The Problems of Aging
and
What Can Be Done to Retard Them

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OBJECTIVES

• Review some of the long standing, but still very pertinent concepts, related to Geriatric Medicine.

• Discuss the concept that aging is the common factor linking most of the serious chronic diseases that reduce the health span of adults.

• Review the potential value of intermittent fasting, and some medications, for improving health span.
Disease in Old Age
A Complication of Being Alive

• Represents a lifelong accumulation of intrinsic metabolic damage to body cells as a result of burning glucose and oxygen to make ATP.

• Common - 100,000 die daily from diseases of old age according to deGrey.

• Very Expensive economically for health care and in terms of human suffering.

• Incurable – unlike many extrinsic infectious diseases.
SPECIAL HEALTH PROBLEMS OF THE ELDERLY

- Loss of organ reserve
- Multiple chronic diseases
- Atypical presentations
- Rapid deterioration if untreated
- Need for rehabilitation
Age Groups of the Elderly

- **Young Elderly** – 65 to 74 years
  - unless there is an obvious major disease, they can be treated like the 50 to 64 age group

- **Oldest Elderly** – 85 years or greater
  - now the fastest growing age group in developed countries
  - Often have several diseases plus one or more of the Geriatric Giants
  - New concept of Gero-Geriatrics
Age Groups of Elderly (con’t.)

• **Middle Elderly** – 75 to 84 years
  – often quite heterogeneous with some being quite vigorous while others are frail.

• Lumping the 65 and older age group into one category is almost as ridiculous as lumping the 21 and younger into one category.
Prof. Bernard Isaacs: A giant in geriatrics
THE GERIATRIC GIANTS
(after Issacs)

- Intellectual Impairment
- Immobility
- Instability (falls)
- Incontinence
- Iatrogenesis
EFFECTS OF THE GERIATRIC GIANTS

• The giants make their victims dependent on others for care.

• When patients afflicted with the giants remain in their own home, there is a need for physically and emotionally demanding care provided by others.

• Admission to hospital or nursing home is often precipitated by an episode of acute illness such as pneumonia or a fracture.
• concept that suggests the developmental age of a normal child and adolescent approximates the functional ability of a person suffering from dementia as they go through various stages of deterioration (after Reisberg)
## Incidence of Dementia in the General Population

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; age 65</td>
<td>0.1%</td>
</tr>
<tr>
<td>65-74</td>
<td>3%</td>
</tr>
<tr>
<td>75-84</td>
<td>12-15%</td>
</tr>
<tr>
<td>85-89</td>
<td>30-50%</td>
</tr>
<tr>
<td>90</td>
<td>70% (Seattle Study)</td>
</tr>
<tr>
<td>100 or &gt;</td>
<td>80% (Tokyo Study)</td>
</tr>
</tbody>
</table>
The amygdala is key to recording emotionally charged memories, and the hippocampus is central to converting short-term memories to permanent ones.
The arterial aspect of the vascular system can be compared to a tree where the main trunk(s) can be blocked by atherosclerosis. However, like a tree the vascular system has numerous branches which can be damaged by the process of arteriolosclerosis. (The latter particularly applies to the brain of the hypertensive person).
Normal Blood Vessel:
- Adventitia
- External elastic membrane
- Media
- Internal elastic membrane
- Lamina propria
- Endothelium
- Lumen

Vascular Hypertrophy:
- Adventitia
- Enlarged media (smooth muscle)
- Small lumen

Vascular Hypertrophy is characterized by an increase in the size of the blood vessel walls, particularly in the media (smooth muscle layer), leading to a smaller lumen and reduced blood flow.
30 YEAR FOLLOW-UP
FRAMINGHAM STUDY

RATE PER 1000

WOMEN
MEN

AGE

45-54 55-64 65-74 75-84 85-94
Rate of death per 100,000 people per year for age related diseases, stratified by age group

Milman and Barzilai
CHARACTERISTICS OF FRAILTY

- Weight loss - >/ 10 lbs (unintentional)
- Low physical activity
- Exhausted feeling
- Slow gait speed
- Weak leg and/or grip strength
- 3 or more of the above indicates frailty (Fried)
- The Canadian authority on frailty is Ken Rockwood of Dalhousie
20 year old female

80 year old female
Waist measurement:
Study finds girth low-tech/high-value indicator of cholesterol problems
Effects of Insulin Resistance

• Decreased insulin action leading to the ravages of hyperglycemia

• High levels of insulin even with normoglycemia can lead to small vessel damage and/or increased risk of malignancy because of insulin growth factor effect
Energy intake > Energy expenditure

↑Fatty acid flux

Defects in adipocyte fatty acid metabolism

↑Fatty acid flux

Skeletal muscle

Liver

Ectopic lipid deposition

Defects in mitochondrial metabolism, biogenesis, or both, leading to decreased fat oxidation
20 year old female

80 year old female
Simple Ways of Retarding Cell Damage in the Aging Process

• Proper nutrition including various forms of fasting that affect the insulin/IGF axis and/or mTOR
Simple Ways of Retarding Cell Damage in the Aging Process

- Proper nutrition including various forms of fasting that affect the insulin/IGF axis and/or mTOR
- Regular exercise
EXERCISE TRAINING

- Biogenesis
- Fusion ↔ Fission
- Mitophagy

Addition of healthy mitochondria
Removal of damaged mitochondria

Enhanced metabolic function/performance
Simple Ways of Retarding Cell Damage in the Aging Process

- Proper nutrition including various forms of fasting that affect the insulin/IGF axis and/or mTOR
- Regular exercise
- Stress control – chronic corticosteroid production results in many of the characteristics of aging
Simple Ways of Retarding Cell Damage in the Aging Process

• Proper nutrition including various forms of fasting that affect the insulin/IGF axis and/or mTOR

• Regular exercise

• Stress control – chronic corticosteroid production results in many of the characteristics of aging

• Pharmacologic agents that mimic caloric restriction
  – Rapamycin
  – Resveratrol
  – Metformin (TAME study)
BRIGHT MINDS (D. Amen)

B  Blood Flow
R  Retirement/Aging
I  Inflammation
G  Genetics
H  Head Trauma
T  Toxins

M  Mental Health
I  Immunity/Infections
N  Neurohormone Deficiencies
D  Diabesity
S  Sleep
“How old would you be if you didn’t know how old you wuz?”
-Satchel Paige