



The Biology of Aging

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*Presented to Science Central
Lunch with a Scientist Program*

What Do I do at IPFW?

- Immunologist- What is this??
- Teaching
- Advising
- Research
- Sports
- Committee member

Involvement with Students

- Advising
- Teaching
- Research
- Clubs
 - Pre-Med Club
- Sports
 - FAR (NCAA)
 - Involvement in intramurals
- Community
 - Swimming

Teaching

- **Variety of classes**
 - Immunology
 - Cancer Biology
 - Virology
 - Microbiology (Nursing)
 - Biology of Aging (Gen Ed & Research interests)
 - Freshman Success classes
- **Service Committees**
 - **Steering Committee for Aging and the Aged**
 - Issues- the senior population on campus

Research Interests

- **Immunosenescence**
 - Understanding how immune system “ages”
 - Understanding how to “delay” these aging changes
 - Understanding how to promote an increase in the **quality** of life as one ages (not necessarily how to extend life)
- **Regulation of tumor growth**
 - Associated with immune response

What is Biological Aging??

- What physical changes occur?
- How old is OLD?
 - Chronological age versus physical age
- What mental changes occur?

What is Biological Aging?

Morphological vs chronological

- How we look?

- Hair

- Loss
- Gray

- Skin

- Wrinkles
- Skin spots

- Stature

- Stooping
- Getting shorter
- osteoporosis

- Changes

- Eyes

- Hearing

- Reflexes

- Memory

- Aches and Pains

- Diseases

- Susceptibility

- Alzheimers (1° genetic but life style important too)

When does Aging Begin?

- **Kids vs Adults**
 - Depends upon who you ask and when you ask
 - Depends upon how you feel at the time you are asked
 - When did I get OLD??
- **Reality**
 - Slow, progressive changes that you are never really aware of
 - Sexual maturity
 - Reproductive life span
- **Who is that in the mirror?**

