

## AGING

- Aging is a biological process that affects most cells, organisms and species. Human aging is associated with increased susceptibility to a variety of chronic diseases, including cardiovascular disease, Type 2 diabetes, neurological diseases and cancer.
- Aging can be defined as a progressive decline in the ability of the organism to resist stress, damage, and disease.
- The accelerated senescent features induced by chronic stress include higher oxidative stress, reduced telomere length, chronic glucocorticoid exposure, thymic involution, changes in cellular trafficking, reduced cell-mediated immunity, steroid resistance, and chronic low-grade inflammation.

• Endocrine. 2006 Feb; [Ann N Y Acad Sci](#). 2009 Feb;1153:139-52

## Oxidative Stress

- Oxidative stress has a central role in aging and in several age-linked diseases such as neurodegenerative diseases, diabetes and cancer.
- Impaired mitochondrial oxidative phosphorylation has been reported in several aging tissues.

• [J Proteomics](#). 2011 Jun 6

## Toxic Metals

- The three elements of mercury, arsenic and cadmium which accumulate age-dependently in adults, may play a role in aging process and higher burden with them may lead to acceleration of aging.

• [Curr Aging Sci](#). 2011 Aug 12

## Telomere

- Telomere biology has recently emerged as an important player in the aging and disease process.
- Telomere shortening is not the only factor that dictates cell fates. The presence of telomerase itself is another critical factor.
- Telomeres are highly sensitive to damage by oxidative stress.
- The contribution to the telomere loss by oxidative DNA damage is believed to be greater than by the 'end-replication problem'.
- Prolonged oxidative damage also dramatically decreases telomerase activity

• [Clin Sci \(Lond\)](#). 2011 May 1

## Telomere

- Addition of antioxidants decelerates telomere shortening in cultured cells and prolongs telomerase activity.
- A higher level of oxidized LDL (low-density lipoprotein) is associated with shorter leucocyte telomere length and increased stiffness of the carotid artery.
- Inflammation is also thought to contribute to telomere attrition in cells of the immune system by promoting leucocyte turnover.
- Psychological and life stress have been shown to be significantly associated with higher levels of oxidative stress, lower telomerase activity and shorter leucocyte telomere lengths.
- Physical activity has been positively associated with telomere length

• [Clin Sci \(Lond\)](#). 2011 May 1

## Telomere

- Individuals in the lowest quartile of DHA+EPA experienced the fastest telomere shortening.
- Female smokers tend to have shorter telomeres, and smoking reduces telomere length in a dose-dependent manner

## TELOMERE AND MEDITATION

- *Meditation may have salutary effects on telomere length by reducing cognitive stress and stress arousal and increasing positive states of mind and hormonal factors that may promote telomere maintenance.*
- *Telomeres are the protective caps at the ends of chromosomes.*
- *Telomere length has now been linked to chronic stress exposure and depression*

Ann N Y Acad Sci. 2009 Aug.

## TELOMERE

- Higher vitamin D concentrations, which are easily modifiable through nutritional supplementation, are associated with longer LTL, which underscores the potentially beneficial effects of this hormone on aging and age-related diseases.
- [J Physiol](#). 2011 Aug 1

## Telomere

- The ends of chromosomes are composed of a short repeat sequence and associated proteins that together form a cap, called a telomere.
- The loss of telomeric repeat sequences or deficiencies in telomeric proteins can result in chromosome fusion and lead to chromosome instability.
- Telomere loss as an important mechanism for the chromosome instability contributing to human cancer.

• [Mutat Res](#). 2011 May 7

## Telomere dysfunction

- Telomere dysfunction, a biomarker of aging, is determined by the load of short telomeres, rather than by the mean telomere length.
- Depressive episode-related stress may accelerate telomere shortening and aging.
- Bipolar disorder is associated with an increased load of short telomeres.

