

## PHYSIOLOGICAL CHANGES

## OLD AGE

Memory is short, and brain is dry.  
My Almond-tree (gray hairs) doth  
flourish now,  
And back, once straight, begins apace  
to bow.  
My grinders now are few, my sight doth  
fail  
My skin is wrinkled, and my cheeks are  
pale.  
No more rejoice, at musickes pleasant  
noyse.

*Anne Bradstreet (1612-1672)*

## Definition of Ageing

- Can be defined as a progressive, generalized impairment of function resulting in a loss of adaptive response to a stress and in a growing risk of age-associated disease (Kirkwood, 1996).

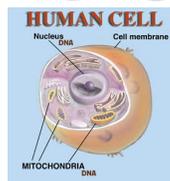
## Normal Characteristics of Ageing

- Changes in appearance
- Gradual reduction in height and weight loss, due to loss of muscle and bone mass
- Ageing is a universal process and biological programmed
- Ageing is a result of damage which accumulates over time

## Biological Aspects of Ageing

Changes that occur in ageing:

- --Changes affecting the cells
- --Changes affecting the tissues
- --Changes affecting organs
- --Changing affecting the whole body





## MAIN FACTORS



- Genetic Aspects
- Cell Damage
- Decline in Function
- Collagen Changes
- Thermoregulatory Mechanism
- Immune System

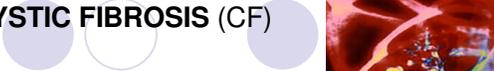
## Genetic Aspects



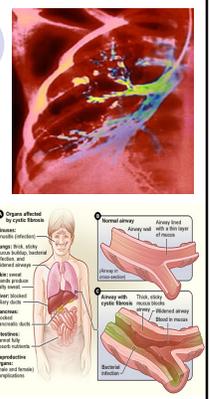
**Genes that promote early ageing such as tumour suppressor**

Some genes cause disease in early life and decrease longevity such as cystic fibrosis which predisposes to early death

## CYSTIC FIBROSIS (CF)



CF IS AN INHERITED DISEASE OF MUCUS AND SWEAT GLANDS THAT AFFECTS MOSTLY LUNGS, PANCREAS, LIVER, INTESTINES, AND SINUSES. MUCUS IS WATERY. IT KEEPS THE LININGS OF CERTAIN ORGANS MOIST AND PREVENTS THEM FROM DRYING OUT OR GETTING INFECTED. BUT IN CF, AN ABNORMAL GENE CAUSES MUCUS TO BECOME THICK AND STICKY.



## Genes that cause age related disease



- Alzheimer's Disease
- Hypercholesterolemia
- Coronary Heart disease
- Cerebral – Vascular Accident
- Diabetes

## Cell Damage



Cell Damage Is Caused by Free Radicals

Free Radicals are naturally-occurring metabolic by-products and strong oxidizing agents

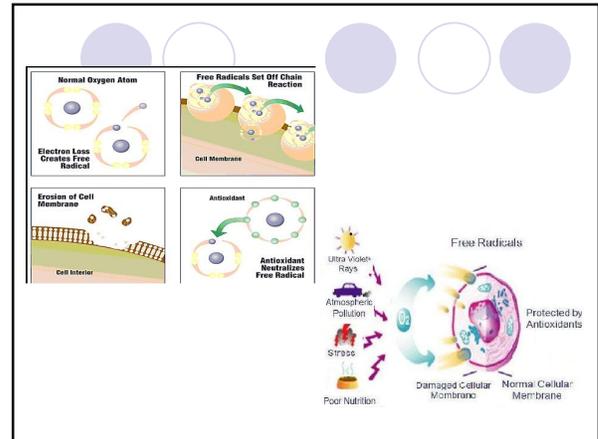
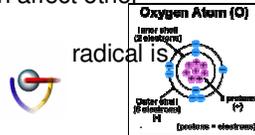
Free Radicals are:

- Highly reactive
- Cytotoxic
- Very unstable and short-lasting

## Free Radical Formation and Damage

[Free – unpaired electron (s)]

1. Generally from oxygen obtaining one or more unpaired electron, forming free radical.
2. Then affects cells or lipids around it.
3. In return, those cells or lipids become a free radical which then affect other neighboring cells.
4. This continues until it is stopped.



