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International Scientific Conference

RECREATION AND JOY OF LIFE IN SENIORS

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BRAIN CARE AND AGING

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Life expectancy for those born after 2010

103 years for females

97 years for males

Life expectancy at birth continues to increase, it is greater than about 6 years in sex ♀.
In the early twentieth century the difference between ♂ and ♀ was clearly lower

We are moving towards an **aging society**. And now in place a "demographic transition" that our population will become more and more "old"

We must therefore confront a real **anthropological revolution** that needs an effective and innovative approach

The greatest achievement of our time, the increase in life expectancy is accompanied by an event in contrast, that the spread of a disease that causes **the devastation of those years more** of life hard-earned.

Alzheimer Dementia

Vascular Dementia

Fronto – temporal Dementia

"Dementia is a severe intellectual impairment, acquired, irreversible, caused by a type of organic brain disorder"
Esquirol, 1814

"The crazys' boat "
Hieronymus Bosh, 1500
Paris " Louvre Museum"

ISSUES IN THE TREATMENT OF ADVANCED DEMENTIAS

The remedies so far put in place to address the devastating issue of dementias have not, despite the efforts, led to great results.
The hopes placed in the pharmacotherapy (cholinesterase inhibitors: *Donepezil*, *Rivastigmine*, *Galantamine*, or Glutamate blocking agents: *Memantine*) went **largely disappointed by the clinical experience**.

The real problem that the scientific world today and the most advanced societies arise in this regard is how **to prevent -** as far as possible **- the dementia**

This is why we are carrying out numerous studies on ***early diagnosis of early disorders of memory and other cognitive domains***, which often lead, in time, to a form of dementia

DEMENTIA'S PREVENTION AND EARLY DIAGNOSIS

- **Prevention** of vascular and metabolic risk factors

- **Maintaining** *physical* and *mental* **wellbeing**

- Adopting **appropriate lifestyles**

- Increasing the "**cognitive reserve**"

- Using integrated diagnostic procedures and **advanced technologies**

- Using **therapeutic interventions** targeted ***in the initial stages*** of cognitive decline and MCI (Mild Cognitive Impairment)

MEDICINE PROVIDES FOR THE WISE USE OF FOOD

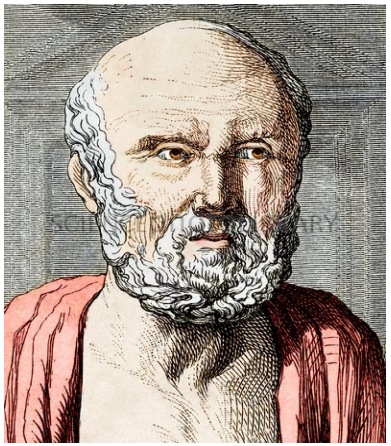
Since ancient times, both in the east – by the Ancient Chinese Medicine – and in the Western culture – by Hippocrates in the treatise *Ancient Medicine* - it is argued that **the power supply is the basis** of *Ars Medica*.

Recent scientific acquisitions have demonstrated that the food - and then the various types of power - influence genes, aging, the immune system, disease prevention.
A reasonable and appropriate use of different nutritional resources play a key role, together with genetic and environmental factors, in the **control** and perhaps also in the **treatment of *brain disorders and mental health***

There are already many evidences about the role that **special power supplies have in the treatment of various diseases**: depression, psychotic illnesses, headaches, epilepsy, Parkinson's disease, dementia, autoimmune diseases, cancer

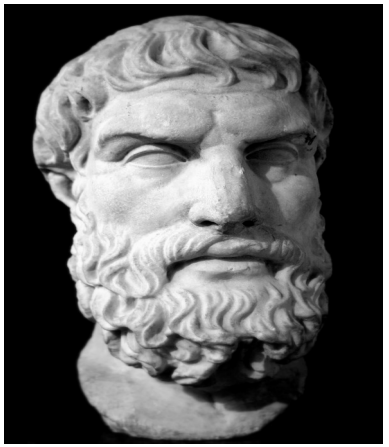
HEALTH AND NUTRITION

HIPPOCRATES , Kos 400 b.C.