• [J Affect Disord.](#) 2011 Aug 29

## Telomerase Activity

- Low telomerase activity was associated with the major risk factors for CVD -smoking, poor lipid profile, high systolic blood pressure, high fasting glucose, greater abdominal adiposity.
- Low telomerase activity in leukocytes was associated with exaggerated autonomic reactivity to acute mental stress and elevated nocturnal epinephrine.
- Low leukocyte telomerase constitutes an early marker of CVD risk, possibly preceding shortened telomeres, that results in part from chronic stress arousal

• [Psychoneuroendocrinology.](#) 2006 Apr 31

## Telomere Shortening

- The progressive increase of inflammation and/or oxidative stress plays a direct role in telomere shortening.
- Telomere shortening increases with the duration of diabetes.
- Rise in insulin resistance is associated with escalated telomere attrition.
- Estrogen can influence the attrition of telomeres by diverse mechanisms.

• [Aging Male.](#) 2011 Aug 9; [Circulation.](#) 2009 May 3; [Jama Med.](#) 2009 Aug 3

## Vitamin D

- Exercise, specifically aerobic exercise, may attenuate cognitive impairment and reduce dementia risk.
- High plasma homocysteine is an independent risk factor for lower physical performance in older women.

• [Mayo Clin Proc.](#) 2011 Sep; [Eur J Clin Nutr.](#) 2011 Aug 24

- Help prevent a number of chronic diseases, including cardiovascular disease, diabetes and malignancies such as breast, colorectal and prostate cancer.
- Vitamin D deficiency is extremely common in urological patients.

• [J Urol.](#) 2011 Aug 17

## Magnesium

- Magnesium-deficient animals show an increased susceptibility to an in vivo oxidative stress and their tissues are more susceptible to in vitro peroxidation.
- Magnesium status may be compromised with ageing for two reasons: insufficient intake (magnesium deficiency) or alterations in magnesium metabolism (magnesium depletion).
- The protective properties of various antioxidant drugs and nutrients suggest that free radicals are involved in the injury process of magnesium deficiency.
- Inadequate magnesium availability in human fibroblast cultures was accelerated cellular senescence, which may be a mechanism through which chronic magnesium inadequacy could promote or exacerbate age-related disease.

• [Magnes Res](#) 1993; [Proc Natl Acad Sci U.S.A.](#) 2008 Apr 15

## Acetyl-L-carnitine

- Acetyl-L-carnitine is a biomolecule able to limit age-linked mitochondrial decay in brain, liver, heart and skeletal muscles by increasing mitochondrial efficiency.
- Defective mitochondria are not only responsible of bioenergetically less efficient cells but also increase ROS production further contributing to tissues oxidative stress.
- Acetyl-L-Carnitine reversed the age-related alterations of 10 mitochondrial proteins relative to mitochondrial cristae morphology, to the oxidative phosphorylation and antioxidant systems, to urea cycle, to purine biosynthesis.

• [J Proteomics.](#) 2011 Jun

## Acetyl-L-carnitine

- Age-related dementias such as Alzheimer disease have been linked to vascular disorders like hypertension, diabetes and atherosclerosis.
- These risk factors cause ischemia, inflammation, oxidative damage and consequently reperfusion, which is largely due to reactive oxygen species (ROS) that are believed to induce mitochondrial damage
- Mitochondria specific antioxidants such as acetyl-L-carnitine and R-alpha-lipoic acid seem to be potential treatments for AD.

• [CNS Neurol Disord Drug Targets.](#) 2011 Mar

## R Lipoic

- Inflammation results in heightened mitochondrial ceramide levels, which cause electron transport chain dysfunction, elevates reactive oxygen species, and increases apoptosis.
- (R)- $\alpha$ -lipoic acid improves many parameters of cardiac mitochondrial decay in aging and lowers ceramide levels in vascular endothelial cells.

• [Pharmacol Res.](#) 2011 Jan

## Selenium

- Cresols are monomethyl derivatives of phenol frequently used as solvents in the production of disinfectants, fragrances, pesticides, dyes..
- General population may be exposed to cresols mainly through inhalation of contaminated air
- Changes in gene expression profile were prevented when rats were supplemented with Se.

• [Arh Hig Rada Toksikol.](#) 2001 Jun 1

## Selenium

- Selenium (Se) is an essential element for normal testicular development, spermatogenesis, and spermatozoa motility and function.
- Supplemental Se and vitamin E may improve semen quality and have beneficial and protective effects, especially on sperm motility.
- Se could also protect against oxidative DNA damage in human sperm cells.

