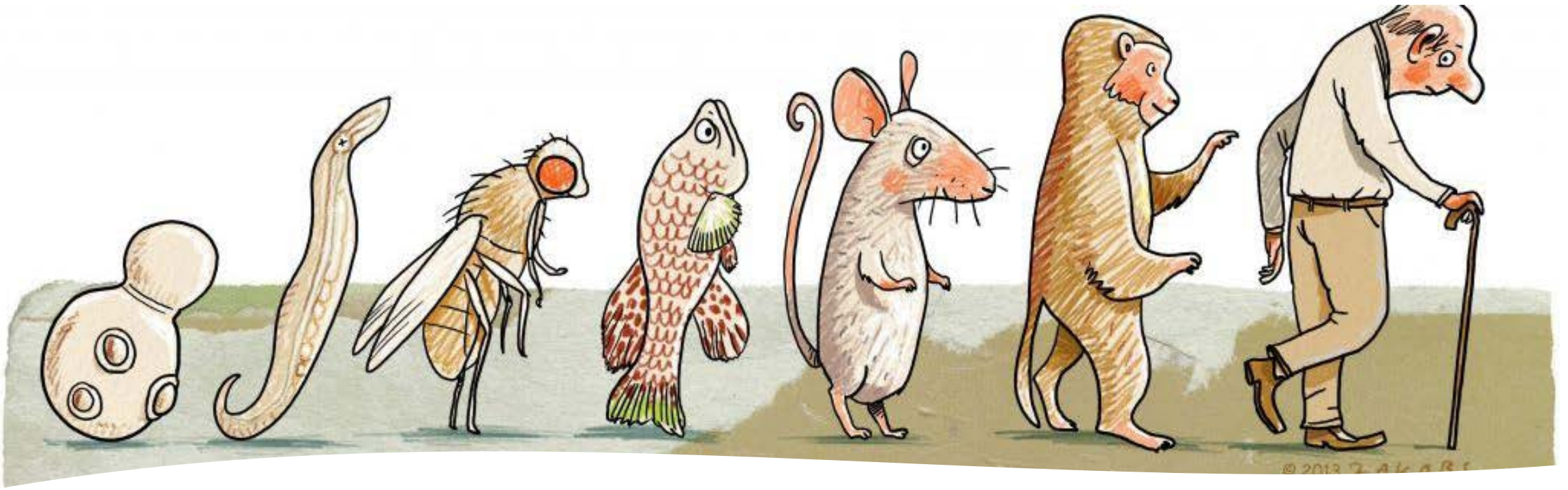




Caring for Geriatric Lab Animals

Julie Mattison, Ph.D., Staff Scientist/Facility Head, IRP
NIA Nonhuman Primate Core



The National Institute on Aging Nonhuman Primate Core

- Growing demand for translational models
- Support the research goals of intramural investigators
- Rhesus monkeys available for collaborative research projects
- Extensive tissue bank
- Unique resource & opportunities

Aging Population

Demographic evolution

Between 2015 and 2050, **the proportion of people aged 60 and over** in the world's population **will almost double**, from 12% to 22%.



All countries face major challenges in **preparing their health and social systems** to address this demographic shift.



By 2020, the number of **people aged 60 and over** will **exceed** the number of children under five.