"Food is the first medicine"

EPICURUS, Samo, 300 b.C .



"We are what we eat"

2400 years later we know ***nutrigenomics*** **and** ***nutrigenetics*** confirm their statements

Physical activity
improves memory and strengthens brain's cells

Many studies have shown that ***physical activity*** **results in positive effects** on the hippocampus and the memory circuits in healthy individuals, but also in those with AD

("Exercise plus behavioral management in patients with Alzheimer disease. A randomized controlled trial", JAMA, 2013)

Other recent studies have confirmed that ***physical activity*** (especially aerobic) has a protective effect on the brain, it encourages the production of new cells (***neurogenesis***) and is a powerful **anti-aging factor**

The resulting increase, **in *physical activity*, of BDNF** (*Brain-derived neurothrophic factor*) levels increases ***"brain plasticity"*** that is, the ability to create new connections (synapses) and that even in subjects with brain damage (from stroke, trauma, biological deterioration, etc.)

Diagnostic procedures for early diagnosis in dementia

Clinical examination: anamnestic, general, geriatric and neurological

Laboratory tests, including markers for dementia

Administration - in previously selected patients – of batteries of standardized **psychometric tests** aimed at the staging of memory disorders, but also of other cognitive domains.

Neuroimaging techniques: Functional MRI
PET (Positron Emission Tomography),
SPECT (single photon emission tomography).

Genetic testing

OTC (Optical coherence tomography) for the study of the retina and optic nerve.

PET / SPECT / MRI
in the early diagnosis of dementias

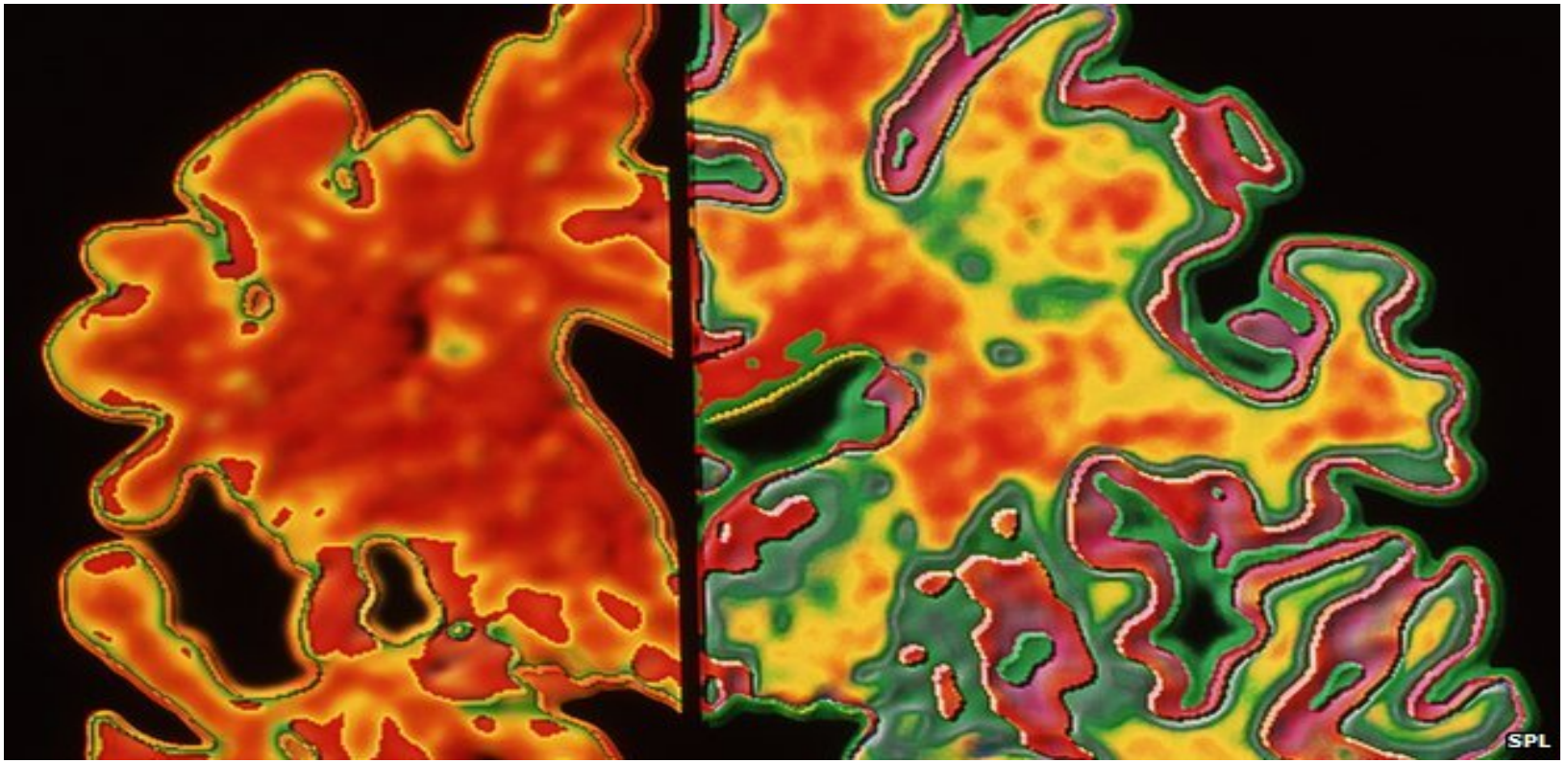
PET - with studies of ***brain metabolism*** (especially glucose uptake) with 18F-DG in MCI