- 122 years old



Jeanne Calment



43



40



41



64



61

- 37 years old



- 49 years old



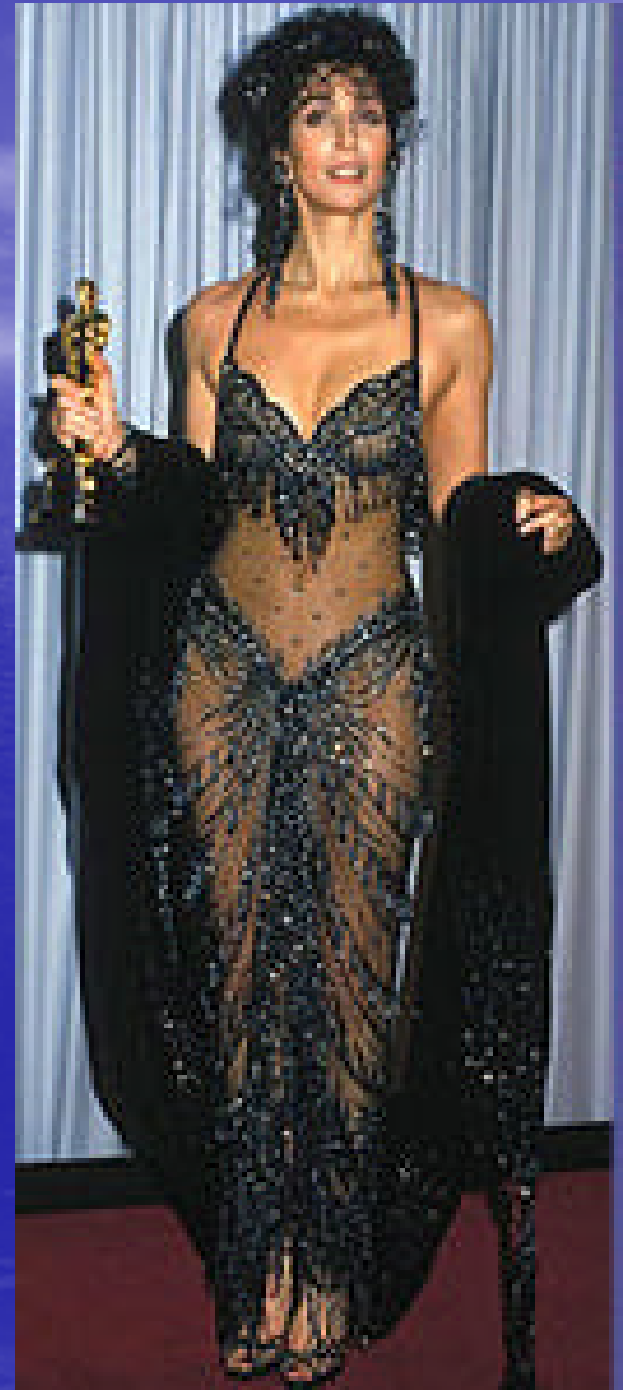
- 115 years old



- 128 years old



59 years old



How is Aging Studied?

- Can we use humans to study aging?
- Need model systems to allow researcher to study process
 - Short life span
 - **Fruit Flies**
 - **Worms**
 - **Rodents**
 - Easily manipulated and controlled
 - **Diet**
 - **Environment**
 - Genetically Identical
 - **Inbred animals**





Definitions

- ◆ **life span**--- Longest time that species is capable of living (110 years for humans)
 - ◆ Even if all disease eradicated
 - ◆ Coronary
 - ◆ cancer
- ◆ **life expectancy**--- Average time that species lives (72-76 years for humans)

Theories of Aging

- **1. Programmed Theory of Aging**
 - Cell death is programmed (telomerase)
- **2. Mutation Theory of Aging**
 - Mutations change function of proteins
- **3. Autoimmune Theory of Aging**
 - Immune system loses effectiveness
- **4. Free-Radical Theory**
 - Take anti-oxidants
- **5. DNA Repair Mechanisms**
 - Repair processes decrease with age

