You will need:
  - A plastic sandwich or quart bag
  - Mesh netting (like for vegetables)
  - ¼ in. bubble wrap
  - Clear liquid soap
  - 1/8 inch beads

Burhansstipanov & Bemis: GENA® excerpt
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Cell Membrane

- To make the cell membrane, you will need a clear plastic sandwich bag or quart-sized bag

sandwich bag or quart sized plastic bag

Burhansstipanov & Bemis: GENA® excerpt
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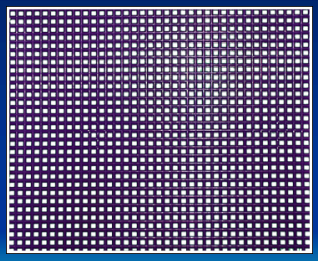
Endoplasmic Reticulum

- The roads/mesh into the cell with the nucleus.
  - Remember that the mesh is how parts of the cell talk with other parts of the same cell.



Plastic mesh

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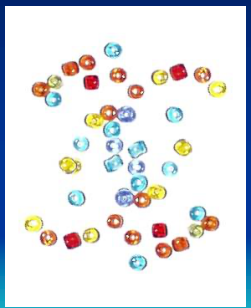
Mitochondria

- Select ~20 1/8 inch beads
  - These represent the mitochondria
  - Place the beads into the cell membrane



Burhansstipanov & Bemis: GENA® excerpt
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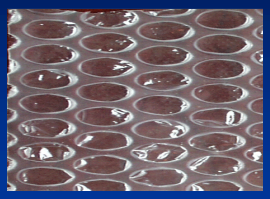
Golgi and Vacuoles

- Cut strips of plastic bubble wrap (5-10 bubbles in a row) for golgi; place in cell.
  - Cut individual bubbles (vacuoles) from a piece of bubble wrap; place in cell.



Golgi

Vacuoles

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Cytoplasm

- Make sure all items are placed in the cell
  - Add about ¼ cup liquid soap to represent the cytoplasm.
  - Now seal up your cells.

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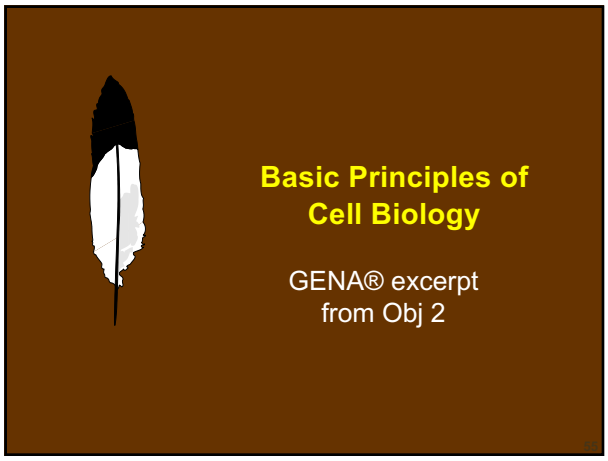
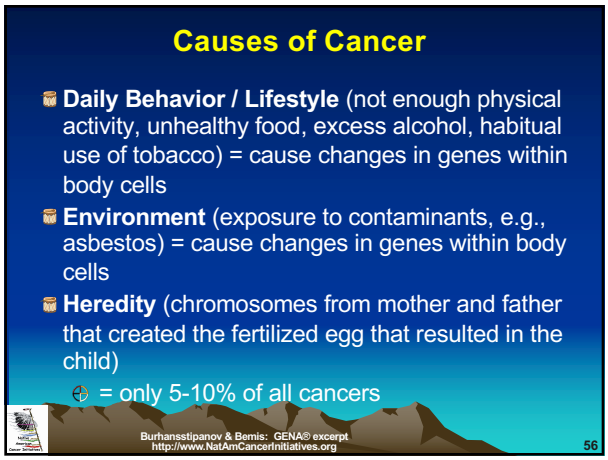
The Cell

- The completed cell with the nucleus inside the cell membrane and the cytoplasm supporting the other structures.

54


Basic Principles of Cell Biology
GENA® excerpt from Obj 2

55


Causes of Cancer
Daily Behavior / Lifestyle (not enough physical activity, unhealthy food, excess alcohol, habitual use of tobacco) = cause changes in genes within body cells
Environment (exposure to contaminants, e.g., asbestos) = cause changes in genes within body cells
Heredity (chromosomes from mother and father that created the fertilized egg that resulted in the child)
= only 5-10% of all cancers
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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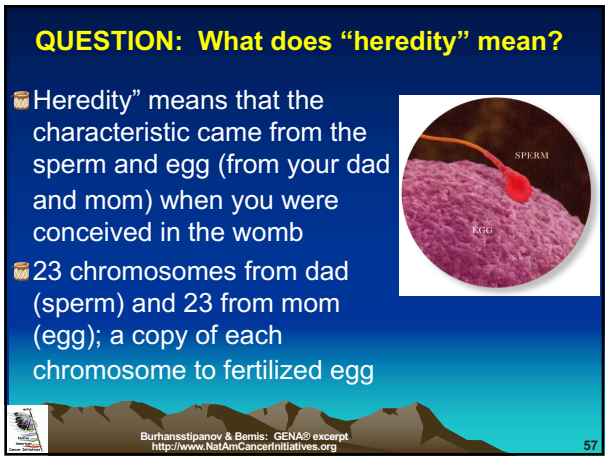
QUESTION: What does "heredity" mean?
Heredity" means that the characteristic came from the sperm and egg (from your dad and mom) when you were conceived in the womb
23 chromosomes from dad (sperm) and 23 from mom (egg); a copy of each chromosome to fertilized egg
SPERM
EGG
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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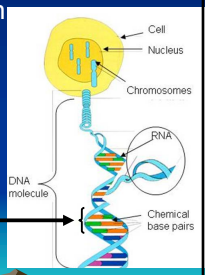
What are "genetics"? What are "genes"?

- "Genetics" is the study of "genes"
- "Genes" contain the information for the body to function
  - Some genes make bones strong
  - Other genes help prevent cancer (tumor suppressor)
- A gene is a segment within a chromosome



Burhansstipanov & Bemis: GENA® excerpt
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58 58

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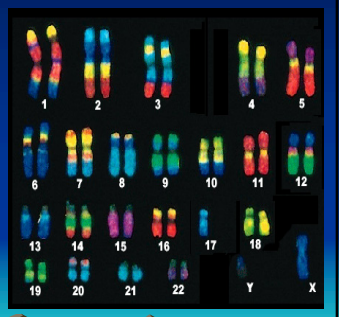
Chromosomes

- Organized by researchers from the largest / longest (number 1) to the smallest (number 22).
- The longer the chromosome, the more genes



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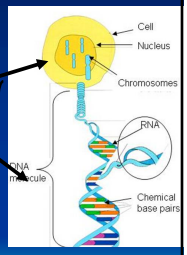
Chromosomes (continued)

- DNA (**D**eoxyribo**n**ucleic **A**cid) molecules refer to the genetic information that is within the chromosomes
- Chromosomes are in the "nucleus" ("brains" of the cell)
  - Chromosomes are packed with thousands of genes
  - Genes tell our cells what to be and how to act



Burhansstipanov & Bemis: GENA® excerpt
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60 60

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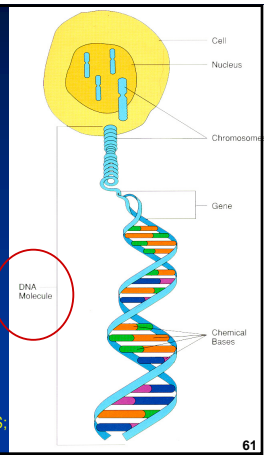
Definitions

DNA = Deoxyribonucleic Acid (the information source)

- The molecule that contains the genetic code for all life forms except for a few viruses



Genetic Basics, National Institutes of Health NIGMS; www.nigms.nih.gov pp. 66-68.

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Definitions (cont.)

DNA = Deoxyribonucleic Acid

- Consists of 2 long, twisted chains made up of nucleotides
  - Each nucleotide contains
    - One base
    - One phosphate molecule
    - And the sugar molecule deoxyribose.

Genetic Basics, National Institutes of Health NIGMS; NIH Pub No. 01-662; May 2001; www.nigms.nih.gov pp. 66-68.

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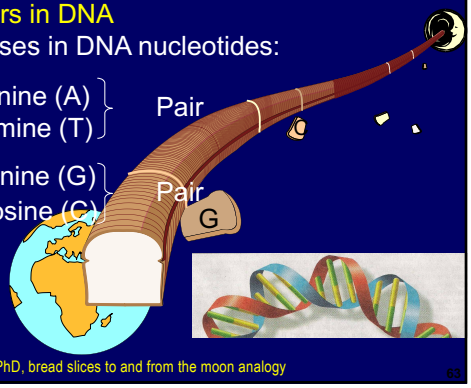
Definitions (cont.)

Base Pairs in DNA

- The bases in DNA nucleotides:
  - Adenine (A)
  - Thymine (T)
  - Guanine (G)
  - Cytosine (C)



Frank Dukepoo, PhD, bread slices to and from the moon analogy

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"Genes" and "Mutations"

- The pattern of information within genes needs to follow a specific sequence for the cell to function correctly.
- When the sequence differs, it is called a "mutation" (or SNP, pronounced "snip")
- Everybody has mutations (or SNPs) that may cause:
  - A different effect or function of the gene
  - The gene to continue having the normal function

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Example: CPT1A

- Human chromosomes have a segment containing a gene called CPT1A
  - A SNP that decreases the function of CPT1A is tested for in infants born in Alaska
- CPT1A helps the body metabolize fatty acids to meet energy needs

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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More about "Genes" (continued)

- The nucleus has genetic information provided from your mother and from your father.
- The human body has about 20,000 genes.
- Every human being is 99.9% similar to any other human being
  - That 0.1% of genetic information is why and how we look and are different from one another

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
66 66

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Human Beings are 99.9% Similar

- 3 billion base pairs total per genome
- 3,000,000,000 X 0.001 = 3,000,000 base pairs (million)
- 3 million base pairs differ through out the genome
- 2% of that or 60 thousand base pairs would be found in the coding regions.
- Differences in noncoding RNAs could be as much as 2.94 million.
- NOTE: micro RNAs

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Excerpt from Native Cancer 101 Module 8: Biospecimens and Biobanking (Community version)

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Why am I here today?

- Research can only be done on the samples that are available in biobanks.
- Historically, most biobanks contain samples from white men.
- This means that research conducted will be more likely to benefit those people.
- The lack of samples from people of other race/ethnicity means that long-standing disparities in research may continue.

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Cancer Care Research

- Every day science makes new progress to:
  - Find cancer sooner
  - Find better treatments
  - Help people live better with cancer
  - Help people live longer after cancer

Lance Whitehair, MD
Navajo Nation
Lab Discoveries with
Dr. Lynne Bemis,
Cancer Research

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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QUESTION: What are biospecimens?

- Materials taken from the human body.
- Contain information, about the human being and also about their disease
- Primarily DNA, RNA and Proteins
  - But not all biospecimens contain DNA

Photo credit: Ronel Jacinto

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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QUESTION: What are common sources of biospecimens?

- Blood
- Saliva
- Hair root
- Fingernails
- Flaked off skin cells (e.g., from clothing)
- Biopsy tissue
- Bronchoscopy
- Sperm
- Surgical Procedure

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Uses of Biospecimens

- Biospecimens can be used:
  - To diagnose a condition
  - To treat a person's disease
  - For research
  - To educate medical students and providers
  - In forensics

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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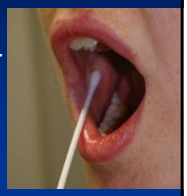
Methods for Collecting of Biospecimens

- Cheek swab (as seen on TV)
  - **QUESTION**: What are other ways to collect specimens?
- Blood draw
- Urine collection
- Hair pull (need follicle)
- Biopsy
- Surgery



Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Biobanks (also called "Repositories")

- The US has thousands of biorepositories
  - Vary in size, type of biospecimens collected, uses and purposes
- Can be owned and run by
  - Government agencies
  - State governments
  - Public health departments
  - Individual investigators
  - Private companies
  - Universities
  - Research Institutes

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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How is a donor's privacy protected?

- Tissue is coded with a unique identifier.
- Categories of biospecimens:
  - Identified
  - Identifiable
  - Anonymized
  - Anonymous

Photo credit: Katherine Briant
Source: Fred Hutchinson Cancer Research Center

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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After Research Is Completed

- Research results may not be ready for many years.
- Donors don't get to decide what type of research for which their specimen is used
- Donors receive results of own medical tests, but usually not results of research performed with leftover tissue.

Photo credit: Rhoda Baer | Source: NCI

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Advancing Cancer Prevention and Treatment

Research on biospecimens can…

- Answer questions:
  - Why does cancer develop?
  - How does cancer grow?
  - Who is at greater risk of developing it?
  - How can side effects be lessened?

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Biobanked specimens can be used is for "Personalized Medicine"

- Goals of personalized medicine:
  - Identify genetic differences between people that affect drug response
  - Develop genetic tests that predict an individual's response to a drug
  - Tailor medical treatments to the individual
    - Increase effectiveness
    - Minimize adverse side effects

Burhansstipanov & Bemis: GENA® excerpt
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Nat Am Cancer 101, Module 8 Biospecimens Objective 2:

Discuss ethical, legal, social, spiritual and cultural considerations and policies related to tissue donation for research.

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Havasupai Study & Case (1989 – 2010)

- In 2010, the Havasupai Tribal Nation settled a class action lawsuit against Arizona State University and the University of Arizona
  - Misuse of blood samples and DNA originally collected for research on diabetes

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Havasupai Study & Case (1989 – 2010)

- These research specimens were later used for multiple other purposes including research on "schizophrenia, inbreeding and population migration."
- Insufficient informed consent process
- Part of the Havasupai conflict was that the tribe thought their specimens were being used for a single study and the researchers thought the specimens were for biobanking

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Havasupai (continued)

- Researchers need to be careful about violations of research ethics for individual studies versus biospecimen storage that allows many researchers to access the specimen for studies without subsequent tribal or individual donor approvals
- $700,000 fine paid by Arizona State University and tribal sanctions prohibiting research studies with ASU
- What happened to the PI? New job, promoted

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Based on Tribal Discussion Groups conducted through "Genetic Education for Native Americans" (GENA®)

- According to GENA® participants (>3,000 AIANs), most tribes and urban Indian programs ARE interested in taking part in research that addresses:
  - Diabetes
  - Obesity
  - Cancer
  - Heart conditions