SPECT - with studies on ***neurotransmitter alterations***, on striatal dopaminergic transmission, on amyloid markers in preclinical phase with the Pittsburgh compound-b (PIB14), on the glucose metabolism changes in the hippocampus and in the temporo-parietal cortex, **in initial AD**

Functiona*l MRI** - with studies aimed at highlighting not only the hippocampus and ***modifications of peri-hippocampal areas, but <u>also</u> in the ***execution of functions***

OTC - Eye cells could help in diagnosing Alzheimer's disease

Melissa Hogenboom *Science reporter, BBC News 13 November 2013*



Retinal nerve fibre layer structure abnormalities in **early Alzheimer's disease**: Evidence in optical coherence tomography

Neuroscience Letters, August 2010

ADVANCES IN NEUROSCIENCES

The **latest research in** ***neurobiology*** **and** ***neurochemistry*** led to understand important aspects of the nervous system and mind in particular

Advances in ***molecular biology*** **and** ***pharmacology*** have allowed ample knowledge on the nerve brokers, on neuro-hormonal transmission, neurotransmitters, receptors on, the neuro-modulators of enzymes necessary for neuronal metabolism

Group of **technologies which study** ***genes*** **and** ***genoma***, mental activity, and the possible modifications

New technologies to improve and modify mental processes

THERAPEUTIC PROCEDURES IN MCI

Appropriate Lifestyles

Power
Hydration
Physical Activity
Fun Activities
Stress Management
Intimacy and Religion

Targeted use of **supplements**

Technical **upgrading** of ***motor*** **and** ***cognitive*** **rehabilitation**, including cognitive tele-rehabilitation

Drug therapies

Care and psychological therapies

CURRENT MODEL OF BRAIN ACTIVITY

The brain is plastic (as experience is capable of change brain connections) and is able to renew partially producing new cells (**neurogenesis**)

The normal mode of operation provides a **constant interweaving** of emotions, learning, memory and consciousness

The mind-brain communication is **integrated communication**, which is influenced by genetics, age, natural and social environment, the lifestyles

By our experiences we constantly remodel. The memories accumulate, and this collection of past scenarios that we store in the brain allows us to put into perspective the sensations and events of each day.