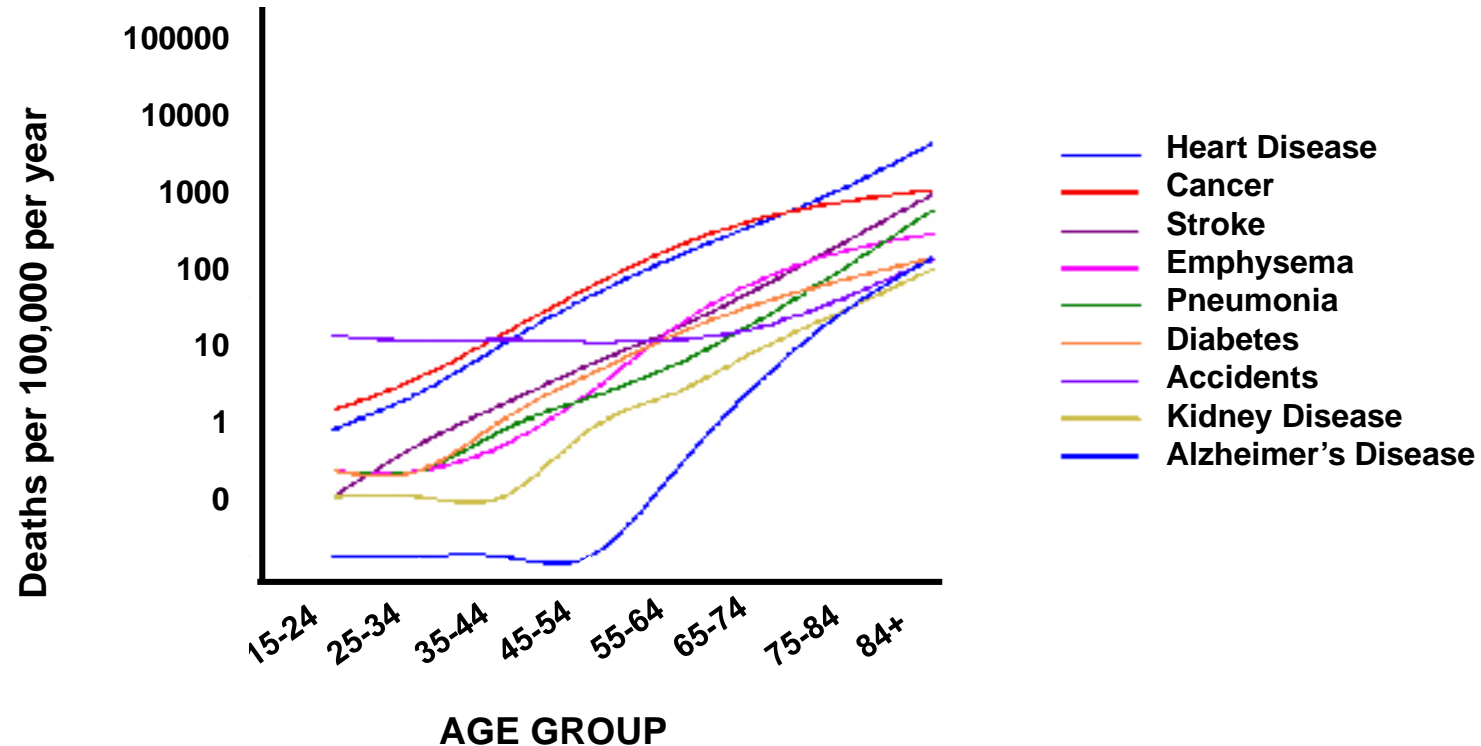
The population is aging much faster than in the past.

The overall average cost of aging-related medical care is **expected to increase by 41%** between 2000 and 2050



36% in developing countries and **48%** in developed countries.
(United Nations General Assembly)

Aging is the major risk factor for ALL chronic diseases



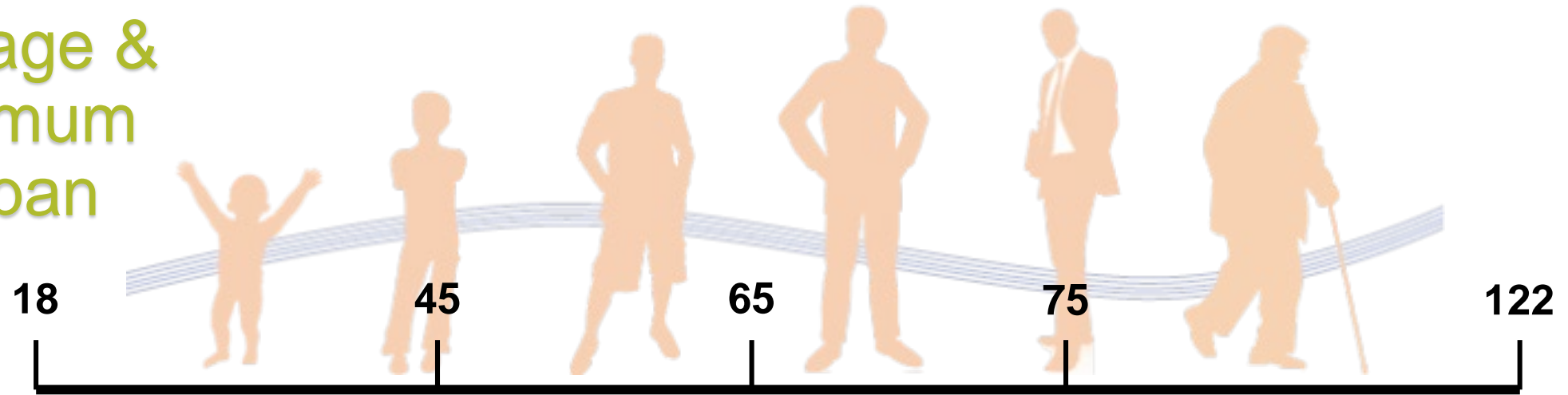
National Vital Statistics System





Aging is not a disease....