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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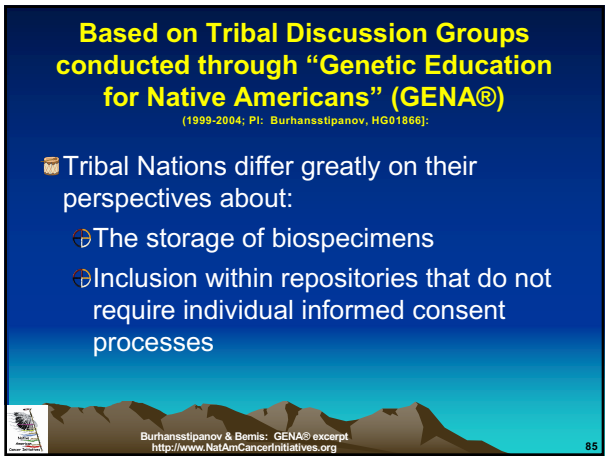
Based on Tribal Discussion Groups conducted through "Genetic Education for Native Americans" (GENA®)
(1999-2004; PI: Burhansstipanov, HG01866]:
Tribal Nations differ greatly on their perspectives about:
The storage of biospecimens
Inclusion within repositories that do not require individual informed consent processes
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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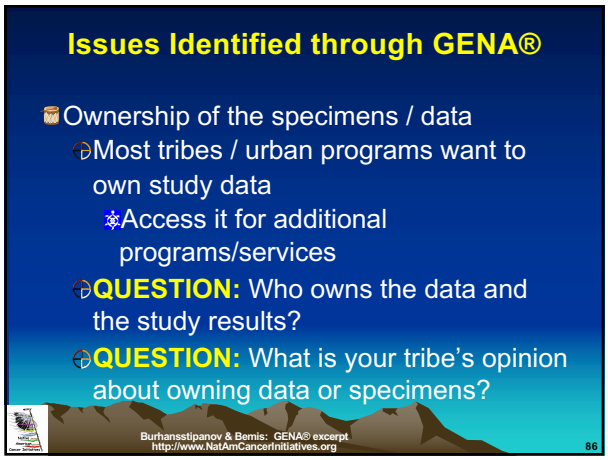
Issues Identified through GENA®
Ownership of the specimens / data
Most tribes / urban programs want to own study data
Access it for additional programs/services
QUESTION: Who owns the data and the study results?
QUESTION: What is your tribe's opinion about owning data or specimens?
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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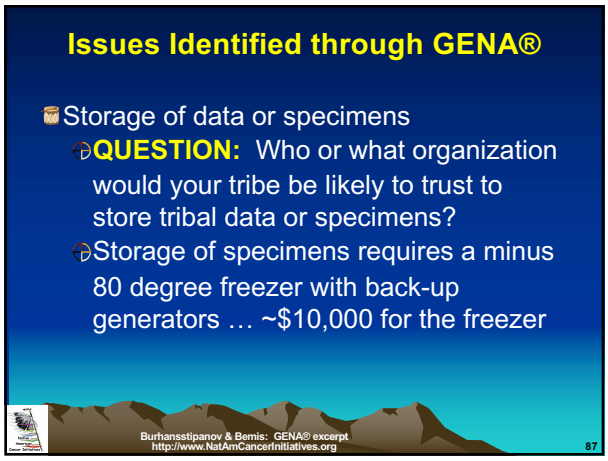
Issues Identified through GENA®
Storage of data or specimens
QUESTION: Who or what organization would your tribe be likely to trust to store tribal data or specimens?
Storage of specimens requires a minus 80 degree freezer with back-up generators … ~$10,000 for the freezer
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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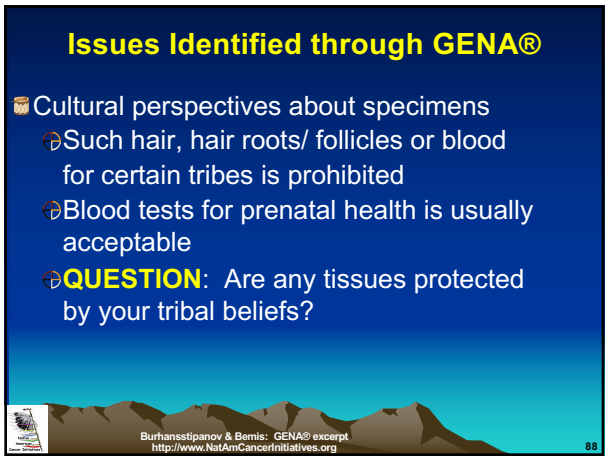
Issues Identified through GENA®
Cultural perspectives about specimens
Such hair, hair roots/ follicles or blood for certain tribes is prohibited
Blood tests for prenatal health is usually acceptable
QUESTION: Are any tissues protected by your tribal beliefs?
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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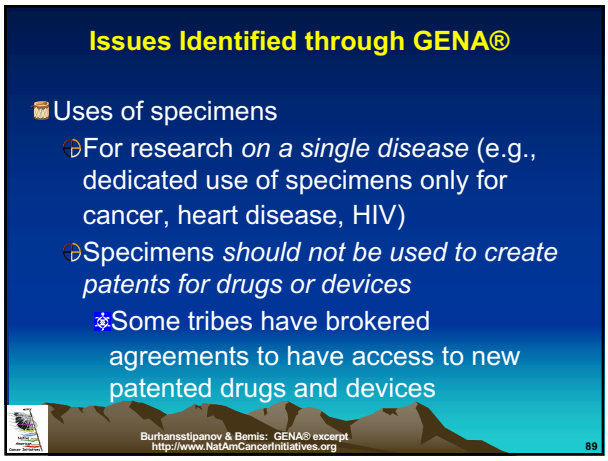
Issues Identified through GENA®
Uses of specimens
For research on a single disease (e.g., dedicated use of specimens only for cancer, heart disease, HIV)
Specimens should not be used to create patents for drugs or devices
Some tribes have brokered agreements to have access to new patented drugs and devices
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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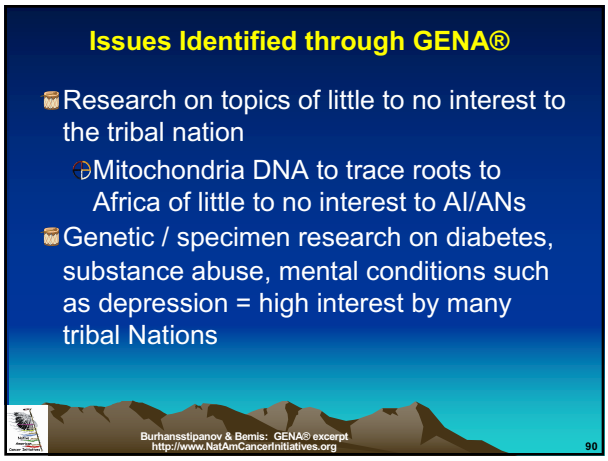
Issues Identified through GENA®
Research on topics of little to no interest to the tribal nation
Mitochondria DNA to trace roots to Africa of little to no interest to AI/ANs
Genetic / specimen research on diabetes, substance abuse, mental conditions such as depression = high interest by many tribal Nations
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Issues Identified through GENA®

- Publication of genetic research findings without obtaining previous tribal approvals
  - Most tribal groups have policies requiring review of findings prior to submission as abstract for conferences, publication
- Tribal sanctions: scientific inadequacy to appropriately protect cultural mores, privacy and confidentiality

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Understand classical genetic concepts and patterns of inheritance and cultural traditions related to these patterns.

GENA® excerpt from Obj 7 and 8

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Terminology

- Phenotype = tongue rolling
- Genotype = TT Tt tt
  - Dominant = T [Capital letters]
  - Recessive = t [lower case letters]
- Homozygous = TT or tt
- Heterozygous = Tt or tT

Perhaps the "phenotype" for tongue rolling is homozygous recessive, or "tt"

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Parents that are heterozygous (Tt) can have offspring that are homozygous or heterozygous at a ratio of

1	:	2	:	1
TT		Tt tT		tt

- a 25% chance of the child being **"homozygous dominant"** (TT)
- a 50% chance of the child being **"heterozygous"** (Tt or tT)
- a 25% chance of the child being **"homozygous recessive"** (tt)

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Punnett Square #1 – tongue rolling

	T	t
T	T T	T t
t	t T	t t

mom

dad

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org

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Punnett Square #2 – tongue rolling

	t	t
T	T t	T t
t	t t	t t

mom

dad

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org

96

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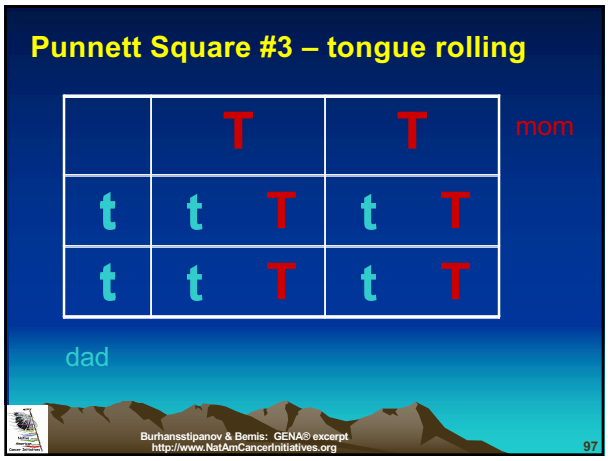

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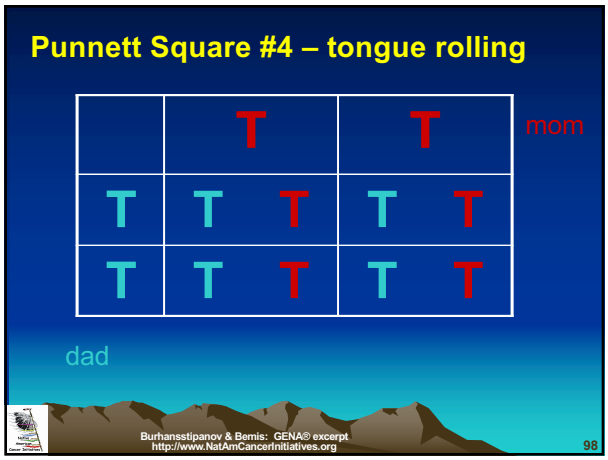

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Gamete Summary Table (score in a red and blue pen)			
Card toss	Genotype (record alleles)	Phenotype	Heterozygous / Homozygous
Ex	T t	Tongue rolling	heterozygote
#1	t t	Unable to roll tongue	homozygote
#2	T T	Tongue rolling	Homozygote
#3	T t	Tongue rolling	Heterozygote
#4	t t	Unable to roll tongue	Homozygote
#5	t T	Tongue rolling	Heterozygote
#6	T t	Tongue rolling	heterozygote

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Genetic "Card Toss" (score in a red and blue pen)			
Card toss	Genotype (record alleles)	Phenotype	Heterozygous / Homozygous
Ex	T t	Tongue rolling	heterozygote
#1			
#2			
#3			
#4			
#5			
#6			

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Reebops

Species with only 7 chromosomes (rather than 23 like humans)

Used with permission from Patti Soderberg, author of article in *The Science teacher*. Nov 1992, pages 28-31(originally called "marshmallow meiosis") Website: *www.wisc.edu/cbe/assets/docs/pdf/**reebops/reebops**.pdf*

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Reebops

- Please work in pairs
- One of you has daddy Reebop's chromosomes and the other has mom Reebop's chromosomes
- Lay out the chromosomes by size
- Turn them over so that you cannot see the "letter" on the chromosomes
- Select one from each size chromosome so that the new fertilized egg receives 7 from mom and 7 from dad
- Put the other chromosomes back into the envelop
- Turn over the fertilized egg chromosomes and match them by sizes to determine the phenotype characteristics

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Create the Baby Reebop - - Start with the body segments using marshmallows For the head, use toothpicks as bones to connect body parts)

Phenotype	Genotype
1 antenna (paper clip)	AA
2 antenna	Aa
No antenna	aa
1 green hump(small marshmallow)	MM
2 green hump	Mm
3 green hump	mm
red nose (small marshmallow)	QQ
orange nose	Qq
yellow nose	qq
Curly Tail (bread bag tie)	TT or Tt
Straight tail	tt
2 eyes (tacs)	EE or Ee
3 eyes	ee
Blue legs (stick pins)	LL or Ll
Red legs	ll
3 body segments (big marshmallow)	DD or Dd
2 body segments	dd

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Fill in the Phenotype of the Reebop fertilized egg

Phenotype Genotype of Reebops

Phenotype	Workshop Phenotype Tally	Genotype	Workshop Genotype Tally
1 antenna	2	AA	
2 antenna	4	Aa	
no antenna	3	aa	
1 hump	1	MM	
2 humps	4	Mn	
3 humps	3	mm	
Red nose	2	QQ	
Orange nose	3	Qq	
Yellow nose	3	qq	
Curly tail	6	TT or Tt	
Straight tail	2	tt	
2 eyes	6	EE or Ee	
3 eyes	2	ee	
Blue legs	6	LL or Ll	
Red legs	2	ll	
3 body segments	4	DD or Dd	
2 body segments	4	dd	

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What is the tally for the genotypes of all of the babies?

Phenotype Genotype of Reebops

Phenotype	Workshop Phenotype Tally	Genotype	Workshop Genotype Tally
1 antenna		AA	
2 antenna		Aa	
no antenna		aa	
1 hump		MM	
2 humps		Mn	
3 humps		mm	
Red nose		QQ	
Orange nose		Qq	
Yellow nose		qq	
Curly tail		TT or Tt	
Straight tail		tt	
2 eyes		EE or Ee	
3 eyes		ee	
Blue legs		LL or Ll	
Red legs		ll	
3 body segments		DD or Dd	
2 body segments		dd	

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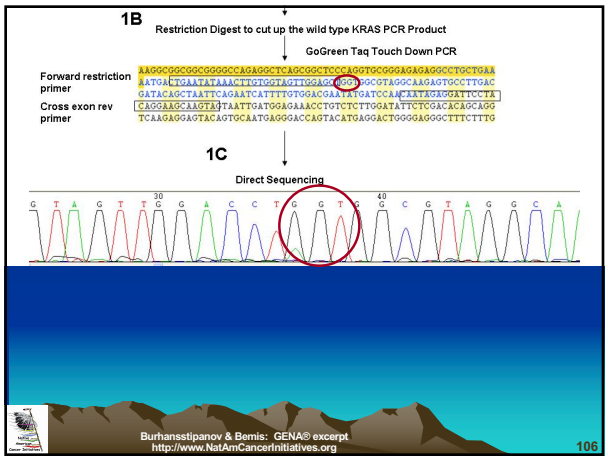

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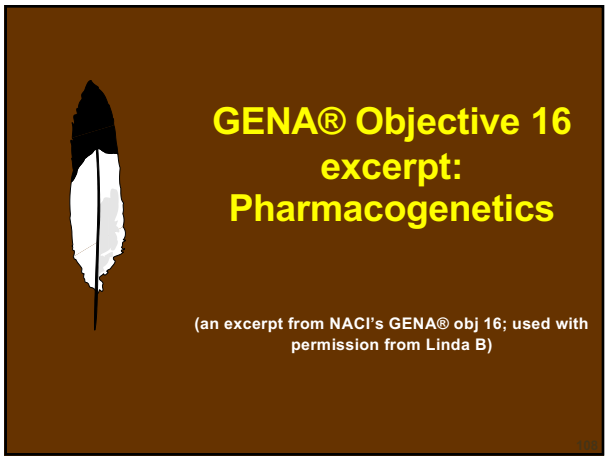
Table 25.2 Comparison of a small section of the BRCA1 DNA sequence	
Human	atcttagagtgtcccatctgtctggagttgatcaaggaacctgtctccacaaag tgtgac
Mouse	atcttagagtgtccgatctgtttggaactgatcaaagaacctgtttccacaaag tgtgac
Rat	atcttggagtgtccaatctgtttggaactgatcaaagaaccggtttccacacag tgcgac
Dog	atcttagagtgtccaatatgtctggagttgatcaaagagcctgtttctacaaag tgtgat

107



108

Definition of "Pharmacogenetics"

- The study of how an individual's genetic inheritance affects the body's response to drugs.
- Pharmacology + genomics = the interaction of medications and genetics... decoding drug responsiveness

Burhansstipanov & Bemis: GENA® excerpt
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QUESTION: What factors can influence how a person responds to medication?

- Weight
- Diet
- Food in stomach
- Fatigue
- Age
- Sun exposure
- Physical condition / lack of exercise
- Drug interactions (i.e., Cross reactivity, synergism)
- Genetic make-up

Obviously, many factors affect people's responses drugs other than genes.

Burhansstipanov & Bemis: GENA® excerpt
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Personalized Medicine

- 1 in 10 people get no relief from the painkiller codeine.
- We don't all respond to a medicine in the same way, or require the same dose.

Burhansstipanov & Bemis: GENA® excerpt
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Goal
Medications "tailor-made" for individuals
Medications adapted to each person's own genetic makeup
How "close" is this research to making personalized medicine for most of us?
Burhansstipanov & Bemis: GENA® excerpt
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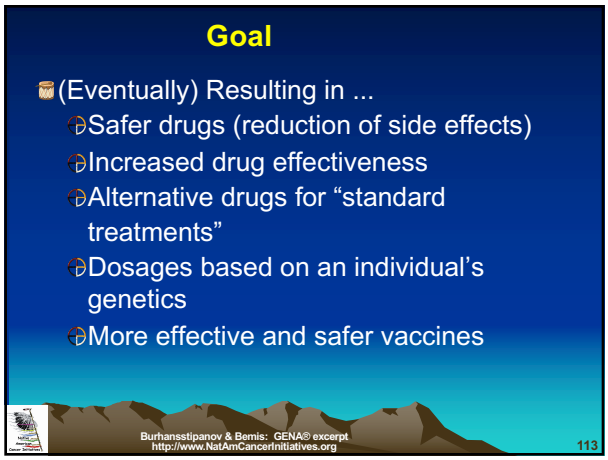
Goal
(Eventually) Resulting in ...
Safer drugs (reduction of side effects)
Increased drug effectiveness
Alternative drugs for "standard treatments"
Dosages based on an individual's genetics
More effective and safer vaccines
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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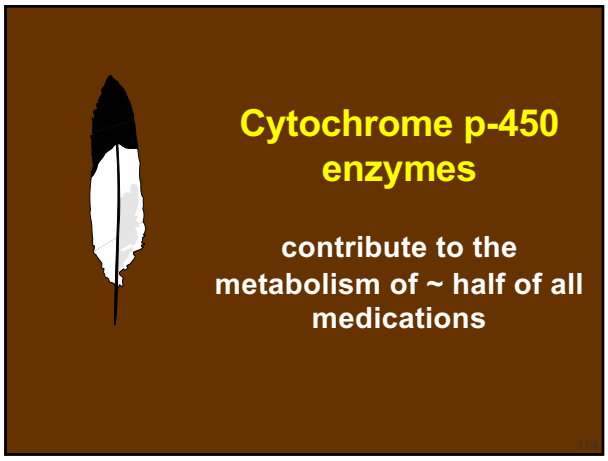
Cytochrome p-450 enzymes
contribute to the metabolism of ~ half of all medications

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The Enzyme "Cytochrome P-450"

- Examples of medicines ...
  - Codeine (opiate to treat pain or relieve cough)
  - Acetaminophen
  - Diazepam (dye az' e pam)
  - Cyclosporin A
  - Erythromycin

Burhansstipanov & Bemis: GENA® excerpt
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Example CYP3A4

- Located 7q22
- Super-family of cytochrome p-450 enzymes
  - Enzyme = Cytochrome P-450 3A4
  - Gene = CYP3A4
  - Expressed in the liver and intestines (i.e., involved in detoxification)
- 3A4 is an ***essential*** enzyme

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Codeine Metabolism - 2D6

- Located 22q13
- 2D6 is one enzyme that is required for the metabolism of codeine to morphine
- Most people are "extensive metabolizers" that allows them to effectively metabolism codeine to morphine