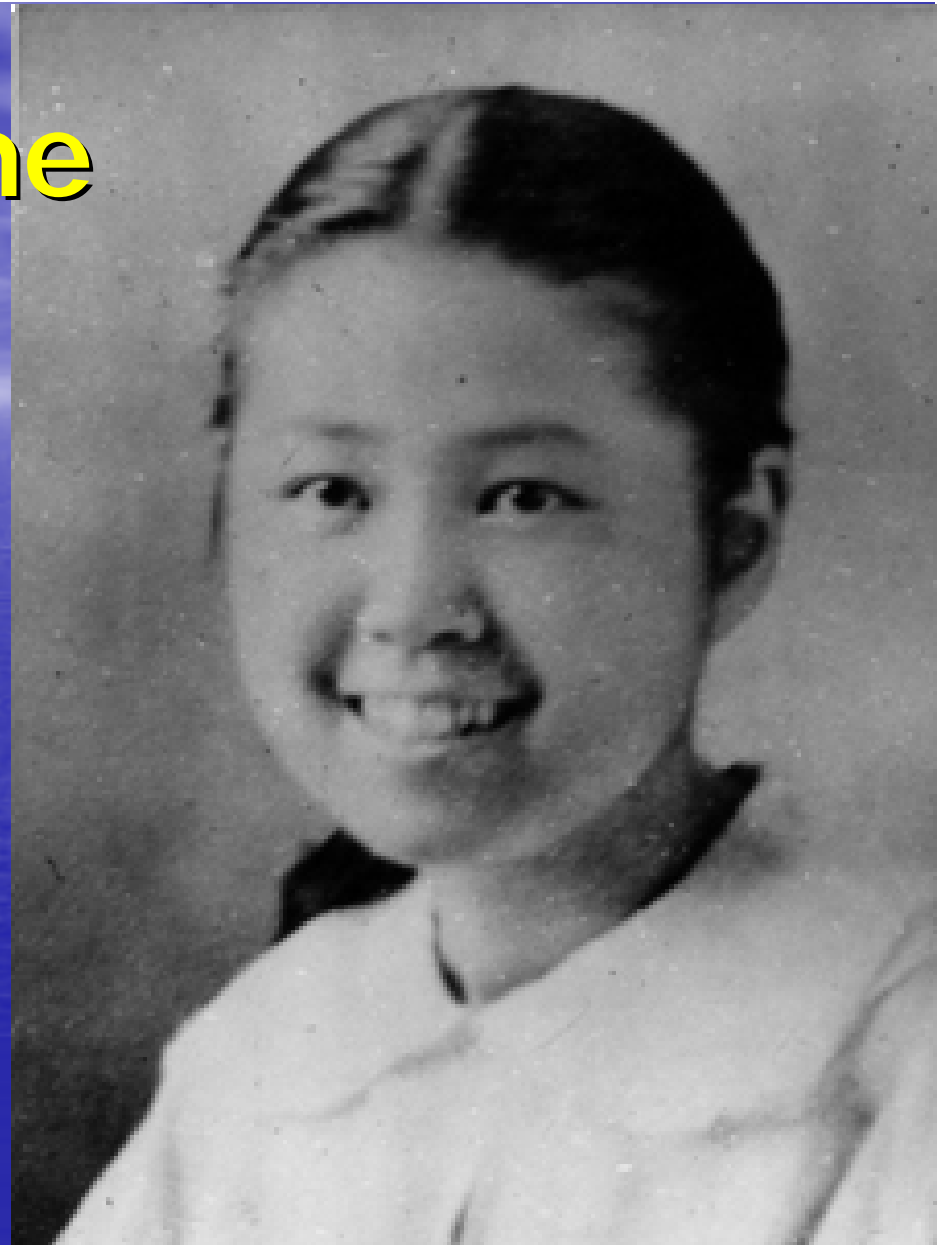
Genes

- Aging genes found
- Women live longer than men (genes, hormones)
- If you want to live a long and healthy life choose your parents wisely

Progeria



Werner syndrome



WS patient age 15 yrs

My Research

- Using rodent model (2 month → 24 month old animals)
- Examination of T and B lymphocytes isolated from spleen
- Look for alterations in signal pathways that may explain the decrease in immune response in aged animals
 - Decrease IL-2 levels and enzyme activity levels

My Research

- Use of strategies to “delay” age-dependent alterations of immune response
 - Dietary restriction (caloric restriction)- up to 70% restricted [works in lab animals fed *ad lib*]
 - Berry extracts
 - Elderberry/Chokeberry/Bilberry products
 - Put into culture with spleen cells from young and old animals and looked for T and B lymphocyte growth (proliferation) and for cytokine production (IL-2 and interferon)

My Research- Findings

- Found that these extracts stimulated cells from older animals more than cells from younger animals
- Found that the extracts stimulate cytokine production more in older animals
- Found that while stimulating immune cell function, these extracts INHIBIT tumor cell growth ! (double edged sword)

My Research- Future

- Feed / Inject extracts into animals and examine resistance to viral infection and tumor cell growth *in vivo*
- Understand the pathways involved in these responses
 - Signal transduction and enzyme activities and gene responses
 - Tumor cell killing

What can we do about aging?

Is College Really Worth the Money?

rd.com
Reader's Digest



The New Pill That Can End Aging
PAGE 70

Faith Hill & 12 Stars
Country Music Takes Over
PAGE 88



Stalked!
Amazing Animal Attacks
PAGE 162

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Strategies for Successful Aging

- Eat well
 - Low cholesterol
 - Avoid red meat
 - High fiber diets
 - Vitamins (A and C and E)- antioxidants
 - Calcium
 - EAT LOTS OF FRUITS AND BERRY PRODUCTS

Strategies for Successful Aging

- Exercise
 - Low impact exercise
 - Swimming
 - Walking
 - Never too late to start

Strategies for Successful Aging

- Keep Mentally Active * * * *
 - Stay active in family activities
 - Stay active in community activities
 - Educate yourselves – educated people live longer
 - Read
 - Crossword puzzles

Strategies for Successful Aging

- **Living Environment**
 - Keep out of sun
 - Non-polluted environment
 - **Air and water (is this possible??)**
 - Live in a stress-free environment
 - **Stress hormones decrease immune function and shorten life expectancy**

- I want to thank my wife and daughter for helping me to continue working at something that I really enjoy (teaching and research)
- I want to thank my dog (Shannon) a Sheltie, who is 16 years + 8 months old!

