



IMMUNOLOGY OF THE AGED

MAINTAINING HEALTHY IMMUNITY IN THE
LATER STAGES OF LIFE

A PRESENTATION BY

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Immunology



INTRODUCTION

- **A long human life span, of eighty years and above, is becoming increasingly attainable**
- **Globally the number of persons aged >60 is expected to move from 901 million in 2015 to 2.1 billion in 2050, and that of persons aged >80 is projected to increase from 125 million in 2015 to 434 million in 2050**
- **However, an equally long health span, devoid of disease and diminished vigor, lags behind the gains in lifespan**
- **The remarkable increase in lifespan is due to major advances in preventing, delaying or curing individual pathologies such as infections, hypertension, type 2 diabetes, and even some forms of cancer**
- **Definitely, ageing processes drive the multiple pathologies and loss of function typical of older individuals**



IMMUNITY AND AGEING

- **Healthy Immunity:** The immune system is your body's first-line defense against invaders like germs. It protects you from getting sick and promotes healing when you are unwell or injured
- Numerous studies have shown that immunological changes occur with age
- Ageing is a time-dependent process whereby one loses the ability to cope with environmental stress and change as easily as one could; associated with a loss of physiological adaptability
- Old people are more susceptible to certain infections than the general population due to various intrinsic and extrinsic factors
- Immune dysfunction in the aged is an intrinsic factor which plays a prominent role in the impaired resistance against infection. Changes in the cellular and humoral immune components are involved



IMMUNITY AND AGEING

- Increased incidence of autoimmune responses during ageing may play a part in some chronic diseases associated with old age
- Circulating immune complexes (CIC) levels are elevated in old age, suggesting a role for IC-mediated damage in age-related diseases
- Presence of low levels of chronic inflammation, **inflammaging**, is found in most major age-related diseases.
- **Inflammaging** is associated with low level persistent infiltration of primarily cells of the innate immune system, and elevated levels of many pro-inflammatory cytokines and chemokines, both within the tissue microenvironment and the systemic milieu.
- Lean elderly subjects who exercise regularly have fewer senescent T cells and lower circulating pro-inflammatory cytokines



IMMUNOPATHOGENESIS OF AGEING

- Immune dysfunctions of the aged include immunodeficiency, autoimmunity and idiopathic paraproteinaemia; some lack the dysfunctions but they occur in combinations in others. Benign paraproteinaemia increases in frequency on ageing
- Increased prevalence of CIC in old people may result from a persistent formation of autoantibody-autoantigen complexes. Immune complex disease is more likely to occur in chronic than in acute infections, and in those who produce antibodies with poor affinity.
- Autoimmunity is a chronic condition and elderly subjects produce antibodies with poor antigen avidity usually due to their associated state of immunodepression.



IMMUNOPATHOGENESIS OF AGEING

- **Increased levels of CIC and autoantibodies in the healthy elderly suggest that they may be related in the pathogenesis of the diseases of old age**
- **Autoantibodies in ageing may cause slowly progressive tissue damage, thus contributing to physical ageing. Immune Complexes are also known to suppress immune responses.**



MAINTAINING HEALTHY IMMUNITY LATER IN LIFE

- **Healthy routines enhance your immunity. A healthy lifestyle offers many benefits, including helping to prevent:**
 - heart disease;
 - type 2 diabetes;
 - obesity;
 - and other chronic diseases.
- **Ways to strengthen the immune system include:**
- **I. Eating well:** Emphasising plenty of fruits and vegetables, lean protein, whole grains, and fat-free or low-fat milk and milk products; limiting saturated fats, cholesterol, salt, and added sugars. Evidence indicate immunological advantage in being lean and slightly hungry rather than obese and satiated.



MAINTAINING HEALTHY IMMUNITY LATER IN LIFE

- 2. Getting enough sleep: Sleep deprivation can reduce the effectiveness of the immune system. During sleep, it releases protective cytokines to deal with infection, inflammation or stress**
- 3. Not smoking: Chemicals in cigarettes damage lung tissue and suppresses the immune response. Smokers are at a higher risk of respiratory illnesses such as flu, bronchitis, and pneumonia.**
- 4. Avoiding excessive alcohol use: Overtime, excessive alcohol use can weaken the immune system.**
- 5. Being physically active: Combined with eating well, physical activity can help maintain a healthy weight. Exercise has an anti-inflammatory effect on the body. Regular physical activity is associated with better immune function. At least 150 minutes of moderately intense activity every week is recommended.**



MAINTAINING HEALTHY IMMUNITY LATER IN LIFE

6. Maintaining a healthy weight: Obesity, a body mass index (BMI) of 30 or more in adults, impairs immune functions; and may lower vaccine effectiveness.



OTHER HEALTHY LIVING STRATEGIES TO STRENGTHEN THE IMMUNE SYSTEM

1. **Washing hands**: Make hand-washing a habit, e.g., before cooking and eating; after using the toilet, coughing or sneezing or blowing your nose; on returning from every outing; and before and after caring for the sick.
2. **Reducing stress levels**: Lowered ability to cope with environmental stress is seen in the aged. Chronic stress lowers the immune response. Under stress the body produces more cortisol which limits the immune system.
3. **Connecting with others**: Senior isolation may lead to the feeling of loneliness and depression which can compromise immune health.
4. **Staying hydrated**: Adequate hydration boosts immune function as it helps in absorption of nutrients and minerals, and in flushing out body waste. At least 8-9 glasses of fluid a day is recommended to stay hydrated.



OTHER HEALTHY LIVING STRATEGIES TO STRENGTHEN THE IMMUNE SYSTEM

5. Spending time outdoor: Vitamin D is obtained from moderate sun exposure. Not many food sources are rich in Vitamin D which strengthens the immune system, thus preventing inflammation.

6. Getting vaccinated: Vaccines build immunity against specific infections.

Vaccine recommendation:

- Recommendations for the aged vary among countries and include vaccination against influenza, *Streptococcus pneumoniae* and *Herpes zoster*; and booster vaccinations against tetanus and diphtheria, and in some cases pertussis and polio.
- Strategies to improve vaccine-elicited antibody responses in the elderly include the use of adjuvant.
- Recently, a 13-valent conjugate vaccine was licensed for adults, with clinical efficacy of 45.6% for pneumonia and 75.0% for invasive disease.



SUMMARY

Immunity in the aged can be enhanced by healthy-living strategies:

- **Eating a diet rich in fruits and vegetables**
- **Exercising regularly**
- **Maintaining a healthy weight**
- **Sleeping adequately**
- **Not smoking**
- **Quitting alcohol or drinking only in moderation**
- **Washing your hands frequently**
- **Minimising stress**
- **Receiving recommended vaccines**



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- **Thank you for your attention.**