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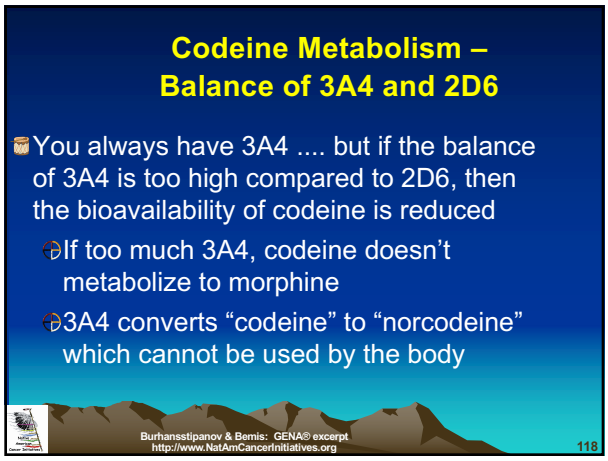
Codeine Metabolism – Balance of 3A4 and 2D6
You always have 3A4 .... but if the balance of 3A4 is too high compared to 2D6, then the bioavailability of codeine is reduced
If too much 3A4, codeine doesn't metabolize to morphine
3A4 converts "codeine" to "norcodeine" which cannot be used by the body
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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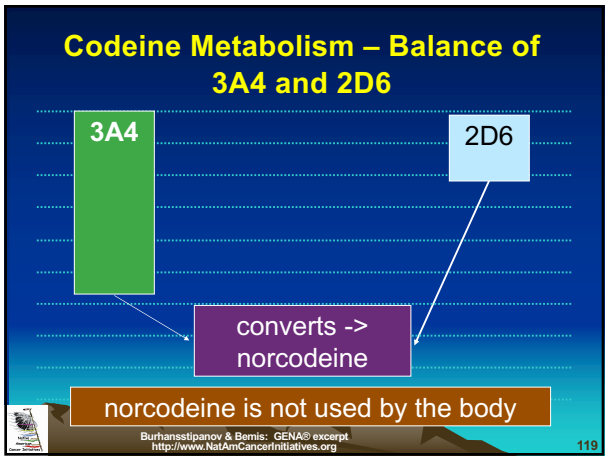
Codeine Metabolism – Balance of 3A4 and 2D6
3A4
2D6
converts -> norcodeine
norcodeine is not used by the body
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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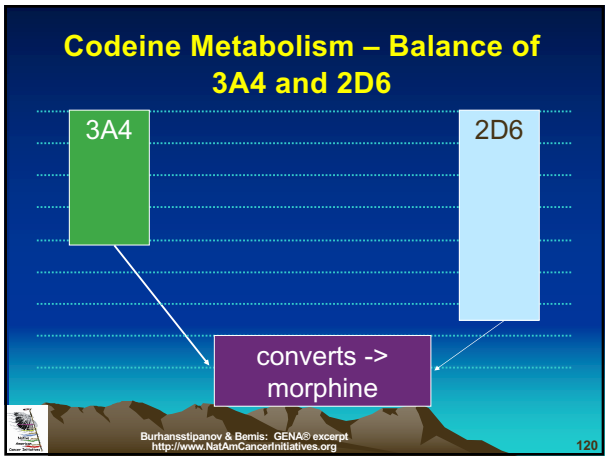
Codeine Metabolism – Balance of 3A4 and 2D6
3A4
2D6
converts -> morphine
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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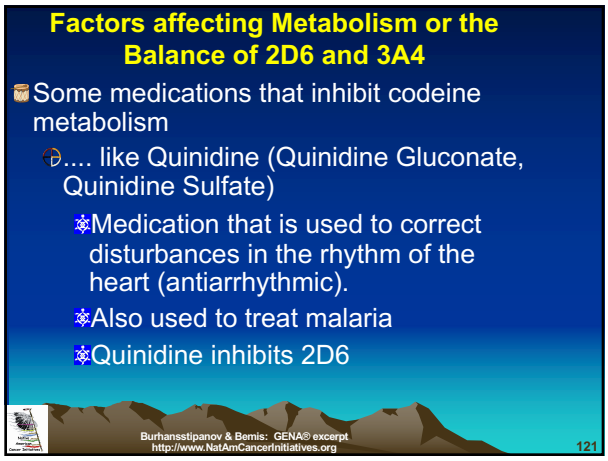
Factors affecting Metabolism or the Balance of 2D6 and 3A4
Some medications that inhibit codeine metabolism
.... like Quinidine (Quinidine Gluconate, Quinidine Sulfate)
Medication that is used to correct disturbances in the rhythm of the heart (antiarrhythmic).
Also used to treat malaria
Quinidine inhibits 2D6
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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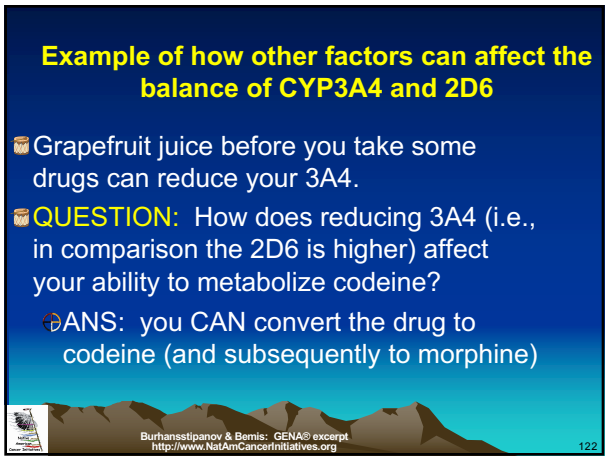
Example of how other factors can affect the balance of CYP3A4 and 2D6
Grapefruit juice before you take some drugs can reduce your 3A4.
QUESTION: How does reducing 3A4 (i.e., in comparison the 2D6 is higher) affect your ability to metabolize codeine?
ANS: you CAN convert the drug to codeine (and subsequently to morphine)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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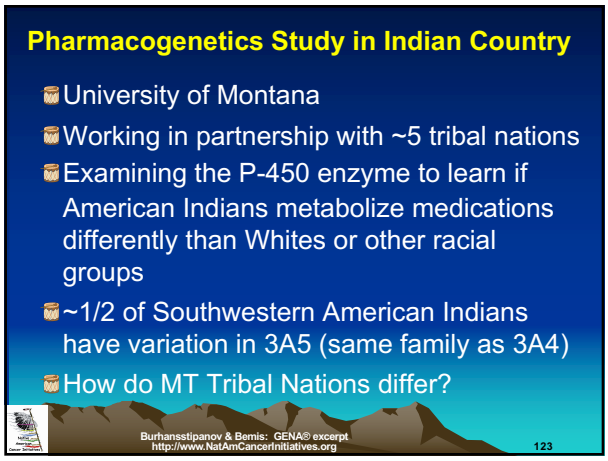
Pharmacogenetics Study in Indian Country
University of Montana
Working in partnership with ~5 tribal nations
Examining the P-450 enzyme to learn if American Indians metabolize medications differently than Whites or other racial groups
~1/2 of Southwestern American Indians have variation in 3A5 (same family as 3A4)
How do MT Tribal Nations differ?
Burhansstipanov & Bemis: GENA® excerpt
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Partnerships / Community-Based Participatory Action Research
excerpt from GENA® Objective 5

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Community-based Participatory Research (CBPR) - definition
CBPR is a partnership approach to research that equitably involves community members, organization representatives and researchers in all aspects of the research process.
Israel BA, Eng E, Schulz AJ, and Parker EA. Eds. Multiple Methods for Conducting Community-Based Participatory Research for Health. text to be released early 2005 from Jossey-Bass
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Principles of CBPR
Recognizes community as a unity of identity
Builds on strengths and resources within the community.
Facilitates collaborative partnerships in all phases of the research.
Integrates knowledge and action for mutual benefit of all partners.
Israel, Barbara A, Schulz, Amy J. Parker, Edith A. and Becker, Adam B. Review of Community-Based Research: Assessing Partnership Approaches to Improve Public Health. Annu. Rev. Public Health. 1998. 19:173-202
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Principles of CBPR

- Promotes a co-learning and empowering process that attends to social inequities
- Involves a cyclical and iterative process.
- Addresses health from both positive and ecological perspectives.
- Disseminates findings and knowledge gained to all partners.

Israel, Barbara A, Schulz, Amy J. Parker, Edith A. and Becker, Adam B. Review of Community-Based Research: Assessing Partnership Approaches to Improve Public Health. Annu. Rev. Public Health. 1998. 19:173-202

Burhansstipanov & Bemis: GENA® excerpt
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Community-based Participatory Research (CBPR) - definition

- Tribal communities can develop partnerships with a research team to collaborate on every step of the research project to address a high priority health issue
- Example: University of Fairbanks (Bert Boyer) and Alaska Native Villages on obesity study

Burhansstipanov & Bemis: GENA® excerpt
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Community-based Participatory Research (CBPR) - definition

- Unable to give up (1) control; (2) power; and/or (3) money
- IRB / HIPAA and tribal project approval processes
- "Easier" for the "Outside Partner" to continue doing "things" as they've always been done

Burhansstipanov & Bemis: GENA® excerpt
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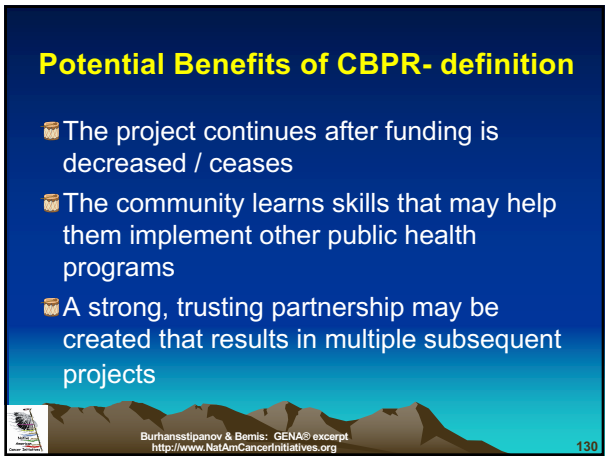
Potential Benefits of CBPR- definition
The project continues after funding is decreased / ceases
The community learns skills that may help them implement other public health programs
A strong, trusting partnership may be created that results in multiple subsequent projects
Burhansstipanov & Bemis: GENA® excerpt
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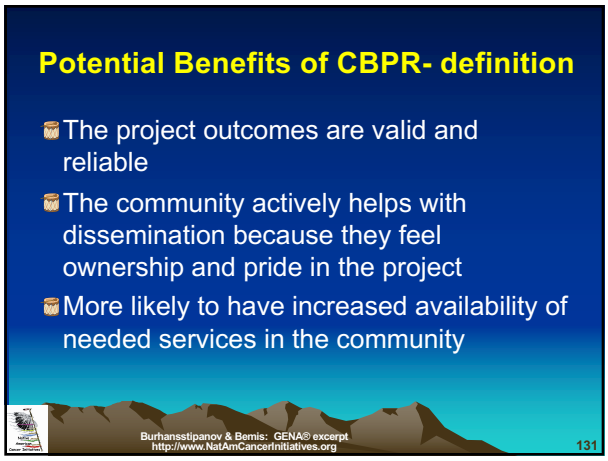
Potential Benefits of CBPR- definition
The project outcomes are valid and reliable
The community actively helps with dissemination because they feel ownership and pride in the project
More likely to have increased availability of needed services in the community
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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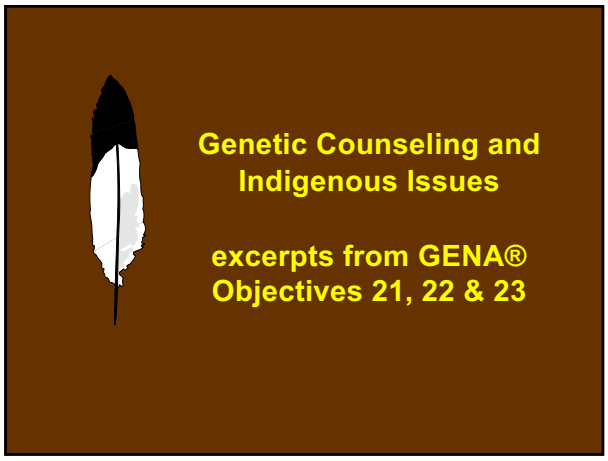
Genetic Counseling and Indigenous Issues
excerpts from GENA® Objectives 21, 22 & 23

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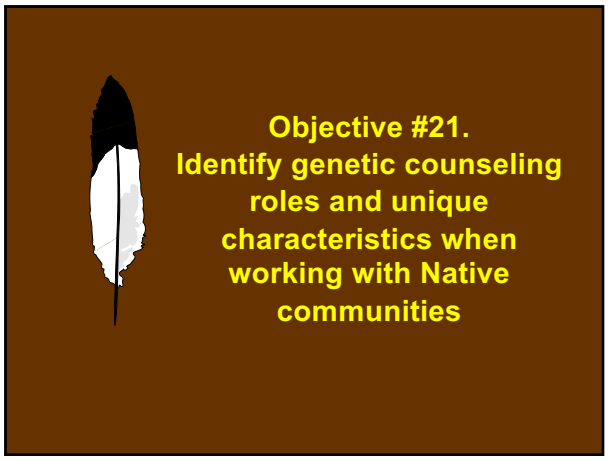
Objective #21.
Identify genetic counseling roles and unique characteristics when working with Native communities

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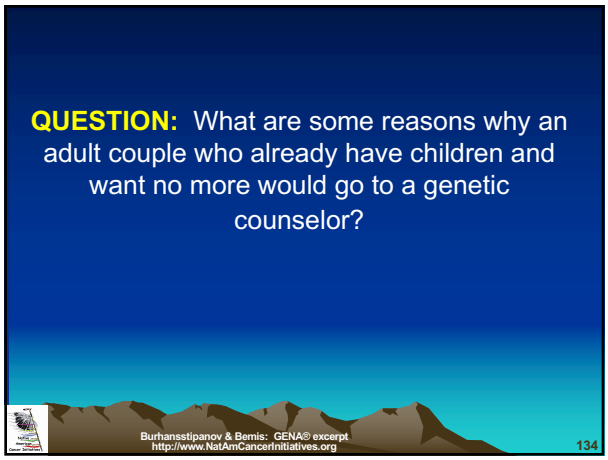
QUESTION: What are some reasons why an adult couple who already have children and want no more would go to a genetic counselor?
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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To determine their personal risks for adult onset diseases (diabetes, cancer)
Most tribal health boards prohibit or strongly discourage genetic testing for these reasons
To determine possible genetic risks of their children as they grow and develop
To help identify "better" medications (pharmacogenomics)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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QUESTION: Who are members of the health care team who could provide genetic counseling?

- Physicians
- Nurses
- Oncologists and Oncology Nurses
- Social workers
- Certified / licensed genetic counselors
  - Limited or no education included in professional training on *how* to conduct genetic counseling, particularly with diverse cultural groups

Burhansstipanov & Bemis: GENA® excerpt
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Genetic Counselors

- Educational Criteria to become a "genetic counselor"
  - Complete specialized clinical training
  - From an accredited program
  - Which includes a master's degree
- There are NO Native American genetic counselors in the U.S.