Average & Maximum Lifespan

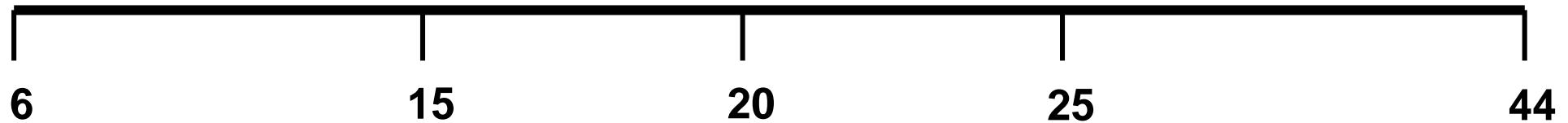


Young Adult

Middle-Aged

Old

Very Old



Challenges of Aging



Age-Related Diseases

- Arthritis
- Cancer
- Alzheimer's Disease
- Diabetes
- Heart Disease
- Depression
- Macular Degeneration
- Stroke
- Dementia
- Osteoporosis
- Vascular Disease
- Sarcopenia
- Atherosclerosis
- Kidney Disease
- Anemia
- Parkinson's Disease
- COPD

Age-Related Conditions

- Hearing loss
- Vision loss
- Loss of coordination
- Increased proportion of fat to muscle
- Loss of bone density
- Neurodegeneration
- Reduced immune response
- Sleep disorders
- Incontinence
- Lung disease
- Dental disease
- Obesity

Longitudinal Aging Studies

Unique Implications

NIA Calorie Restriction Project

- In its 32nd year
- Primary outcome measure is lifespan
- 7 animals > 40 years of age
- Oldest 44 years
- One employee has been working with the same animals for 27 years





Unique Challenges & Considerations



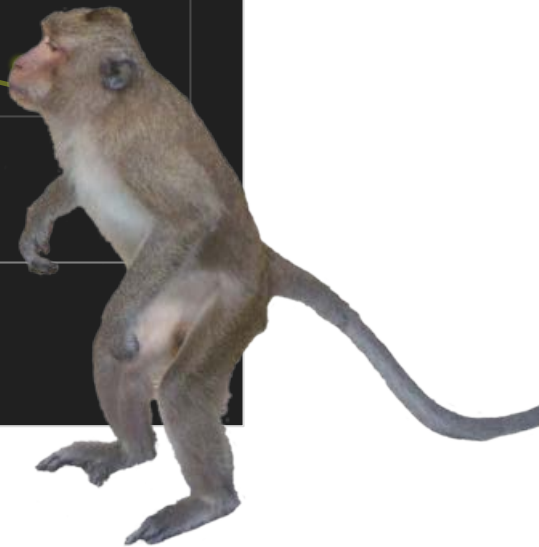
- Functional declines
 - Reduced movement
 - Kyphosis
- Decreased caloric intake
 - Weight loss
 - Sarcopenia, difficult BCS
- Age-related diseases
 - Heart disease
 - Cancer
 - Diabetes
 - Cataracts
- Often require:
 - Individualized care
 - Modified husbandry procedures
 - Creativity in treatment approaches
 - Patience
 - Consistency in
 - Staff
 - Care
 - Housing conditions
 - Routine husbandry





Experimental Endpoint Criteria

- Based on:
 - Overall condition
 - Blood work
 - Diagnostic tests
 - Body weight & condition
 - Appetite
 - Behavior
 - Activity
 - Potential for pain or distress, if untreated
 - Treatment response



Prognostic Indicators:

1. Blood work indicative of organ failure
2. Weight loss (~10%) from the onset of a medical condition and in conjunction with adverse health conditions
 - A gradual age-related weight loss is considered typical of natural aging
 - Rate of weight gain following illness is not a good indicator of outcome in aged monkeys
3. Body condition score of 1.5 out of 5, considering muscle condition
4. Prolonged anorexia, defined as failure to consume enough calories to maintain calculated resting metabolic rate
5. Hypothermia that is unresponsive to medical management
6. Uncorrectable surgical complications
7. Notable signs of severe pain or distress** that cannot be alleviated
8. Clinical signs refractory to treatment including diarrhea, vomiting, dehydration



****Signs of Pain or Distress**

Loud & persistent vocalizations, moaning, huddled position, glassy eyed, lack of grooming, restlessness, shaking, anorexia, teeth grinding, depressed attitude, lethargy, atypical behavior, peri-orbital edema, increased respiratory effort

Caretakers, Researchers , & Euthanasia Decisions

& Coping Strategies

- Euthanasia decisions are generally clinically based
- Not everyone sees old monkeys in the same way
- Group discussion regarding animal health, clinical assessment, & euthanasia decision
- End of study strategies:
 - One tech anesthetize, another administers euthanasia
 - Acknowledging that there are tasks some tech/caretakers don't like to perform
 - Pathology report, post-necropsy discussion
- Maximize the use of the animals
 - The animal serving many purposes
- Need ways to implement the tools & creativity