## Free Radicals

- Free Radicals are also:
- Generated by carcinogens, mutagens, radiation
- Contained in foods, additives, tobacco and environmental pollutants

## Free Radicals In Ageing

- Free Radicals may damage DNA
- Free Radicals oxidise fatty acids, main constituents of cell membranes
- Beneficial effects in phagocytosis and immune system

## Protective Mechanisms against Free Radicals

- Enzymes such as catalase, peroxidase inactivate free radicals
- Substances that remove free radicals:
  - Metalloproteins: Iron, Copper, Selenium
  - Antioxidants: Vitamins C, E, Beta carotene
  - Metabolites: Uric Acid

## Remember

Ageing has been attributed to increased cell damage caused by free radicals  
In ageing, the protective mechanisms against free radicals are decreased

## Decline in Function

- Ageing process itself
- Disease
- Disuse

Ageing affects many systems

- Cardiovascular
- Respiratory
- Renal and Urinary
- Gastro-intestinal
- Skeletal
- Nervous
- Skin

## Changes with Collagen

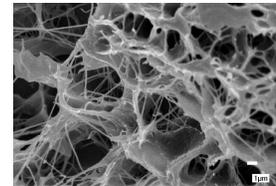
Collagen fibres are widespread in the body.

They undergo continuous change with age.

Increased cross-linkage causes collagen fibres to become stiffer, less flexible and more fragile

This effect is most marked in:

- The lungs which become stiffer and less elastic
- The skin becomes creased and less pliable



## Ageing of Elastin

**Ageing of Elastin** results in reduced elasticity and thickening of elastic fibres

The lungs loses elastic recoil, reduces compliance and decreases reserves

Elasticity is lost in arteries. They become thicker and calcified.



## Thermoregulatory Mechanisms

In normal environmental situation, voluntary remedial action is taken to the perception of heat and cold.

1. Feeling Hot:

Light clothing

Drink cold water

Swimming

Switch on fan or air conditioner

## Thermoregulatory Mechanisms

2. Feeling Cold:
- Wear more clothes
  - Take hot drinks
  - Get active
  - Switch on heater

## Thermoregulatory Mechanisms

In Old Persons

- Thermoregulatory mechanisms are not usually deranged
- Perception of cold, heat and thirst are decreased
- Tolerance may be increased
- There is a tendency of lethargy. This prevents remedial action to be taken
- There may be fear of catching cold or using appliances
- Poverty may contribute to lack of use of appliances.

## However

- Elderly persons are very sensitive to very cold and very hot weather

## Therefore

- Under low ambient temperature
  - Warm clothing
  - Ventilated room
  - Avoid draughts
  - Switch on heater
  - Given hot food and drink
- Under high ambient temperature
  - Light clothing
  - Intermittent cool drinks
  - Ventilated room
  - Switch on fan/air conditioner

## Immune System

- Ageing attributes to abnormal function of the immune system
- The Thymus gland atrophy with age (source of T-Lymphocytes)
- B-Lymphocytes slightly reduced

## Avoid Relapses

- **Immunization against influenza is effective in the elderly- it is recommended**
- **Avoid cross infection**
- **Healthy diet**
- **Avoid Sedentary Lifestyle**
- **Continue program of weight-bearing exercises**
- **Ensure adequate calcium intake.**

## Conclusions

- Healthy diet: Low fat high fibre diet is highly recommended
- Optimal Nutrition is Important and Necessary for Health. It contributes to a decent Quality of Life in the OLDER Adults



- Exercise if started early enough can diminish some of the effects of ageing.
- Exercise can prevent or diminish the long-term effects of various diseases
  - Atherosclerosis
  - Hypertension
  - Coronary Heart Disease
  - Diabetes
- Healthy diet and exercise are the main criteria of a healthy lifestyle



## MAINTAINING A BALANCED DIET AND MODERATE EXERCISE SHOULD BE LIFELONG



## Steps to Healthy Aging

- MONITORING YOUR OWN HEALTH IS A GOOD ADAGE
- Chronic diseases like diabetes, high BP, obesity, etc cause most problems in old age
- Most chronic diseases can be delayed or severity reduced
- Adopt healthy lifestyle behaviors from childhood
- Keep weight at BMI < 26
- Be physically active within limitations
- Eat nutritious foods
- Eat sparingly

## Steps to Healthy Aging

- Avoid misuse of alcohol/drugs; abstinence best
- Avoid smoking
- Make a social network
- Save for care in old age
- Regular screening for cancer/diabetes, high BP etc
- Regular medical examinations/dental checks

## Good Health to You!