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Examples of reasons why health care team members are asked/required to perform cancer genetic counseling (regardless of insufficient training)

- Help the patients understand the implications:
  - Of the genetic conditions
  - Of the genetic test results (pros and cons of both positive and negative test results)

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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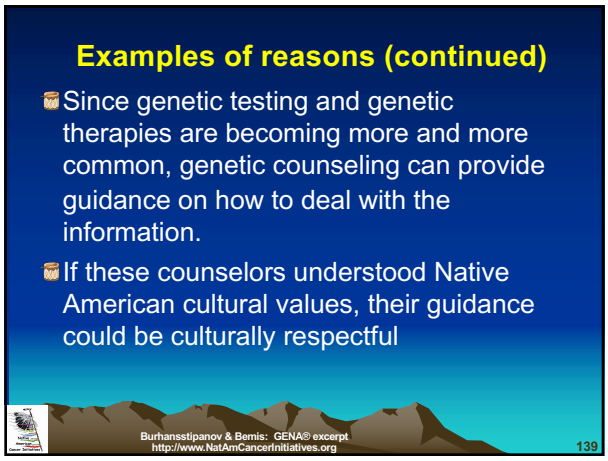
Examples of reasons (continued)
Since genetic testing and genetic therapies are becoming more and more common, genetic counseling can provide guidance on how to deal with the information.
If these counselors understood Native American cultural values, their guidance could be culturally respectful
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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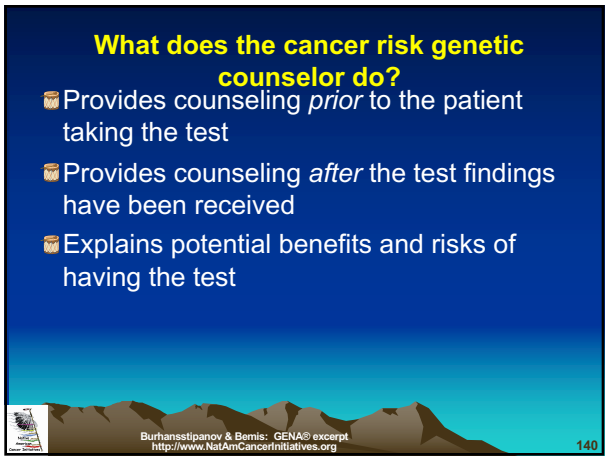
What does the cancer risk genetic counselor do?
Provides counseling *prior* to the patient taking the test
Provides counseling *after* the test findings have been received
Explains potential benefits and risks of having the test
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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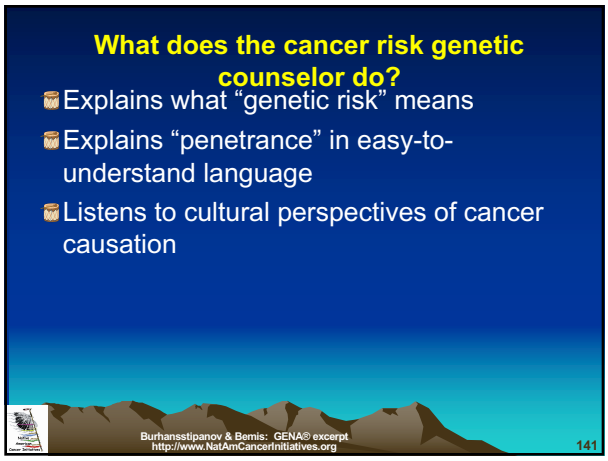
What does the cancer risk genetic counselor do?
Explains what "genetic risk" means
Explains "penetrance" in easy-to-understand language
Listens to cultural perspectives of cancer causation
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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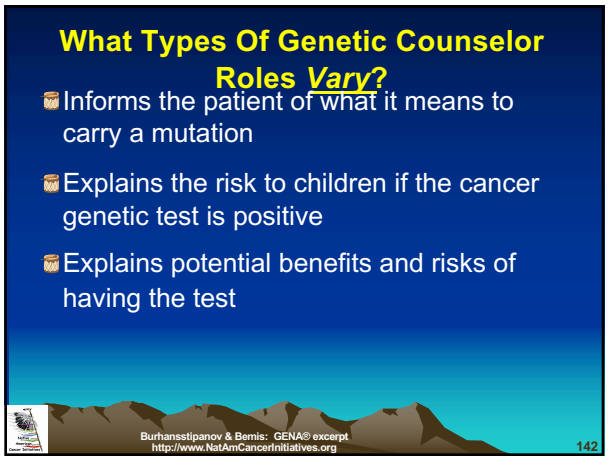
What Types Of Genetic Counselor Roles Vary?
Informs the patient of what it means to carry a mutation
Explains the risk to children if the cancer genetic test is positive
Explains potential benefits and risks of having the test
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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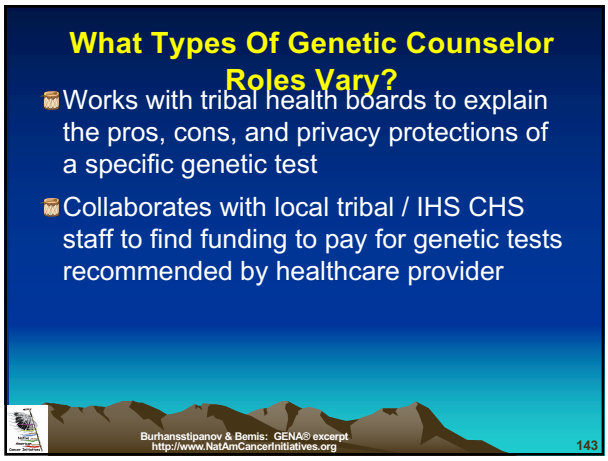
What Types Of Genetic Counselor Roles Vary?
Works with tribal health boards to explain the pros, cons, and privacy protections of a specific genetic test
Collaborates with local tribal / IHS CHS staff to find funding to pay for genetic tests recommended by healthcare provider
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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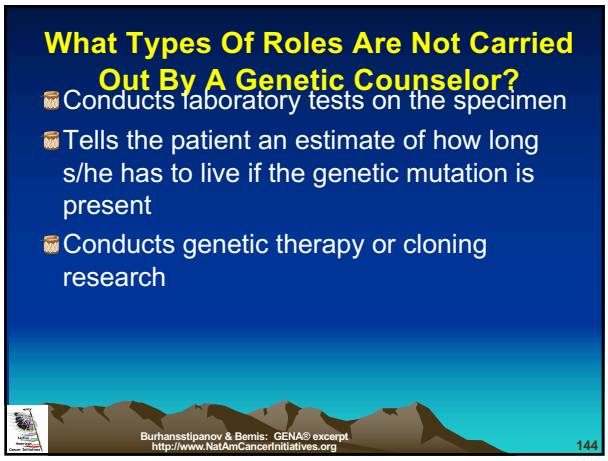
What Types Of Roles Are Not Carried Out By A Genetic Counselor?
Conducts laboratory tests on the specimen
Tells the patient an estimate of how long s/he has to live if the genetic mutation is present
Conducts genetic therapy or cloning research
Burhansstipanov & Bemis: GENA® excerpt
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IHS Policies regarding non-pregnancy-related genetic testing

March 19, 2000 (no changes as of 2005)

- IHS does not have an explicit policy;
- The practice is to refer to: local tribal health council or board for guidance
- General counseling and testing when the patient's clinician determines it is needed to make a clinical diagnosis

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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For examples of common issues and suggested policy language from tribal leaders and community members:

- Burhansstipanov L, Bemis L, Kaur JS, Bemis G. Sample genetic policy language for research conducted with Native Communities. *Journal of Cancer Education* :2005: 20: (Suppl.): 52-57.

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Tribal / IHS Contracted Health Services (CHS)

- Every fiscal year (Oct 1) Congress determines amount of money to be allocated to *each* federally recognized tribal nation
- Most tribes are out of CHS dollars by May or June (i.e., no referrals unless top 1-2 priorities until Oct 1)

Burhansstipanov & Bemis: GENA® excerpt
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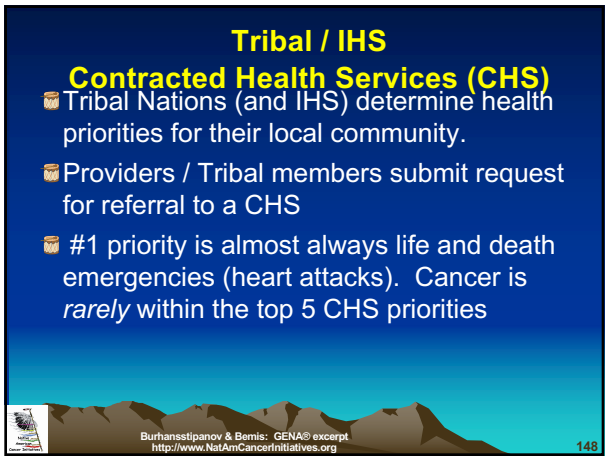
Tribal / IHS
Contracted Health Services (CHS)
Tribal Nations (and IHS) determine health priorities for their local community.
Providers / Tribal members submit request for referral to a CHS
#1 priority is almost always life and death emergencies (heart attacks). Cancer is *rarely* within the top 5 CHS priorities
Burhansstipanov & Bemis: GENA® excerpt
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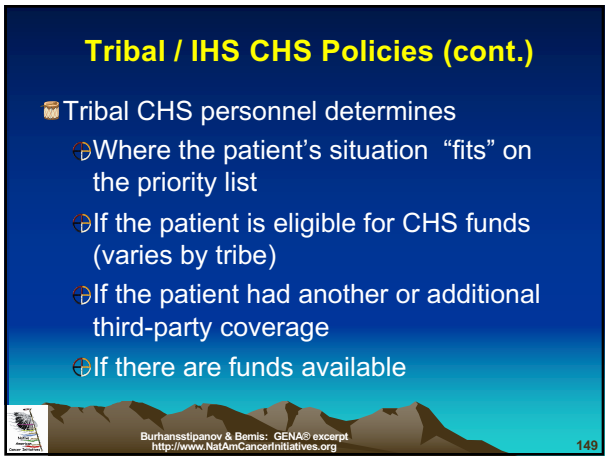
Tribal / IHS CHS Policies (cont.)
Tribal CHS personnel determines
Where the patient's situation "fits" on the priority list
If the patient is eligible for CHS funds (varies by tribe)
If the patient had another or additional third-party coverage
If there are funds available
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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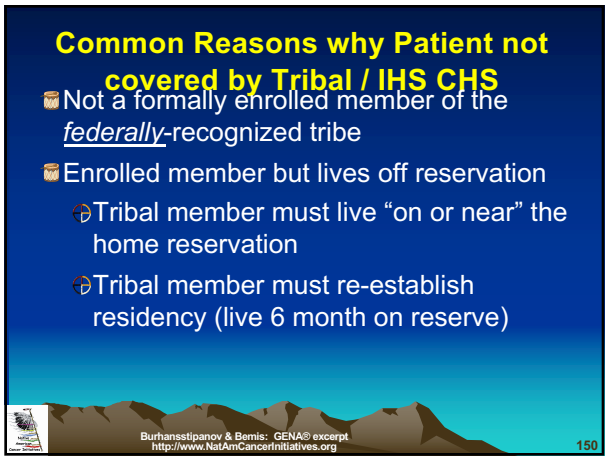
Common Reasons why Patient not covered by Tribal / IHS CHS
Not a formally enrolled member of the *federally*-recognized tribe
Enrolled member but lives off reservation
Tribal member must live "on or near" the home reservation
Tribal member must re-establish residency (live 6 month on reserve)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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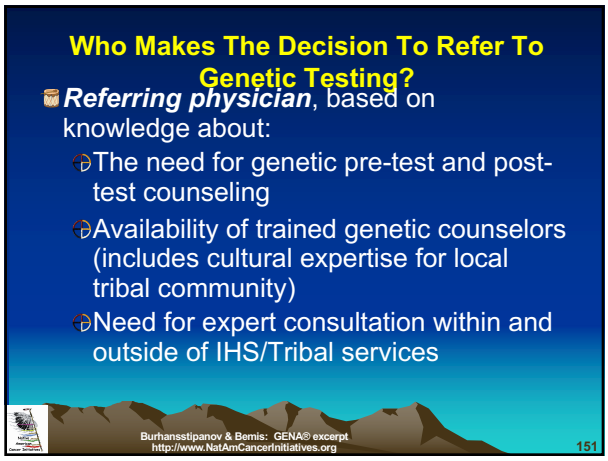
Who Makes The Decision To Refer To Genetic Testing?
Referring physician, based on knowledge about:
The need for genetic pre-test and post-test counseling
Availability of trained genetic counselors (includes cultural expertise for local tribal community)
Need for expert consultation within and outside of IHS/Tribal services
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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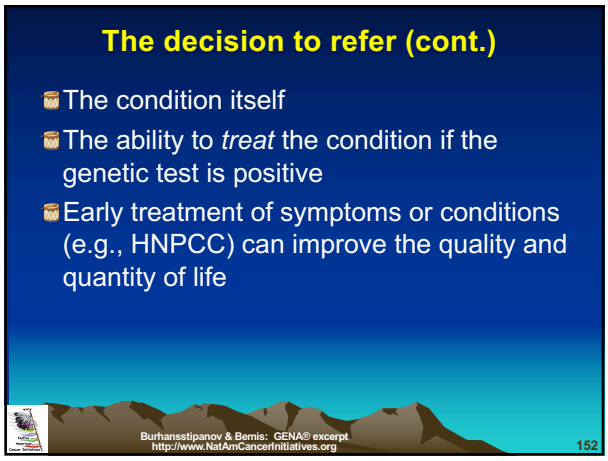
The decision to refer (cont.)
The condition itself
The ability to treat the condition if the genetic test is positive
Early treatment of symptoms or conditions (e.g., HNPCC) can improve the quality and quantity of life
Burhansstipanov & Bemis: GENA® excerpt
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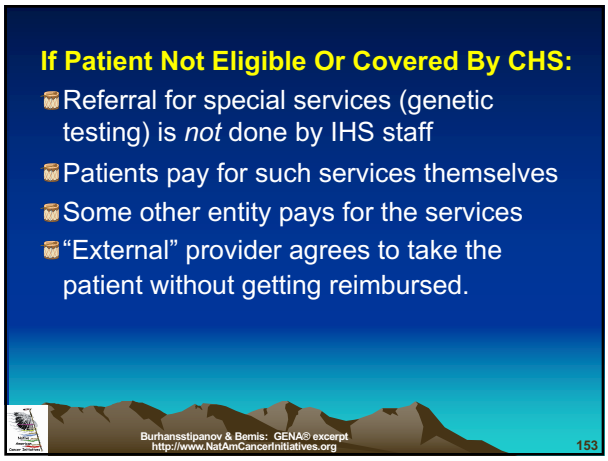
If Patient Not Eligible Or Covered By CHS:
Referral for special services (genetic testing) is not done by IHS staff
Patients pay for such services themselves
Some other entity pays for the services
"External" provider agrees to take the patient without getting reimbursed.
Burhansstipanov & Bemis: GENA® excerpt
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Examples Of Where And How The Policies Vary

- North Carolina provides free genetic counseling to any resident.
- Winnipeg, Canada: varies in each province.
- In Manitoba, if Aboriginal meets the criteria (high risk), genetic testing is offered *within the context of research study.* Travel costs also included

Burhansstipanov & Bemis: GENA® excerpt
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Objective 22: Identify family history collection protocols and cultural issues appropriate for Native Peoples

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Reasons Family History Collection May be Important

- Determine if traits in a family are due to environmental, and / or hereditary factors.
- Provides a basis for making a diagnosis.
- Demonstrates biological and non-biological relationships (e.g., adoption)
- May reveal patterns of inheritance and expressivity within the family.

Burhansstipanov & Bemis: GENA® excerpt
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Reasons Family History Collection May be Important

- Clarifies family myths regarding who in the family is at risk.
- Helps explain why some members of the family are not affected.

Burhansstipanov & Bemis: GENA® excerpt
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Sample Cancer Family History Questionnaire

1. Name
2. Date
3. Age
4. Ethnic Background
5. Do you have any specific concerns about cancer in yourself or your family?
6. Do you or any members of your family have a history of cancer?

Burhansstipanov & Bemis: GENA® excerpt
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	Yes / No	Type of Cancer (if known)	Age at Dx	Living / Deceased
yourself				
your mother				
your father				
your sisters & brothers				
your children				
your mother's sisters & brothers				
your father's sisters and brothers				
your nieces & nephews				
your mother's parents				
ur father's parents				

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org

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Example of Culturally Inappropriate Family History Data Collection by Epidemiologists during the Hanta Virus Infection

- Epidemiologists demanded to interview the surviving family members immediately following the patient's death
- Researchers unaware / unwilling to be educated by local Native physician of local cultural beliefs of no discussion of the deceased for 3 days

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Example of Culturally Inappropriate Family History Data Collection by Epidemiologists during the Hanta Virus Infection

- Family forced to violate cultural practices = very difficult ceremony
- Researchers given inaccurate information
- Linear epidemiology data collection process = alienated the community

Burhansstipanov & Bemis: GENA® excerpt
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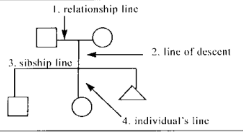
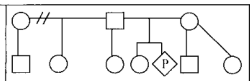
Pedigree Line Definitions

Definitions	Comments
	If possible, male partner should be to left of female partner on relationship line. Siblings should be listed from left to right in birth order (oldest to youngest) For pregnancies not carried to term (SABs and TOPs) the individual's line is shortened.

1. Relationship line (horizontal)

a. Relationships		A break in a relationship line indicates the relationship no longer exists. Multiple previous partners do not need to be shown if they do not affect genetic assessment
b. Consanguinity		If degree of relationship not obvious from pedigree, it should be stated (e.g., third cousins) above relationship line.

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Pedigree Line Definitions (cont.)

2. Line of descent (vertical or diagonal)

a. Genetic		Biological parents shown		
Twins	Monozygotic 	Dizygotic 	Unknown 	A horizontal line between the symbols implies a relationship line.
Family history not known/available for individual	? 	? 		
No children by choice or reason unknown		vasectomy 	tubal 	
Infertility		azoospermia 	endometriosis 	Indicate reason, if known.
b. Adoption	in 	out 	by relative 	Brackets are used for all adoptions. Social vs. biological parents denoted by dashed and solid lines

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Common Pedigree Symbols, Definitions, Abbreviations

	Male	Female	Sex Unknown
Individual	 b. 1925	30 y	4 mo
Affected individual (define shading in key)			
Affected individual (more than one condition)			
Multiple individuals, number known	 5	 5	 5
Multiple individuals, number unknown	n	 n	 n
Deceased individual	 d. 35 y	 d. 4mo	
Stillbirth (SB)	 SB 28 wk	 SB 30 wk	SB 34 wk
Pregnancy(P) (light shading can be used for affected)	 P LMP: 7/1/94	 P 20 wk	 P

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Common Pedigree Symbols, Definitions, Abbreviations

Spontaneous abortion (SB) (ectopic = ECT)	 male	female	ECT
Affected SAB	male	female	16 wk
Termination of Pregnancy (TOP)	male	female	
Affected TOP	male 16 wk	female	
Proband	P	P	P
Consultand			

Source: Reprinted, by permission, from Bennett et al., Am J Hum Genet 56:746. Copyright 1995 by The University of Chicago Press.