Gerald Maurice Edelman (Nobel Prize in Medicine in 1972) has proposed a model of **continuous development of neural connections** by synapses based on the experience and plasticity

"Darwinism of synapses replaces the Darwinism of genes"

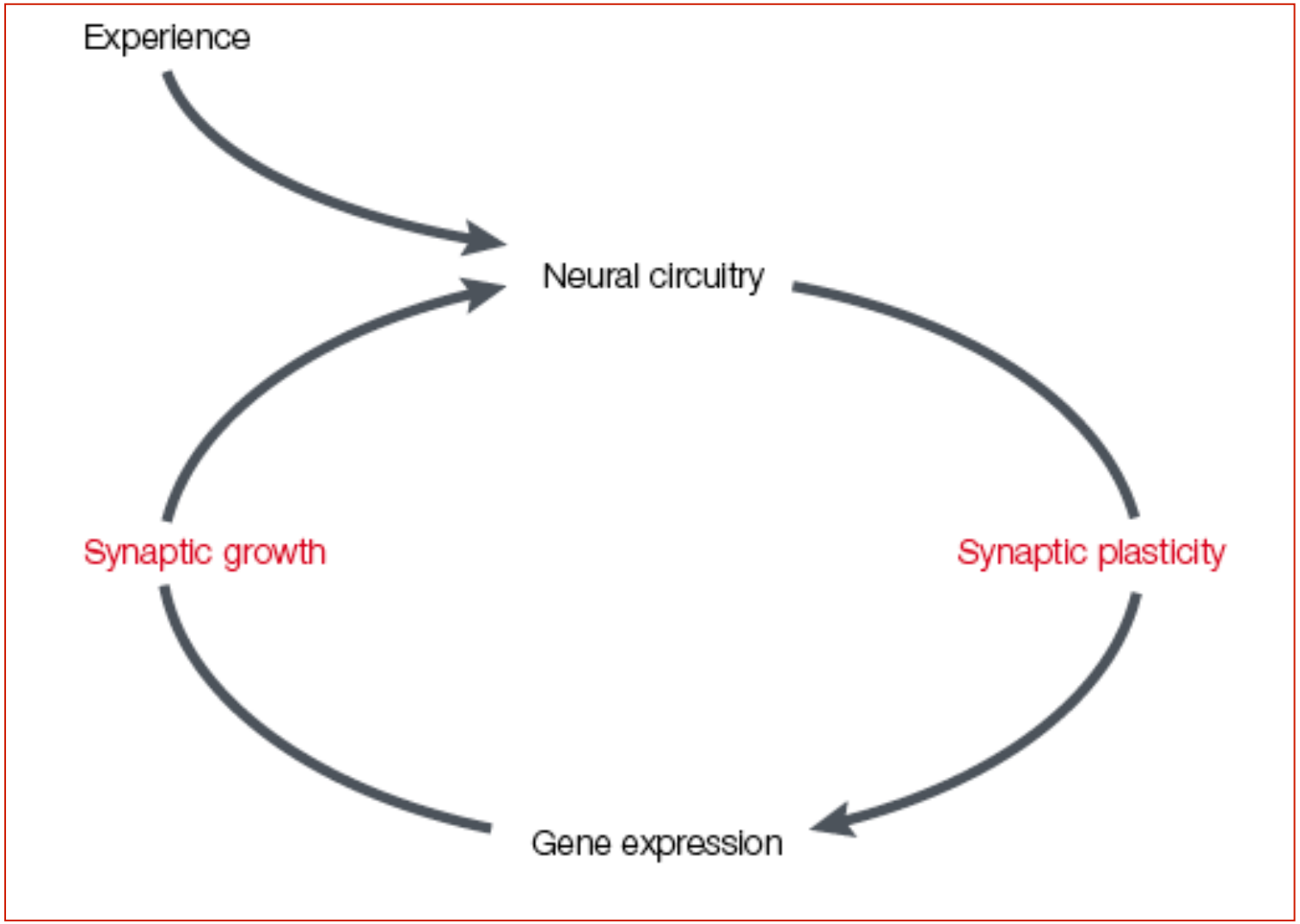
MIND AND MEMORY

The mind is the essence of individuality. Humans share fundamental genes for thinking and learning, but everybody has individual differences that lead to a complex interaction with environment and experiences which make the person unique