• [Int J Gen Med.](#) 2011

## Selenium

- Modest deficiency of any vitamin or mineral could increase age-related diseases.
- Modest selenium deficiency is common in many parts of the world; optimal intake could prevent future disease.
- On modest selenium deficiency, nonessential selenoprotein activities and concentrations are preferentially lost.
- The same set of age-related diseases and conditions, including cancer, heart disease, and immune dysfunction, are prospectively associated with modest Se deficiency and also with genetic dysfunction of nonessential selenoproteins
- [EASEB J.](#) 2011 Jun;25.

## Selenium

- Selenium is needed for the proper functioning of the immune system, and appears to be a key nutrient in counteracting the development of virulence and inhibiting HIV progression to AIDS.
- Antioxidant and catalyst for the production of active thyroid hormone.
- An elevated selenium intake may be associated with reduced cancer risk.
- Reduced levels of selenoproteins in peripheral blood cells were associated with impaired T lymphocyte proliferation, abnormal mononuclear cell cytokine secretion, and telomere shortening.

• [Lancet.](#) 2000 Jul 15;356(9225):233-41; [J Clin Invest.](#) 2010 Dec 1;120(12):4220-35

## ZINC

- Zinc and copper play an important role in maintaining metabolic homeostasis in elderly subjects and is therefore expected to have a crucial effect on antioxidant mechanism.
- Many studies confirm a decline of zinc levels with age.
- Data indicate that a wide prevalence of marginal zinc deficiency in elderly people may contribute to immunosenescence.

• [Exp Gerontol.](#) 2009 Dec;44(12):812-7. Epub 2009 Oct 28; [Immun Ageing.](#) 2009 Jun 12;6:9.

## Gynostemma pentaphyllum tea

- Antidiabetic effect of the traditional Vietnamese herb *Gynostemma pentaphyllum*.
- Shows a prompt improvement of glycemia and insulin sensitivity, and thereby provides a basis for a novel, effective, and safe approach, using *Gynostemma pentaphyllum* tea, to treat type 2 diabetic patients.

• [Horm Metab Res.](#) 2010 May

## CARDIOVASCULAR AND INFLAMMATION

Association of seropositivity to *H. pylori* with cardiovascular diseases and metabolic syndrome. *H. pylori* infection might be one of the risk factors of atherosclerosis through inflammation (fibrinogen).

*H. pylori* infection is prevalent in Korean adults and is associated with cardiovascular risk factors, especially with triglyceride, HDL-cholesterol and apolipoproteins, independently from the presence of peptic ulcer.

[Int J Cardiolol.](#) 2007 Oct 18; [Int J Cardiolol.](#) 2005 Jul. 20

## CORTISOL

- Chronic psychological stress is associated with accelerated aging.
- Cortisol may potentially induce oxidatively generated damage to cellular constituents such as DNA and RNA.
- Is an explanatory factor in the complex relation between stress, aging and disease.

• [PLoS One.](#) 2011

## Estrone.

- Higher estrone levels were strongly associated with an increased risk of incident prostate cancer.

• [Urology.](#) 2010 Nov

## Caloric Restriction

- Caloric Restriction provides protection from type 2 diabetes, cardiovascular and cerebral vascular diseases, immunological decline, malignancy, hepatotoxicity, liver fibrosis and failure, sarcopenia, inflammation, and DNA damage.
- It also enhances muscle mitochondrial biogenesis, affords neuroprotection; and extends mean and maximum lifespan.

• [Ageing Res Rev.](#), 2010 Jul

## Chinese parsley ; Coriandrum Sativum

- Coriander demonstrated that is capable of removing considerable amounts of both forms of mercury from water.

• [J Hazard Mater.](#), 2005 Feb 14

## Emotions and Stress

- "Spiritual" positive emotions like hope, faith, forgiveness, joy, compassion and gratitude are extremely important in the relief of stress and in regulation of the neuroendocrine system, protecting us against stress.
- Eight positive emotions: love, awe, hope, compassion, faith (trust), forgiveness, joy and gratitude

• [Mens Sana Monogr.](#), 2011 Jan

## THANK YOU

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