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Pedigree Collection And Risk Assessment From That Pedigree

- Pedigree collection involves the genetic counselor asking patient and/or family members information about their ancestors and immediate family

Burhansstipanov & Bemis: GENA® excerpt
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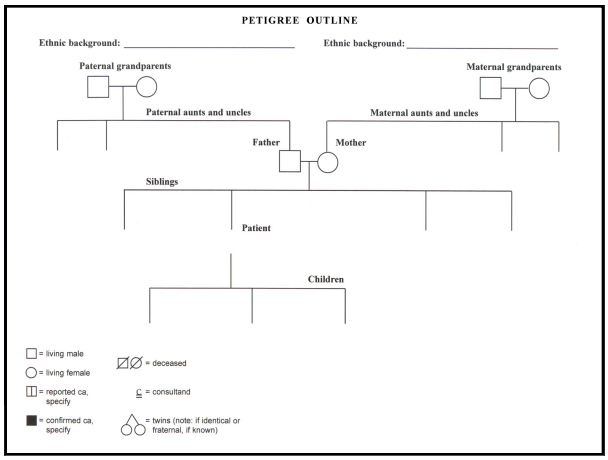

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Using BRCA2 As An Example

- Having the marker does not mean you will develop cancer
- The marker indicates a predisposition
- Every single person has a BRCA2 gene, but only a few have the mutations.

Burhansstipanov & Bemis: GENA® excerpt
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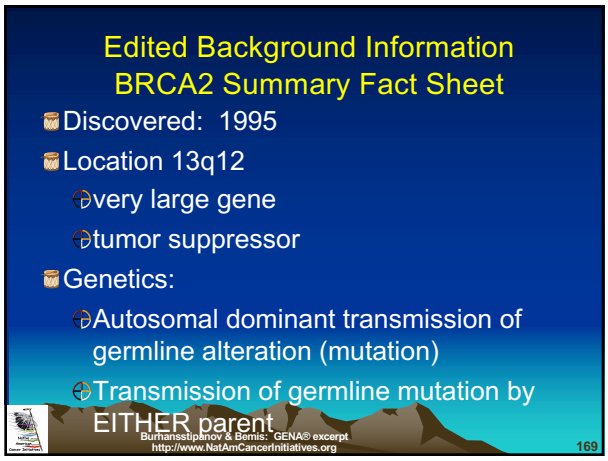
Edited Background Information
BRCA2 Summary Fact Sheet
Discovered: 1995
Location 13q12
very large gene
tumor suppressor
Genetics:
Autosomal dominant transmission of germline alteration (mutation)
Transmission of germline mutation by EITHER parent
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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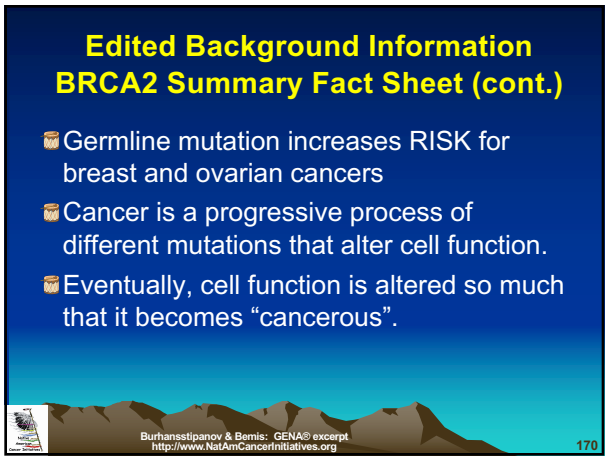
Edited Background Information
BRCA2 Summary Fact Sheet (cont.)
Germline mutation increases RISK for breast and ovarian cancers
Cancer is a progressive process of different mutations that alter cell function.
Eventually, cell function is altered so much that it becomes "cancerous".
Burhansstipanov & Bemis: GENA® excerpt
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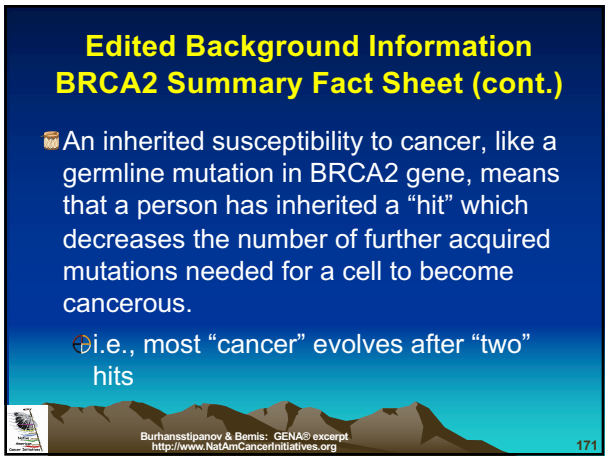
Edited Background Information
BRCA2 Summary Fact Sheet (cont.)
An inherited susceptibility to cancer, like a germline mutation in BRCA2 gene, means that a person has inherited a "hit" which decreases the number of further acquired mutations needed for a cell to become cancerous.
i.e., most "cancer" evolves after "two" hits
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Increased Cancer Risks for Mutations in BRCA2:

- Women
  - Breast cancer
  - Ovarian cancer (not as high as BRCA1 mutations)
- Men
  - Breast cancer
  - Prostate cancer

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Increased Cancer Risks for Mutations in BRCA2:

- Other Cancers (risk for these may be slightly elevated over the general population)
  - Colon cancer
  - Pancreatic cancer
  - Stomach cancer
  - Cancer of the gallbladder
  - Melanoma

Burhansstipanov & Bemis: GENA® excerpt
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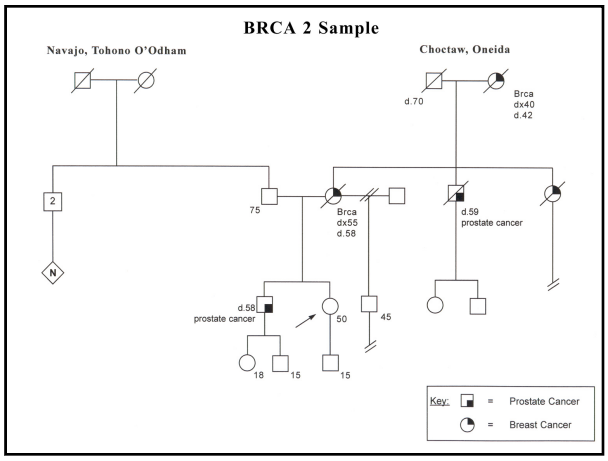

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Translate the BRCA2 Pedigree

- Definitions
- Symbols
- Outline
- NOTE: the "key" or "legend" at the bottom of pages … varies among facilities

Burhansstipanov & Bemis: GENA® excerpt
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Translate the Pedigree Definitions

- **QUESTION 1:** What does the circle mean? Female
- **QUESTION 2:** What does the square mean? Male
- **QUESTION 3:** What does it mean when a diagonal line goes through the circle or the square? Deceased
- **QUESTION 4:** What does the "Dx" mean? Age of Diagnosis

Burhansstipanov & Bemis: GENA® excerpt
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Translate the Pedigree Definitions

- **QUESTION 5:** What does the circle or square includes a blackened square? Cancer diagnosed
- **QUESTION 6:** What does the "d." mean? Died

The individual providing the information about the family (consultant)

- **QUESTION 8:** What does the diamond shape is used? Gender unknown

Burhansstipanov & Bemis: GENA® excerpt
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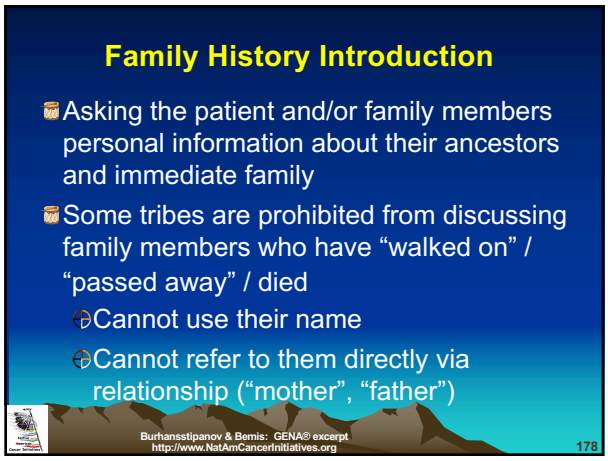
Family History Introduction
Asking the patient and/or family members personal information about their ancestors and immediate family
Some tribes are prohibited from discussing family members who have "walked on" / "passed away" / died
Cannot use their name
Cannot refer to them directly via relationship ("mother", "father")
Burhansstipanov & Bemis: GENA® excerpt
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Family History Introduction
Violations of these cultural practices can result in the family having to do timely and expensive ceremonies
Linear format of family / pedigree collection process frequently results in erroneous information
Encourage patient to "tell a story"
Be careful about how we talk about our relatives ("my daughter")
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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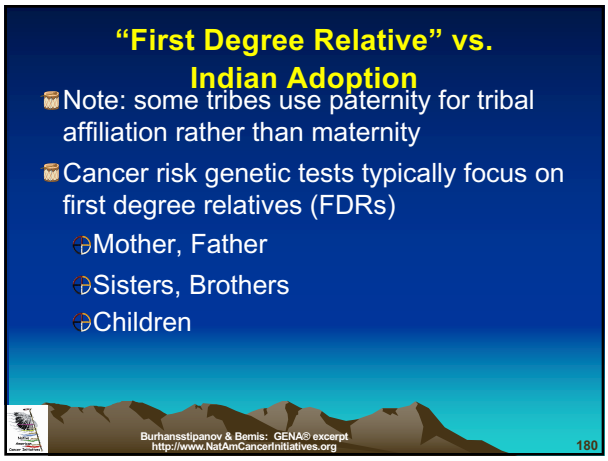
"First Degree Relative" vs. Indian Adoption
Note: some tribes use paternity for tribal affiliation rather than maternity
Cancer risk genetic tests typically focus on first degree relatives (FDRs)
Mother, Father
Sisters, Brothers
Children
Burhansstipanov & Bemis: GENA® excerpt
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"First Degree Relative" vs. Indian Adoption

- Indian cultures actively support adoption of others who need or want assistance / guidance
  - Cousins, aunties, uncles, other relatives
  - Other members / children / youth of the community
  - Friends / their children / youth

Challenging to distinguish among "blood" relatives and "adopted" relatives from our (Natives') beliefs

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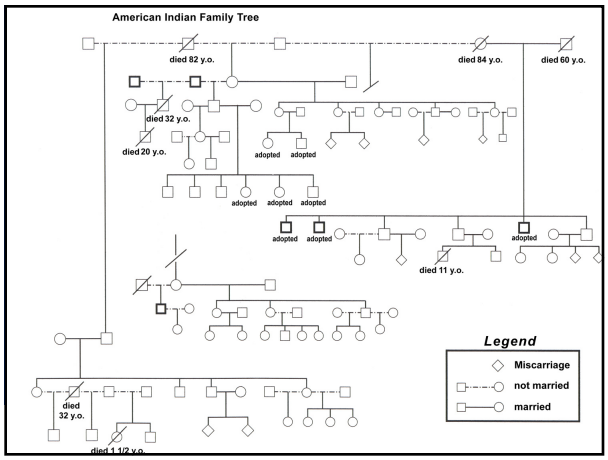

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GENA® Objective 23

Examine cultural issues that are related to informed decision making by members of Native Communities.

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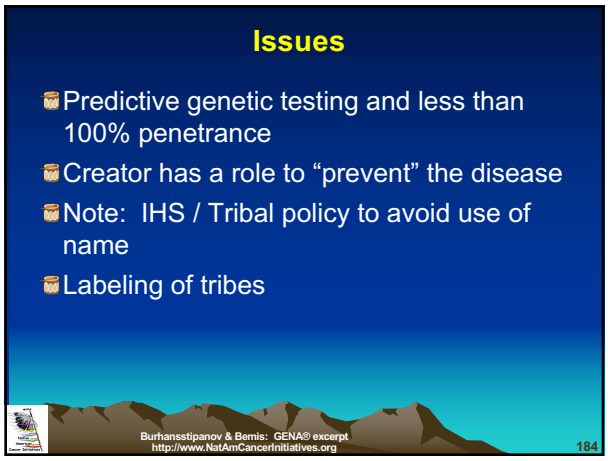
Issues
Predictive genetic testing and less than 100% penetrance
Creator has a role to "prevent" the disease
Note: IHS / Tribal policy to avoid use of name
Labeling of tribes
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Issues
Tribal sanctions against testing
Who is the decision-maker in the family / community?
Publication of pedigree and loss of "anonymity"
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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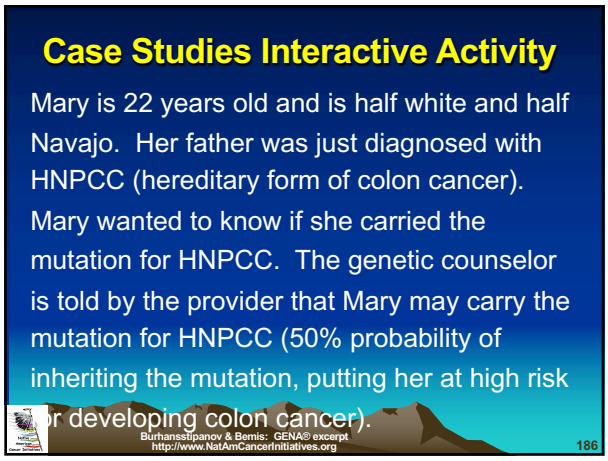
Case Studies Interactive Activity
Mary is 22 years old and is half white and half Navajo. Her father was just diagnosed with HNPCC (hereditary form of colon cancer). Mary wanted to know if she carried the mutation for HNPCC. The genetic counselor is told by the provider that Mary may carry the mutation for HNPCC (50% probability of inheriting the mutation, putting her at high risk for developing colon cancer).
Burhansstipanov & Bemis: GENA® excerpt
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Case Study #1: Beneficence

- Although there is an early onset in this disease, there are also lifestyle changes that can help her maintain her health even with this mutation (e.g., high fiber diet and regular colon cancer screening)
- **Question 1:** How should the genetic counselor prepare Mary to consider testing?

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Case Study #1: Beneficence

Question 2: How would knowing these test results benefit Mary's well-being?

Question 3: How would knowing these test results "cause her harm?"

Question 4: If you were Mary's genetic counselor, how would you help her gather more information?

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Case Study #2: Autonomy

- A Cherokee woman, age 32, comes in for genetic counseling and testing for BRCA1/2. She is accompanied by her mother. The women are both attentive and enthusiastic during the counseling session, asking questions for clarification and indicating to the genetic counselor that they are understanding the information about inheritable cancer risk.

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Case Study #2: Autonomy

- When the genetic counselor turns the session towards the family history, the mother begins answering many of the questions, especially pertaining to latter generations.
- The genetic counselor does not find this concerning, as it is often natural for the older family member to fill in the details when present for this part of the session.

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Case Study #2: Autonomy

- The genetic counselor continues to analyze the family history and tells the daughter that she appears to be a candidate for BRCA testing.
- As the counselor continues to explain what that means, and describes the risks, benefits, and limitations of the genetic test the daughter begins "tuning out" and the mother begins commanding the genetic counselor's attention.

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Case Study #2: Autonomy

- The genetic counselor tries to engage the daughter while explaining the consequences of testing -- positive or negative for a mutation. The mother suddenly chimes in, "My daughter will have this test."

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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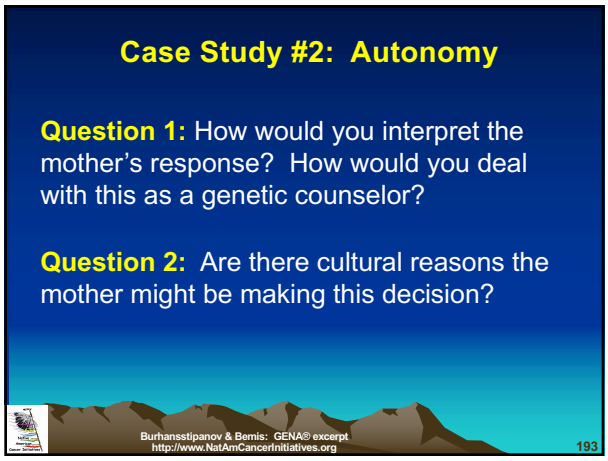
Case Study #2: Autonomy
Question 1: How would you interpret the mother's response? How would you deal with this as a genetic counselor?
Question 2: Are there cultural reasons the mother might be making this decision?
Burhansstipanov & Bemis: GENA® excerpt
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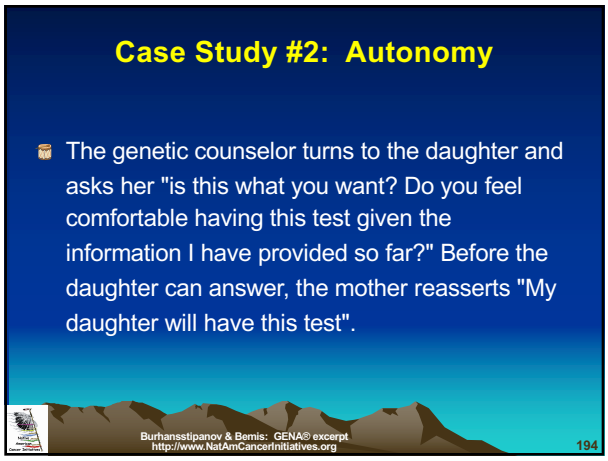
Case Study #2: Autonomy
The genetic counselor turns to the daughter and asks her "is this what you want? Do you feel comfortable having this test given the information I have provided so far?" Before the daughter can answer, the mother reasserts "My daughter will have this test".
Burhansstipanov & Bemis: GENA® excerpt
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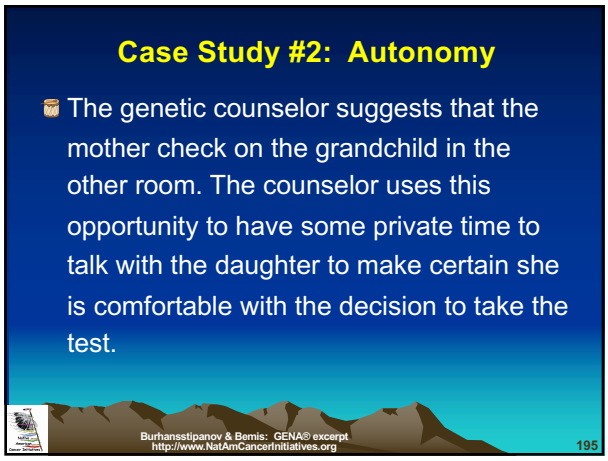
Case Study #2: Autonomy
The genetic counselor suggests that the mother check on the grandchild in the other room. The counselor uses this opportunity to have some private time to talk with the daughter to make certain she is comfortable with the decision to take the test.
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Case Study #2: Autonomy

- The answer culturally could be, "My mother makes this decision for me, but I have the information so I can make the decision when it is my daughter's turn to be tested".
- **Question:** As a genetic counselor, what are alternative ways to handle this type of situation to assure patient autonomy?