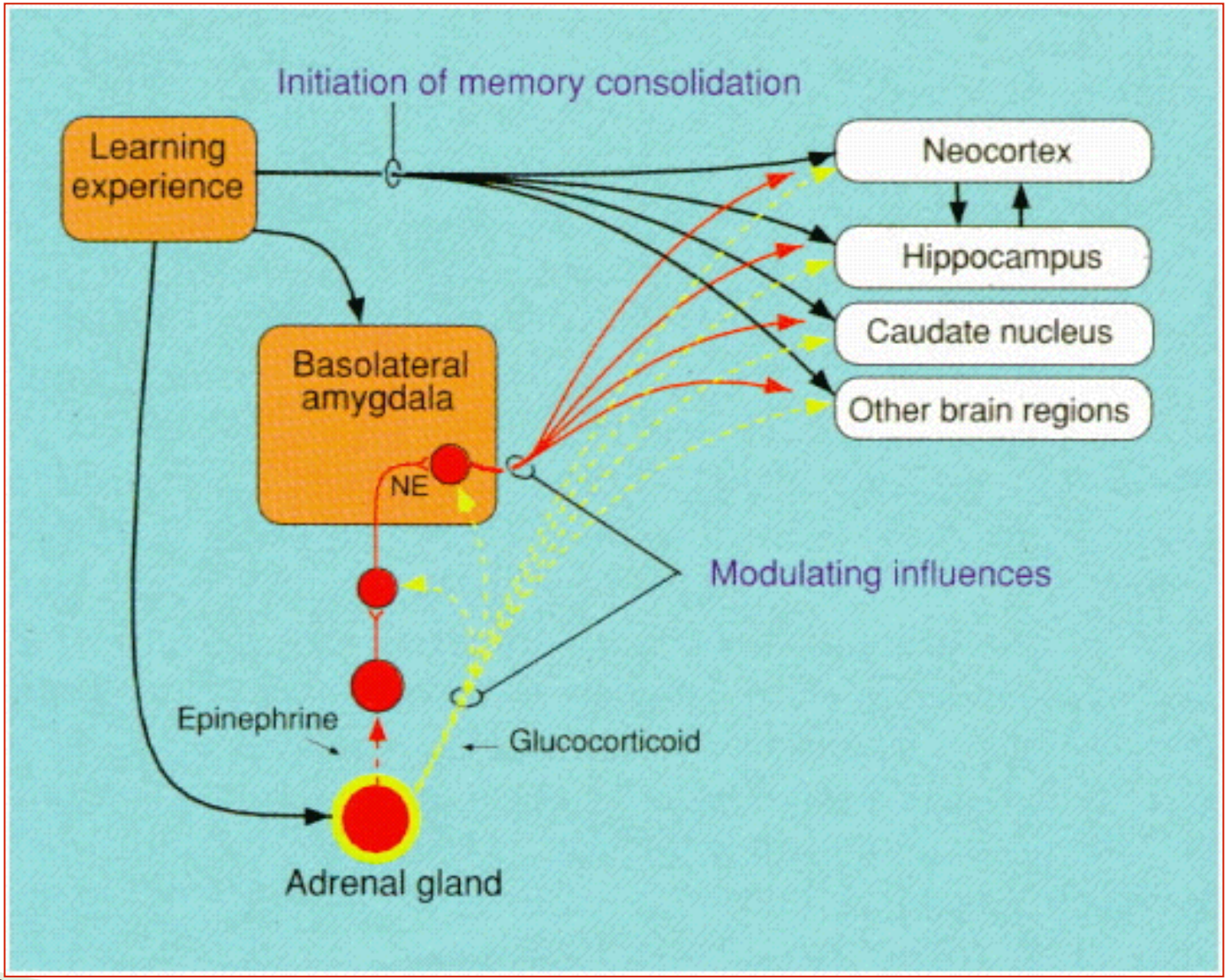
Our experiences **change us continuously** and modify the layers of memories that we accumulate in our mind

We can exploit these qualities of the brain **to keep our minds efficient** even in old age and to optimize our memory