Questions????



Cartoons

The background of the slide is a blue gradient. The top half shows a lighter blue sky with wispy white clouds. A horizontal line represents the horizon. The bottom half shows a darker blue surface, likely water, with a reflection of the sky and clouds above.

Jerry Scott & Jim Borgman

I CAN'T GET THE VCR TO WORK!

THAT'S BECAUSE YOU'RE USING THE WRONG REMOTE, DAD.

AND YOU DIDN'T SET THE TV TO "VCR 1"

AND YOU DON'T HAVE IT TUNED TO CHANNEL 3

AND YOU DIDN'T HIT "INPUT 1"

AND YOU HAD THE VCR ON "PAUSE" INSTEAD OF "PLAY"

AT LEAST YOU WERE IN THE RIGHT ROOM.

SCOTT AND BORGMAN
1123

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- Because that's all you can remember anyway

HAPPY BIRTHDAY!

As we get older, we still
eagerly anticipate
Happy Hour.



- Only now it's called "Nap Time"

HAPPY BIRTHDAY! YOU KNOW YOU'RE
GETTING OLDER WHEN YOU CLOSE
YOUR EYES TO MAKE A WISH...

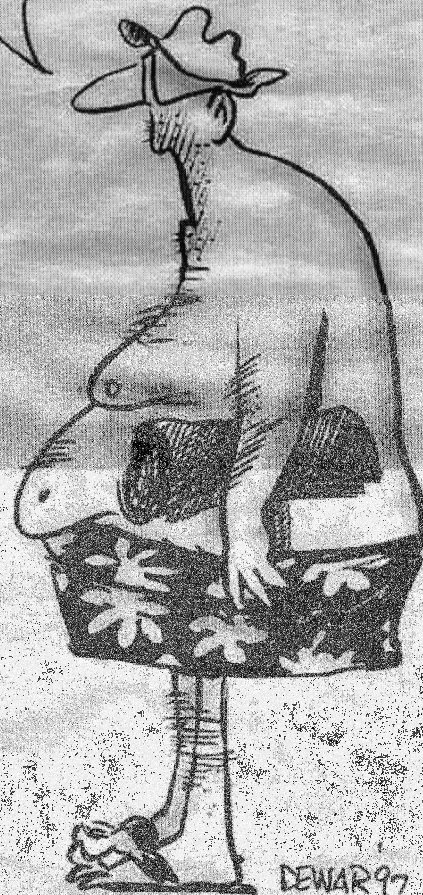
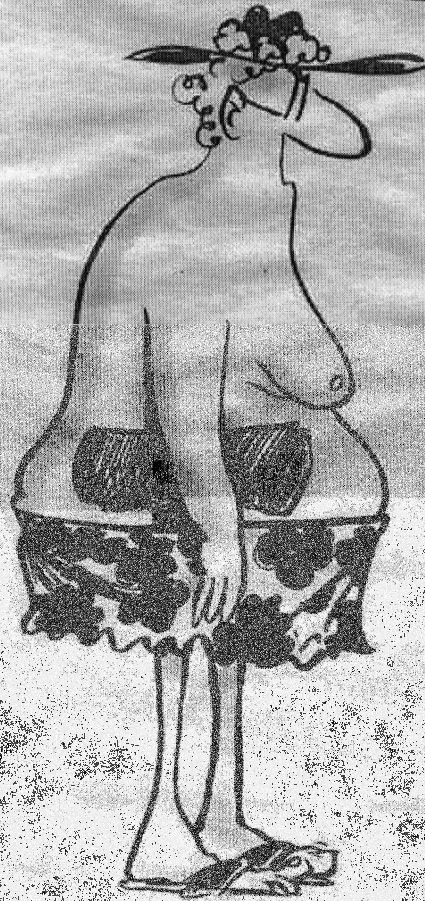


- ... and when you open them, the party's been over for hours

- Hope you all age well !!

Thank you !!

GOOD LORD, ETHEL...
YOU CAN'T APPEAR
IN PUBLIC
LIKE THAT!



DEWAR 97
OTTAWA
SUN