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Case Study #3: Justice

- A Northwestern tribal member, Joseph, has two uncles who were diagnosed with thyroid carcinomas. Both had worked at the Hanford Weapons Project, as did Joseph.
- NOTE: the Hanford project was in the NW and there was plutonium exposure to workers and to nearby communities.

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Case Study #3: Justice

- Joseph used to hear about workers getting thyroid cancer while working at the Hanford Project (exposure to plutonium). He comes to the genetic counselor for evaluation. Joseph states that he wants to be tested for the RET oncogene, but that his tribe has an ordinance prohibiting any genetic testing of individuals.

Burhansstipanov & Bemis: GENA® excerpt
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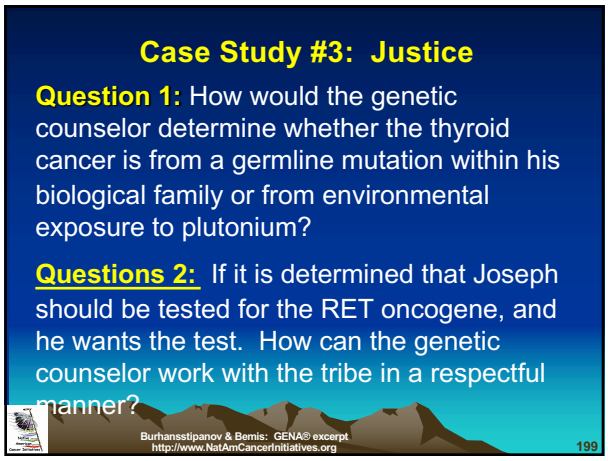
Case Study #3: Justice
Question 1: How would the genetic counselor determine whether the thyroid cancer is from a germline mutation within his biological family or from environmental exposure to plutonium?
Questions 2: If it is determined that Joseph should be tested for the RET oncogene, and he wants the test. How can the genetic counselor work with the tribe in a respectful manner?
Burhansstipanov & Bemis: GENA® excerpt
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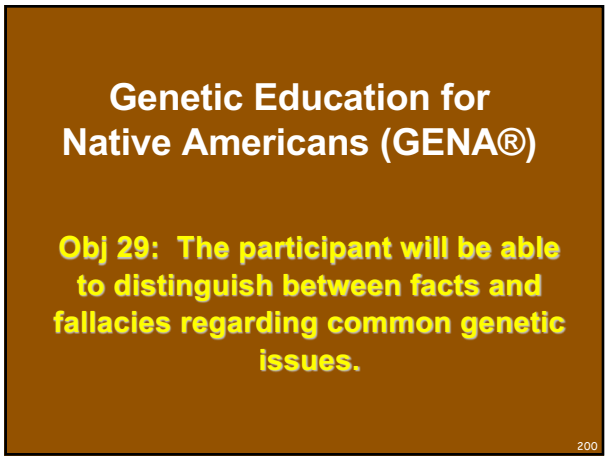
Genetic Education for Native Americans (GENA®)
Obj 29: The participant will be able to distinguish between facts and fallacies regarding common genetic issues.
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Faculty:
Linda Burhansstipanov, MSPH, DrPH
Lynne Bemis, PhD
Clif Poodry, PhD
For further information, please contact:
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Pine, CO 80470-7830
Phone: 303-838-9359
Web: http://NatAmCancer.org
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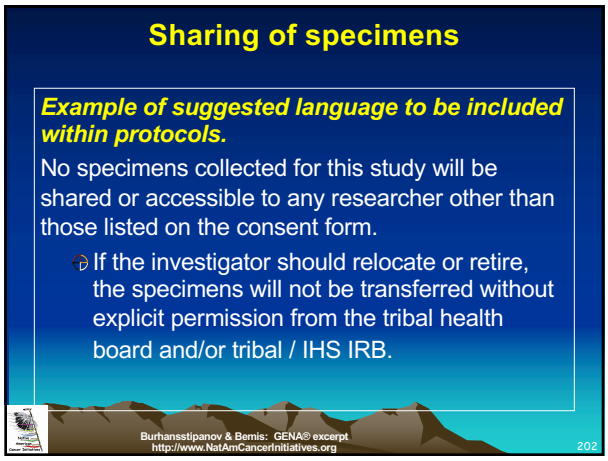
Sharing of specimens
Example of suggested language to be included within protocols.
No specimens collected for this study will be shared or accessible to any researcher other than those listed on the consent form.
If the investigator should relocate or retire, the specimens will not be transferred without explicit permission from the tribal health board and/or tribal / IHS IRB.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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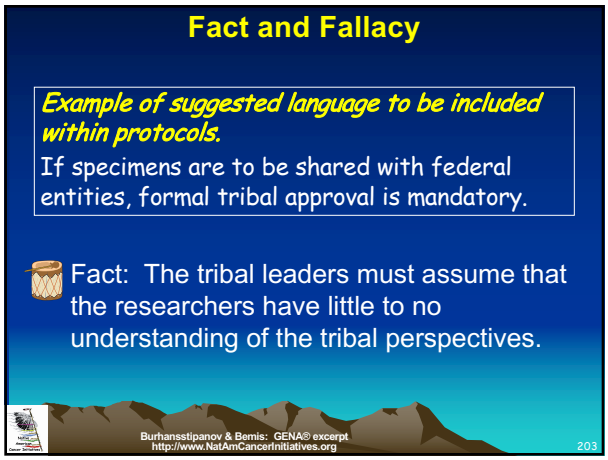
Fact and Fallacy
Example of suggested language to be included within protocols.
If specimens are to be shared with federal entities, formal tribal approval is mandatory.
Fact: The tribal leaders must assume that the researchers have little to no understanding of the tribal perspectives.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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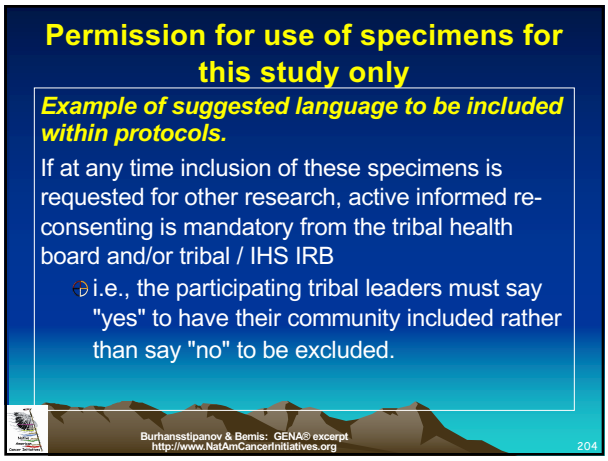
Permission for use of specimens for this study only
Example of suggested language to be included within protocols.
If at any time inclusion of these specimens is requested for other research, active informed re-consenting is mandatory from the tribal health board and/or tribal / IHS IRB
i.e., the participating tribal leaders must say "yes" to have their community included rather than say "no" to be excluded.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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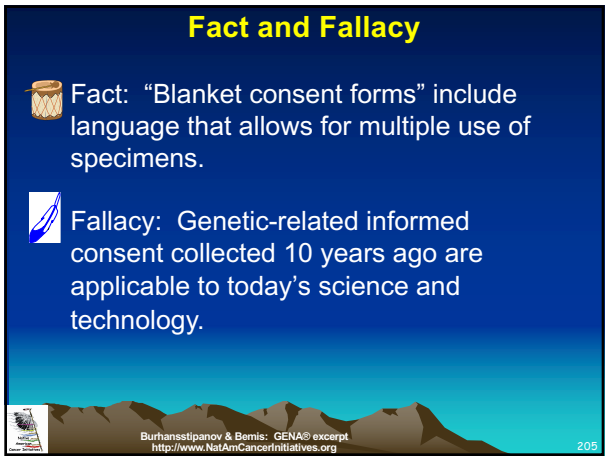
Fact and Fallacy
Fact: "Blanket consent forms" include language that allows for multiple use of specimens.
Fallacy: Genetic-related informed consent collected 10 years ago are applicable to today's science and technology.
Burhansstipanov & Bemis: GENA® excerpt
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Fact and Fallacy
(cont.) Perhaps more importantly, the alternative origin stories of scientists are seen as intending to weaken tribal land and other legal claims that are supported in US federal and tribal law (Harry and Dukepoo). As genetic evidence has already been used to resolve land conflicts in Asian and Eastern European countries, this is not an unfounded fear.
TallBear ISE 2000, p. 6
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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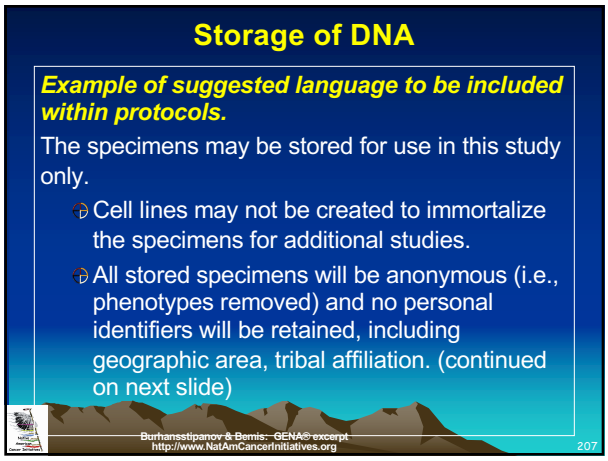
Storage of DNA
Example of suggested language to be included within protocols.
The specimens may be stored for use in this study only.
Cell lines may not be created to immortalize the specimens for additional studies.
All stored specimens will be anonymous (i.e., phenotypes removed) and no personal identifiers will be retained, including geographic area, tribal affiliation. (continued on next slide)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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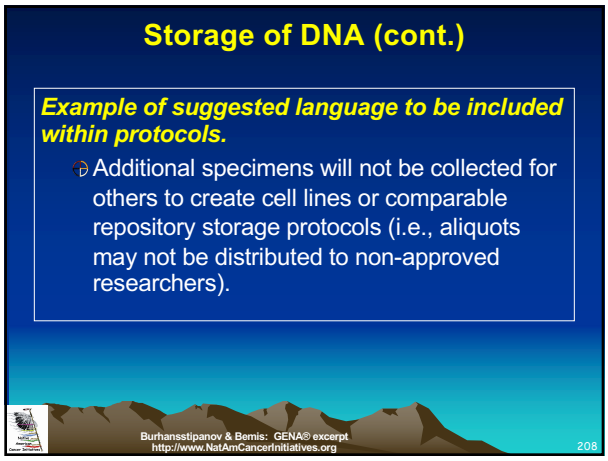
Storage of DNA (cont.)
Example of suggested language to be included within protocols.
Additional specimens will not be collected for others to create cell lines or comparable repository storage protocols (i.e., aliquots may not be distributed to non-approved researchers).
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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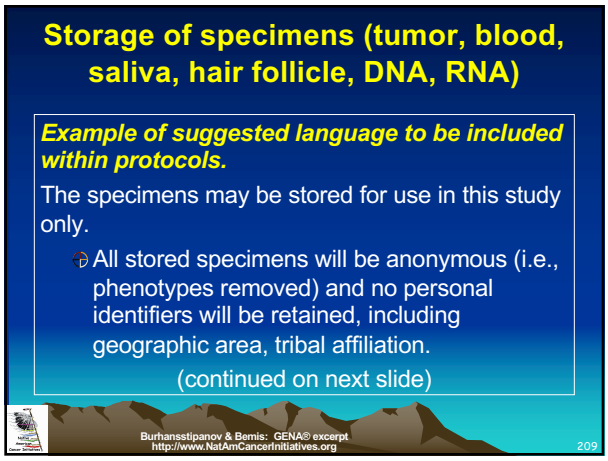
Storage of specimens (tumor, blood, saliva, hair follicle, DNA, RNA)
Example of suggested language to be included within protocols.
The specimens may be stored for use in this study only.
All stored specimens will be anonymous (i.e., phenotypes removed) and no personal identifiers will be retained, including geographic area, tribal affiliation.
(continued on next slide)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Disposal of unused specimens upon completion of this study
Example of suggested language to be included within protocols.
The investigators agree to discard unused specimens according to the local tribal community's restrictions.
This may include returning the specimens to tribal leaders for ceremonies or other culturally specific practices.
The community may elect to have the scientists dispose of the specimens by ordinary means.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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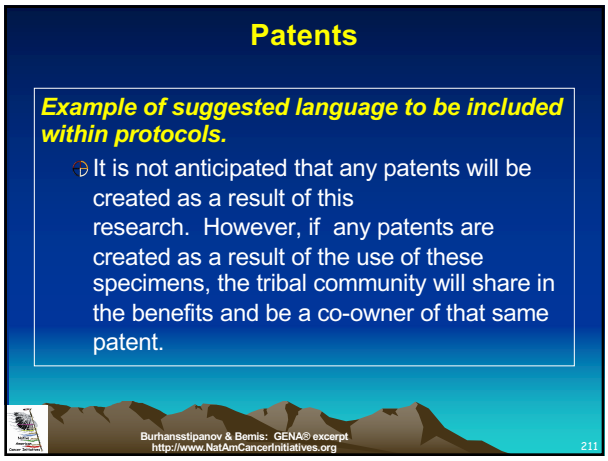
Patents
Example of suggested language to be included within protocols.
It is not anticipated that any patents will be created as a result of this research. However, if any patents are created as a result of the use of these specimens, the tribal community will share in the benefits and be a co-owner of that same patent.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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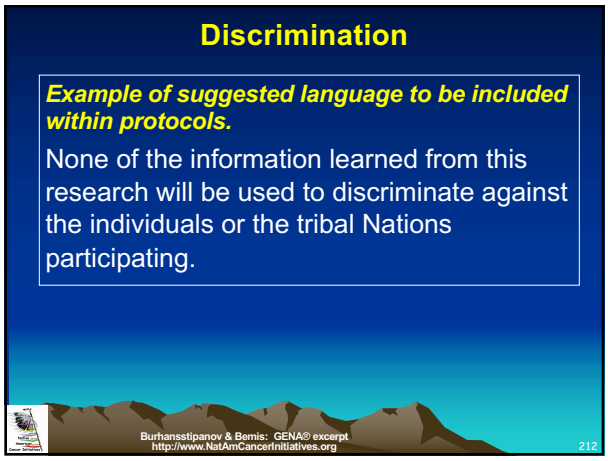
Discrimination
Example of suggested language to be included within protocols.
None of the information learned from this research will be used to discriminate against the individuals or the tribal Nations participating.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: Specimens have been shared without informing the tribal Nation(s).
Fallacy: Most researchers are dishonest and will use the specimens any way desired without regard for the tribal agreement.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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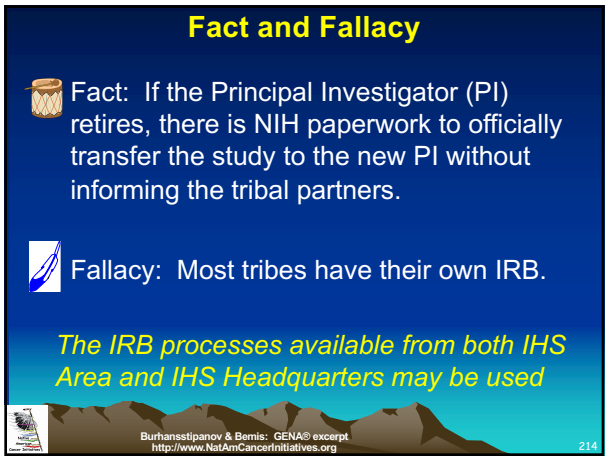
Fact and Fallacy
Fact: If the Principal Investigator (PI) retires, there is NIH paperwork to officially transfer the study to the new PI without informing the tribal partners.
Fallacy: Most tribes have their own IRB.
The IRB processes available from both IHS Area and IHS Headquarters may be used
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: The federal government is likely to be unaware of tribal perspectives.
Fallacy: The federal government will protect and be responsive to tribal perspectives
Case-by-case exceptions: such as Dr. Francis Collins, NHGRI & NIH Director, who has made great efforts to respect the tribal perspectives. Thank you.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: Indian people have also expressed suspicion that DNA analysis is a tool that scientists will use to support theories about the origins of tribal people that contradict tribal oral histories and origin stories and this perceived by some as presenting a risk to the integrity of tribal religions. (cont.)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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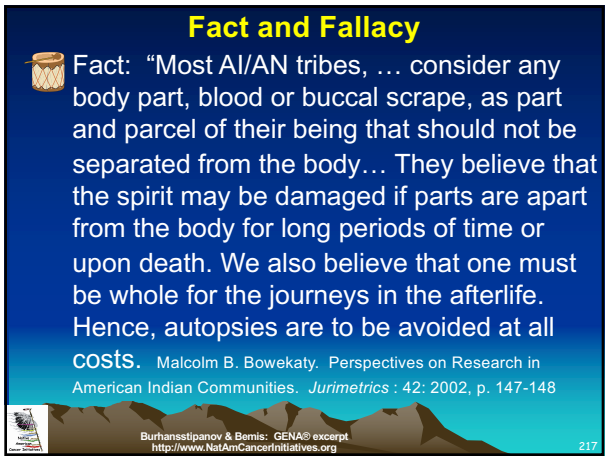
Fact and Fallacy