NEURO-BIOLOGICAL BASES OF MEMORY

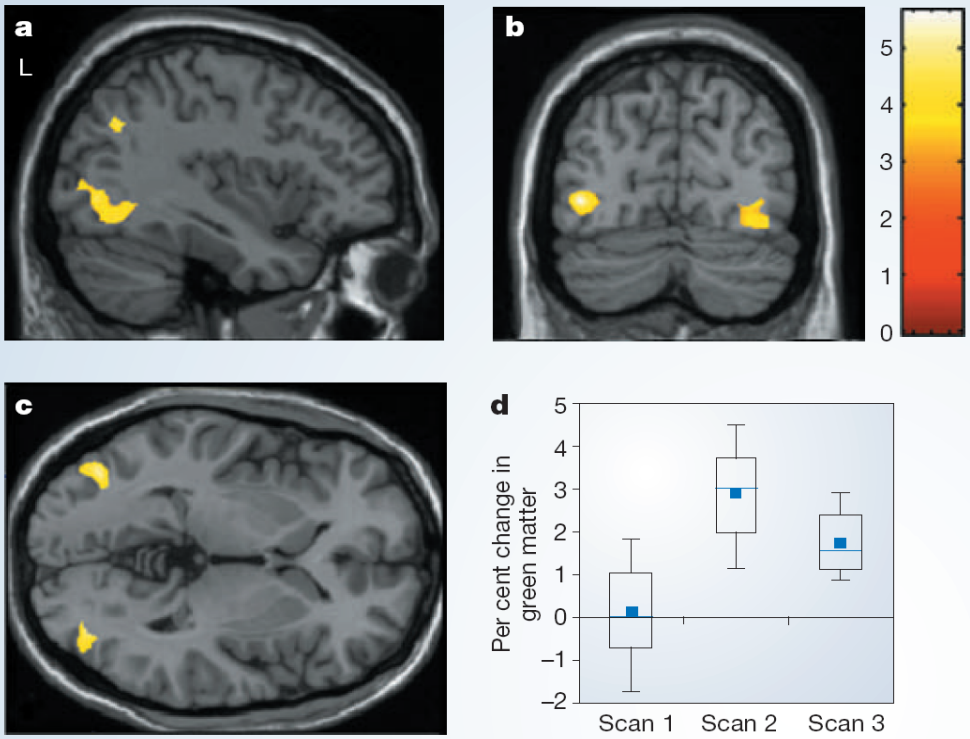


SYSTEMS GOVERNING THE CONSOLIDATION OF MEMORY



Changes in grey matter induced by training

Nature, 2004



Mind Sports preserve and improve cognitive function

An important longitudinal study of 469 elderly - published in June 2003 of the *New England Journal of Medicine* by researchers at the "Albert Einstein College of Medicine" in New York, showed that **people who play cards, chess, checkers**, as well as those who play tools, ***less frequently become dementia impaired*** than those who do not practice mind-oriented activities

A very recently published study (March 2017), performed at the Mayo Clinic in Rochester, USA, confirmed the ***positive effects*** of mental activities and **games on cognitive function in old age:**

*"Association Between **Mentally Stimulating Activities in Late Life** and the Outcome of Incident Mild Cognitive Impairment, With an Analysis of the APOE ε4 Genotype"*

JAMA Neurol. 2017; 74(3): 332-338.

Many other data from the scientific literature show how ***playing Bridge*** constitutes an effective aid to the **development and maintenance of cognitive activity at all ages in men and women**

You can play bridge at a high level at all ages

At the age of 86 years Benito Garozzo won second place European Championship in Transnational Open Teams in June 2013 (Ostend, Belgium) with the Zaleski team.

GOOD GENES AND HEALTHY ENVIRONMENT

Longevity is genetically programmed with a **network adequate defence**: healthy mitochondrial engines, powerful anti-oxidant systems, effective DNA repair mechanisms

But the genetic program *must be supported* by **environment**: lack of pollution, quality of life, fit individual lifestyles

Food qualitatively and quantitatively controlled, physical activity, stress management techniques, adoption of adequate lifestyles, mental stimulating activities, allow individuals to "**get healthy at the end**" and avoids building a society full of invalids

To age well ... We share childhood

Paul Klee - Pumpkins