Fact: "Most AI/AN tribes, … consider any body part, blood or buccal scrape, as part and parcel of their being that should not be separated from the body… They believe that the spirit may be damaged if parts are apart from the body for long periods of time or upon death. We also believe that one must be whole for the journeys in the afterlife. Hence, autopsies are to be avoided at all costs. Malcolm B. Bowekaty. Perspectives on Research in American Indian Communities. Jurimetrics : 42: 2002, p. 147-148
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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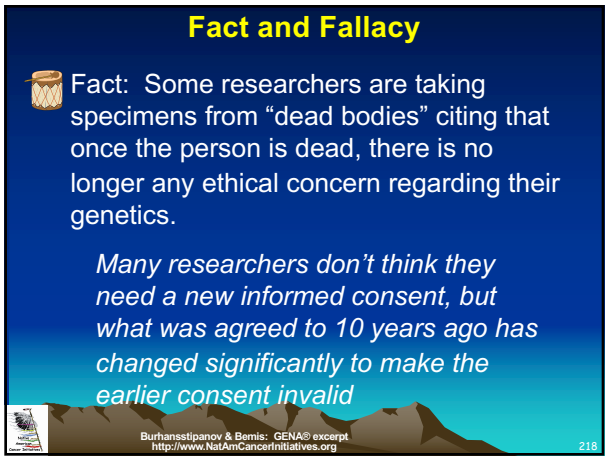
Fact and Fallacy
Fact: Some researchers are taking specimens from "dead bodies" citing that once the person is dead, there is no longer any ethical concern regarding their genetics.
Many researchers don't think they need a new informed consent, but what was agreed to 10 years ago has changed significantly to make the earlier consent invalid
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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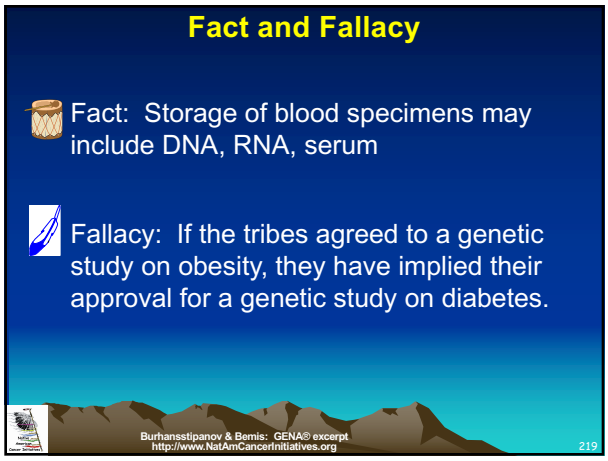
Fact and Fallacy
Fact: Storage of blood specimens may include DNA, RNA, serum
Fallacy: If the tribes agreed to a genetic study on obesity, they have implied their approval for a genetic study on diabetes.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: It is acceptable to most tribes to provide biological specimens for health care.
Research specimen collection without limits on storage … is not acceptable. Our people have taboos against storage and permanent usage of biological specimens.
(Bowekaty, p. 148)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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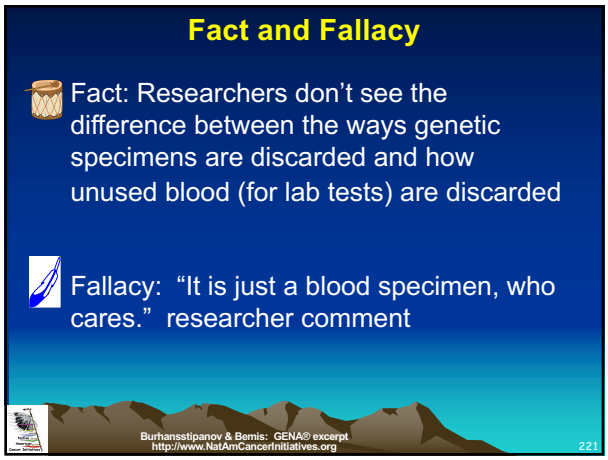
Fact and Fallacy
Fact: Researchers don't see the difference between the ways genetic specimens are discarded and how unused blood (for lab tests) are discarded
Fallacy: "It is just a blood specimen, who cares." researcher comment
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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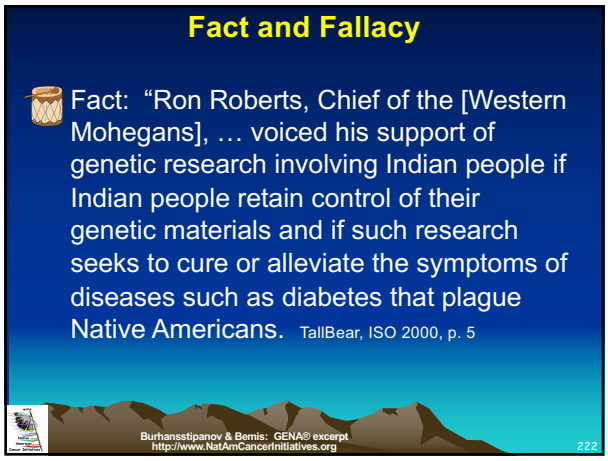
Fact and Fallacy
Fact: "Ron Roberts, Chief of the [Western Mohegans], … voiced his support of genetic research involving Indian people if Indian people retain control of their genetic materials and if such research seeks to cure or alleviate the symptoms of diseases such as diabetes that plague Native Americans. TallBear, ISO 2000, p. 5
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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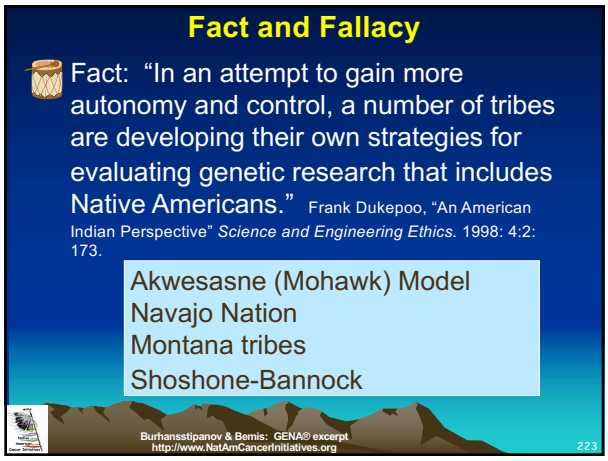
Fact and Fallacy
Fact: "In an attempt to gain more autonomy and control, a number of tribes are developing their own strategies for evaluating genetic research that includes Native Americans." Frank Dukepoo, "An American Indian Perspective" Science and Engineering Ethics. 1998: 4:2: 173.
Akwesasne (Mohawk) Model
Navajo Nation
Montana tribes
Shoshone-Bannock
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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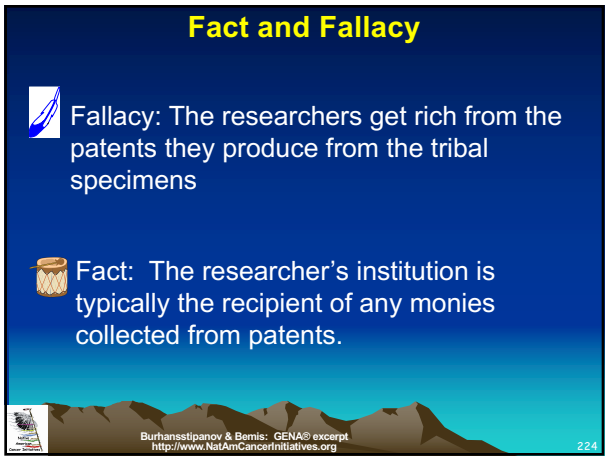
Fact and Fallacy
Fallacy: The researchers get rich from the patents they produce from the tribal specimens
Fact: The researcher's institution is typically the recipient of any monies collected from patents.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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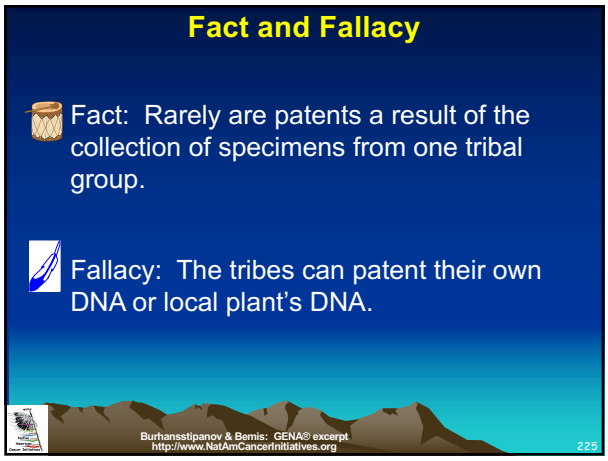
Fact and Fallacy
Fact: Rarely are patents a result of the collection of specimens from one tribal group.
Fallacy: The tribes can patent their own DNA or local plant's DNA.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fallacy: Genetic research is "likely to result in patents on genetic inheritance of indigenous peoples and possible manipulations of their DNA, which violate the natural genetic integrity of their ancestry." Debra Harry, Press Release June 26, 2000 from Indigenous Peoples Council on Biocolonialism
Fact: There have been little to no efforts to patent DNA specific to indigenous peoples.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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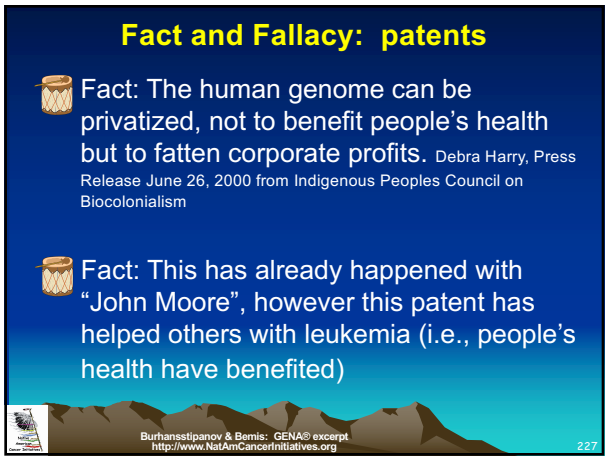
Fact and Fallacy: patents
Fact: The human genome can be privatized, not to benefit people's health but to fatten corporate profits. Debra Harry, Press Release June 26, 2000 from Indigenous Peoples Council on Biocolonialism
Fact: This has already happened with "John Moore", however this patent has helped others with leukemia (i.e., people's health have benefited)
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: The community has the right to not participate in any study or to withdraw at any time during a study
Fallacy: The tribal community can reclaim their genetic specimens if they choose to withdraw from a study
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: Tribal communities can develop partnerships with a research team to share the benefits of patenting (e.g., services, not just monetary).
Fallacy: The researcher will want to partner with the tribe.
the researcher is likely to be unaware of partnering possibilities.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Is it the researchers' responsibility if they approach the tribe to have understanding of genetic perspectives and of other tribes' concerns?
Fallacy: No federally recognized tribe is participating in genetic research.
Strong Heart, AN Obesity Study
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: Peer reviewed publications are typically published before the tribal community is informed of the findings.
Fallacy: Genetic research results in improving tribal programs and services.
Although this is the goal of many genetic studies, it takes a long time for the research to be translated into improved services.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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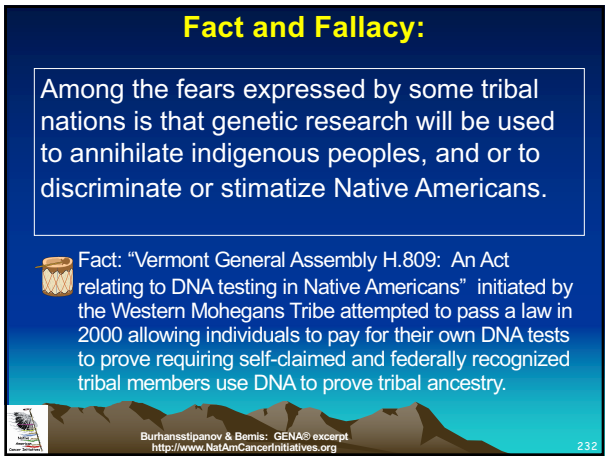
Fact and Fallacy:
Among the fears expressed by some tribal nations is that genetic research will be used to annihilate indigenous peoples, and or to discriminate or stimatize Native Americans.
Fact: "Vermont General Assembly H.809: An Act relating to DNA testing in Native Americans" initiated by the Western Mohegans Tribe attempted to pass a law in 2000 allowing individuals to pay for their own DNA tests to prove requiring self-claimed and federally recognized tribal members use DNA to prove tribal ancestry.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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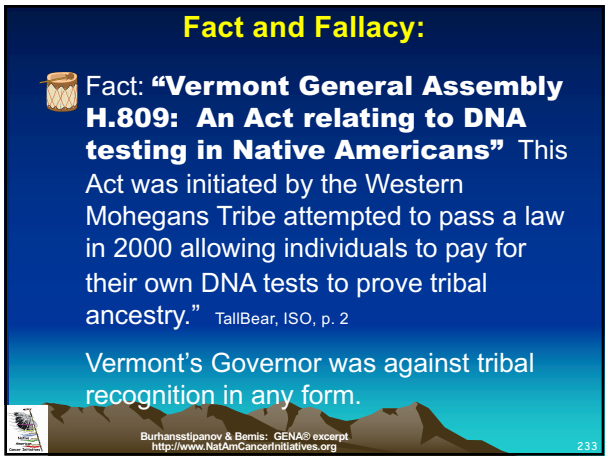
Fact and Fallacy:
Fact: "Vermont General Assembly H.809: An Act relating to DNA testing in Native Americans" This Act was initiated by the Western Mohegans Tribe attempted to pass a law in 2000 allowing individuals to pay for their own DNA tests to prove tribal ancestry." TallBear, ISO, p. 2
Vermont's Governor was against tribal recognition in any form.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fact: This research is possible by classifying individuals by their Haploid (HLA mitochondrial testing). The tests clarifies what percent Native American, Northern European, Asian, Pacific Islander, etc. one is.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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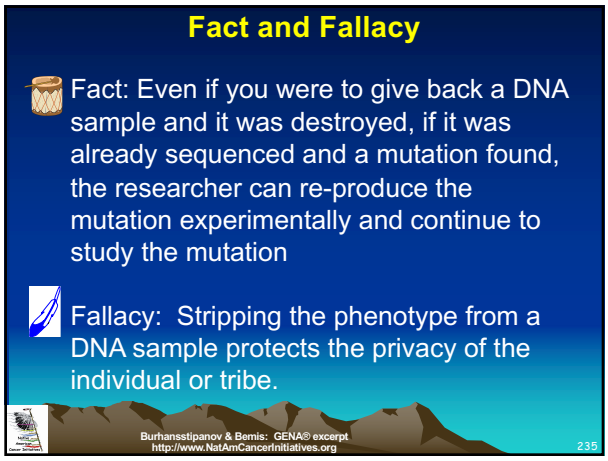
Fact and Fallacy
Fact: Even if you were to give back a DNA sample and it was destroyed, if it was already sequenced and a mutation found, the researcher can re-produce the mutation experimentally and continue to study the mutation
Fallacy: Stripping the phenotype from a DNA sample protects the privacy of the individual or tribe.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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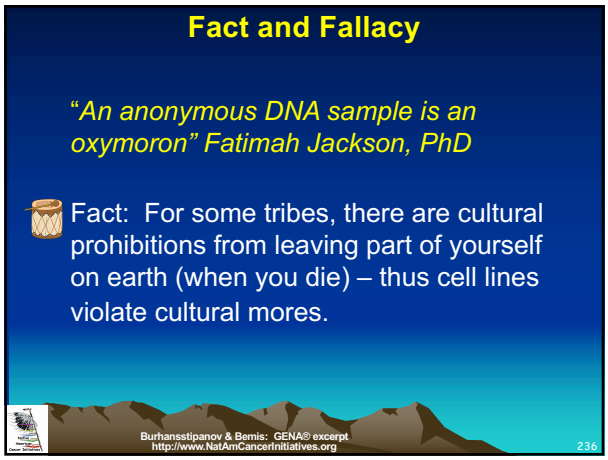
Fact and Fallacy
"An anonymous DNA sample is an oxymoron" Fatimah Jackson, PhD
Fact: For some tribes, there are cultural prohibitions from leaving part of yourself on earth (when you die) – thus cell lines violate cultural mores.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy
Fallacy: If you eliminate names and just use tribal affiliation, you have protected the privacy of the individual
Many people from other cultures share this discomfort of leaving cell lines on earth … and others are proud to do so.
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy

- Fact: Legislation to prohibit such discrimination has several loop holes
- Fact: The researchers have no way of understanding tribal perspectives unless the tribe educates them.

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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Fact and Fallacy

- Fact: DNA testing has been used to support or deny an individual or a group's claim to cultural political rights.

  Kimberly TallBear, Genetics culture and identity in Indian Country. ISE 2000 Conference 7th International Conference of Ethnobiology.
- Fact: There is more diversity within each racial group's genome than there is among racial groups. President's Cancer Panel, New York, NY, April 9, 1997
- Fact: There is no such thing as an "American Indian gene".

Burhansstipanov & Bemis: GENA® excerpt
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BRIEF Overview of Precision Medicine Initiative (now called "All of Us"), Cancer Moonshot and 21st Century Cures Act

President Obama
Jan 20, 2015

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The *All of Us* Research Program

All of Us — The Precision Medicine Initiative

THE FUTURE OF HEALTH BEGINS WITH YOU

- One million or more volunteers nationwide, providing data on an ongoing basis
- Not a study on any one disease, but a hu data resource to inform many research studies on a wide variety of health conditions
- One of the world's largest biomedical databases, to accelerate breakthroughs
- Launching in 2017

Used with permission from: https://www.nih.gov/sites/default/files/research-training/initiatives/pmi/fo-webinar-slideshow.pdf accessed by Linda B on 03-03-2017

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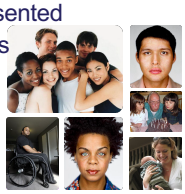
A Transformational Approach to Diversity

Reflecting the country's rich diversity to produce meaningful health outcomes for historically underrepresented communities



People

Health Status

Geography

Data Types

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The Power of a Million: How *All of Us* Can Lead to Better Health

- **Provide information** to help researchers and providers to:
  - Determine individuals' risk of developing certain diseases
  - Find biological markers to aid in prevention and diagnosis
  - Find the most effective therapy for different people
  - Identify solutions to health disparities
- **Build a community** of participants interested in joining clinical trials
  - to help research happen faster
- **Empower participants** with data to improve their own health

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Burhansstipanov & Bemis: GENA® excerpt
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What a Participant Will Be Asked to Do

1. Enroll & Consent
2. Surveys
3. Baseline Measurements
4. Biosamples
5. Wearables/ mobile tech

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The Value of Participating in All of Us

- An opportunity to fight disease and improve the health of future generations
- An opportunity to ensure that your community is included in studies that lead to new understanding and new treatments
- A chance to learn more about your own health The chance to be part of a movement, to make our health care more precise, more personal and more effective

Used with permission from: https://www.nih.gov/sites/default/files/research-training/initiatives/pmi/fo-webinar-slideshow.pdf accessed by Linda B on 03-03-2017

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Volunteer Participants will share:

- Electronic health records
- Health survey information
- Mobile health data on lifestyle habits and environmental exposures
- Take part in
  - Standard baseline exam for vital signs
  - Medication assessment
  - Past medical history
  - Provide a blood sample

https://www.nih.gov/allofus-research-program/participation accessed on 03-03-2017

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org

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All of Us Research Program

- February 22, 2017
- Dara Richardson-Heron, M.D.
- Named Chief Engagement Officer
- https://www.nih.gov/research-training/allofus-research-program
- Any one can sign up to receive regular updates and newsletters from the program

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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National Institute on Minority Health and Health Disparities

- Supports Transdisciplinary Collaborative Centers for Health Disparities Research Focused on Precision Medicine (U54)
  - Vanderbilt
  - Stanford (includes Lakota Sioux AIs)
  - University of Chicago
- "Stimulate research exploring the potential for precision medicine, in an effort to promote health equity and reduce health disparities."

Burhansstipanov & Bemis: GENA® excerpt
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A Moonshot to Cure Cancer

"For the loved ones we've all lost, for the families that we can still save; let's make America the country that cures cancer once and for all. What do you think? Let's make it happen. And medical research is critical."

~ President Barack Obama, State of the Union Address, January 12, 2016

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A Moonshot to Cure Cancer

https://www.cancer.gov/research/key-initiatives/moonshot-cancer-initiative/blue-ribbon-panel

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H.R. 34, the 21st Century Cures Act

- President Obama signed the bill Dec. 13. 2016
- "We are now one step closer to ending cancer as we know it, unlocking cures for diseases like Alzheimer's, and helping people seeking treatment for opioid addiction finally get the help they need…

https://www.niehs.nih.gov/news/newsletter/2017/1/science-highlights/21st_century_cures/index.htm

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5 Ways **the Cures Act** Invests in President Obama's priorities in Science and Health:

1. **Finally funds the fight against the opioid epidemic** to provide the resources and treatment people need
2. **Supports the Vice President's Cancer Moonshot** to transform cancer research and accelerate discoveries
3. **Invests in the President's signature BRAIN research initiative** to tackle diseases like Alzheimer's
4. **Provides needed resources to expand the President's Precision Medicine Initiative** to find cures and better tailor treatments
5. **Includes important, bipartisan mental health policies** that address suicide prevention, serious mental illness and more

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NIH Tribal Health Research Office

- Established in 2015
- Located in the Division of Program Coordination, Planning, and Strategic Initiatives in the Office of the Director (OD), NIH

David R. Wilson, Ph.D.
Diné, Born for Tódích'íi'nii and born to Honágháahnii)
Director of the Tribal Health Research Office, NIH
Jan 22, 2017

Burhansstipanov & Bemis: GENA® excerpt
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Natives' Voices about Pros and Cons of AI/ANs taking part as per November 10, 2016 meeting (7:30-3 pm)

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University of Oklahoma AI/AN Precision Medicine Meeting
Nov 10, 2016

- ~100 participants
  - 20 from tribal programs
  - 70 from academic and research institutions
  - 10 from NIH
- Goal: to cultivate a dialogue between AI/AN community leaders and health researchers in the context of contemporary cancer research.

Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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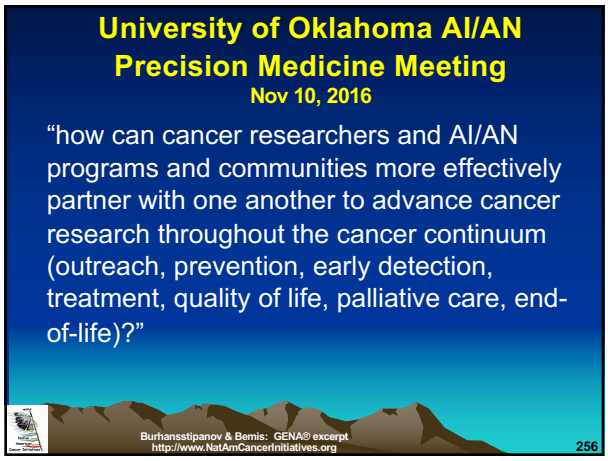
University of Oklahoma AI/AN
Precision Medicine Meeting
Nov 10, 2016
"how can cancer researchers and AI/AN programs and communities more effectively partner with one another to advance cancer research throughout the cancer continuum (outreach, prevention, early detection, treatment, quality of life, palliative care, end-of-life)?"
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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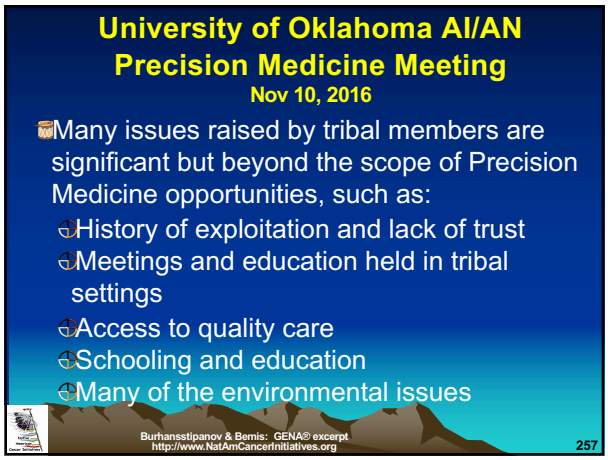
University of Oklahoma AI/AN
Precision Medicine Meeting
Nov 10, 2016
Many issues raised by tribal members are significant but beyond the scope of Precision Medicine opportunities, such as:
History of exploitation and lack of trust
Meetings and education held in tribal settings
Access to quality care
Schooling and education
Many of the environmental issues
Burhansstipanov & Bemis: GENA® excerpt
http://www.NatAmCancerInitiatives.org
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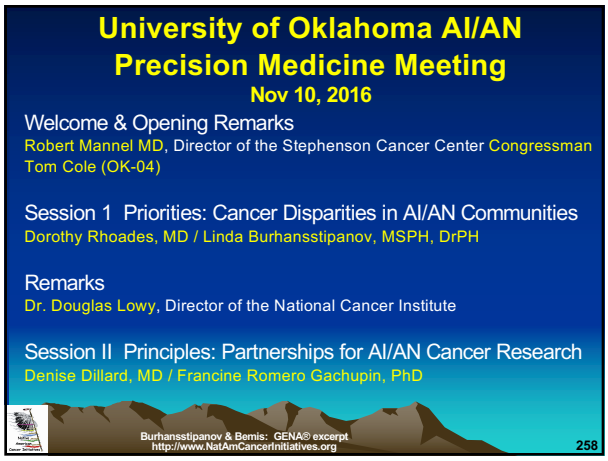
University of Oklahoma AI/AN
Precision Medicine Meeting
Nov 10, 2016
Welcome & Opening Remarks
Robert Mannel MD, Director of the Stephenson Cancer Center Congressman Tom Cole (OK-04)
Session 1 Priorities: Cancer Disparities in AI/AN Communities
Dorothy Rhoades, MD / Linda Burhansstipanov, MSPH, DrPH
Remarks
Dr. Douglas Lowy, Director of the National Cancer Institute
Session II Principles: Partnerships for AI/AN Cancer Research
Denise Dillard, MD / Francine Romero Gachupin, PhD
Burhansstipanov & Bemis: GENA® excerpt
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University of Oklahoma AI/AN Precision Medicine Meeting
Nov 9, 2016

Session III New Initiatives: What are the Challenges and Opportunities in Cancer Precision Medicine, and How It Can Inform the Needs of Our Communities to Reduce Cancer Risk and Overcome Cancer Disparities? Cheryl Willman, Md / Judith Kaur, Md

WRAP-UP AND CONCLUDING REMARKS

Burhansstipanov & Bemis: GENA® excerpt
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Everett Rhoades, M.D.
Kiowa Nation

First American Indian Director of the IHS (served 11 years from 1980s-1990s)

"A consent for future use of biospecimens or data cannot be informed and therefore is unethical on its face."

http://aianhealthcareers.org/page1/page12/page13/page13.html

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Overall concerns

- Trust
- Partnerships
- Short timelines
- Lack of understandable language or cultural *protocols* to discuss "All of Us" with community members
- Methodologies (CBPR preferred)
- BUT, many AI/ANs do not want to be left out either!

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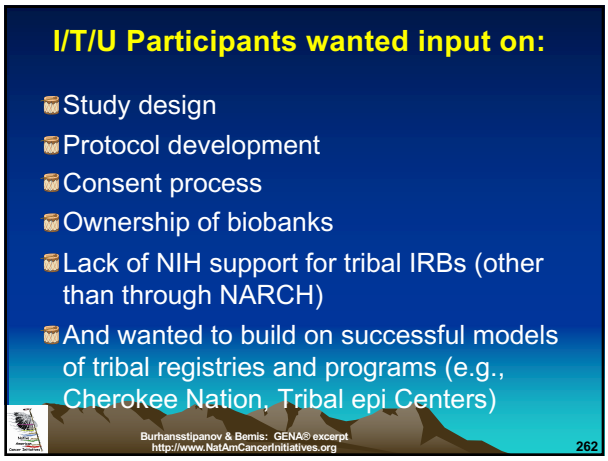
I/T/U Participants wanted input on:
Study design
Protocol development
Consent process
Ownership of biobanks
Lack of NIH support for tribal IRBs (other than through NARCH)
And wanted to build on successful models of tribal registries and programs (e.g., Cherokee Nation, Tribal epi Centers)
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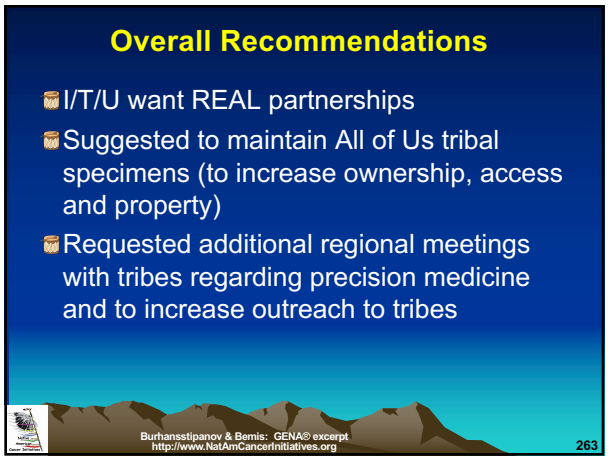
Overall Recommendations
I/T/U want REAL partnerships
Suggested to maintain All of Us tribal specimens (to increase ownership, access and property)
Requested additional regional meetings with tribes regarding precision medicine and to increase outreach to tribes
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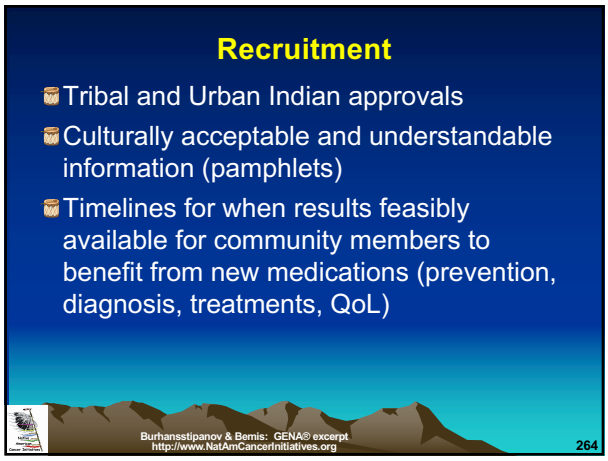
Recruitment
Tribal and Urban Indian approvals
Culturally acceptable and understandable information (pamphlets)
Timelines for when results feasibly available for community members to benefit from new medications (prevention, diagnosis, treatments, QoL)
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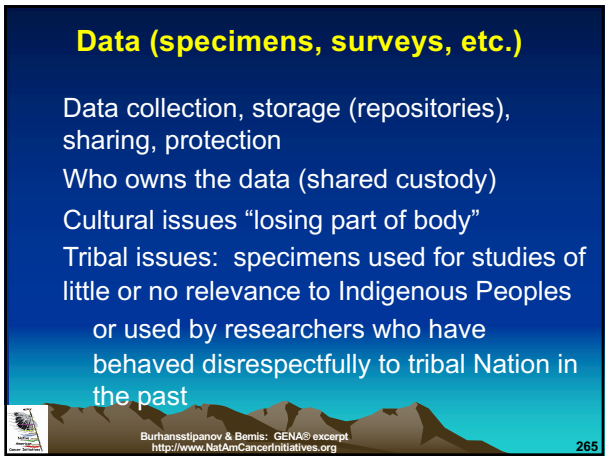
Data (specimens, surveys, etc.)
Data collection, storage (repositories), sharing, protection
Who owns the data (shared custody)
Cultural issues "losing part of body"
Tribal issues: specimens used for studies of little or no relevance to Indigenous Peoples
or used by researchers who have behaved disrespectfully to tribal Nation in the past
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Priorities for Research Focus
Historical trauma and relationship to DNA
Environmental issues related to illnesses and chronic conditions
Prevention of diseases of highest priorities to AI/ANs (cancer, diabetes, obesity)
Relationships between traditional Indian medicine and western medicines (respect)
Clinical trials addressing access and biomarkers
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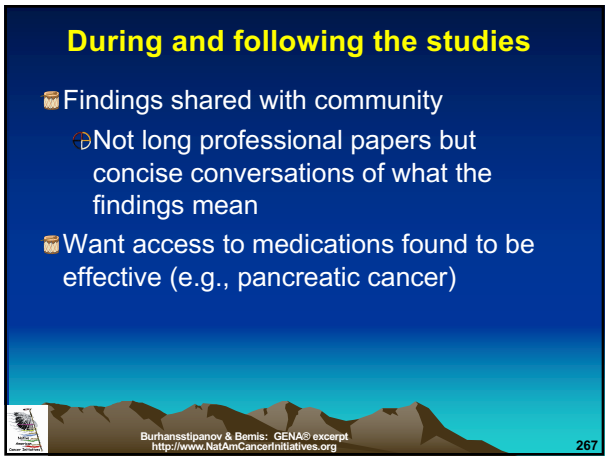
During and following the studies
Findings shared with community
Not long professional papers but concise conversations of what the findings mean
Want access to medications found to be effective (e.g., pancreatic cancer)
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Thank you for taking your time to take part in this workshop!

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