

## Use It or Lose It -Aging Brain and Its Plasticity-

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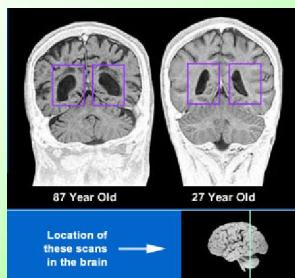
The 5<sup>th</sup> Annual Art and Science of Aging Conference



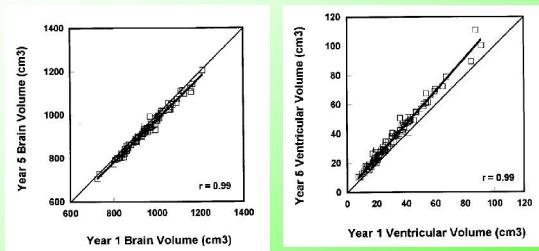
## Outline

- ∅ Structural changes in the aging brain
- ∅ Neurogenesis and cortical reorganizations
- ∅ The adaptive brain
  - Brain activations when cognitive tasks are performed

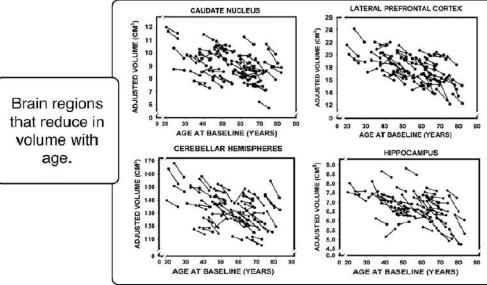
### Structural changes in the aging brain:



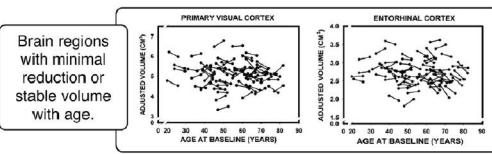
Resnick et al., 2003  
A longitudinal study of 92 non-demented old adults (59-85)



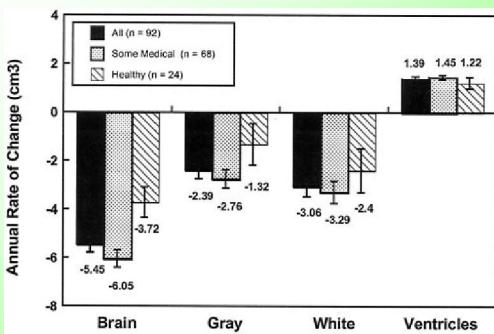
**Raz, et al., 2005**  
A 5-year study of healthy older adults (mean age 63.79)



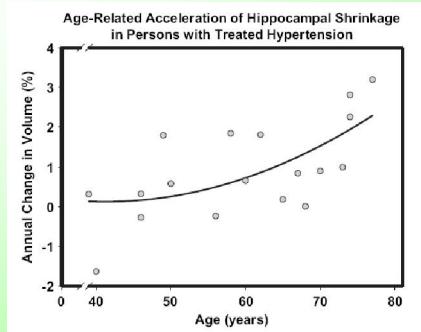
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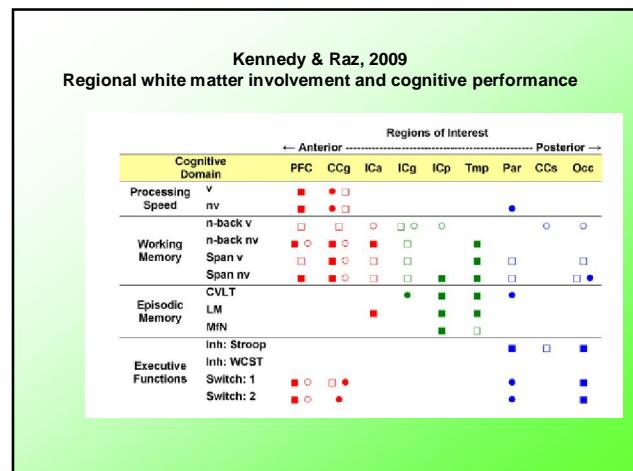
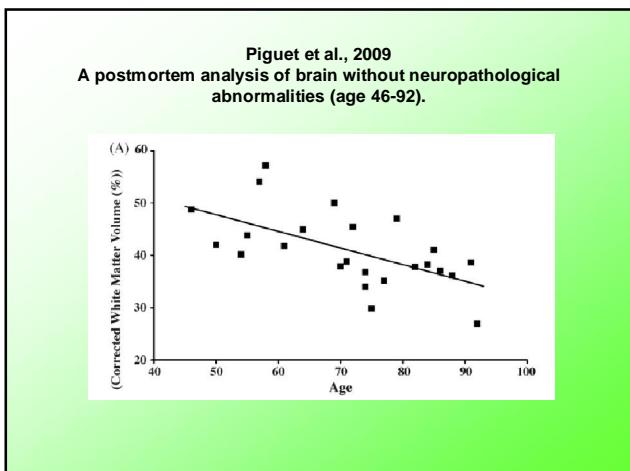
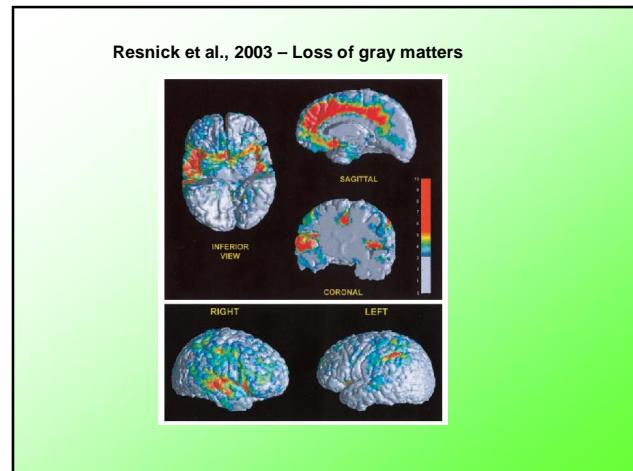
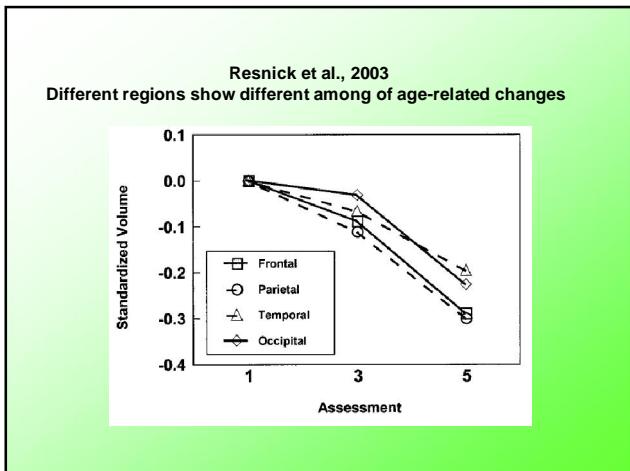


**Resnick et al., 2003**  
Individual differences in the rate of volume change



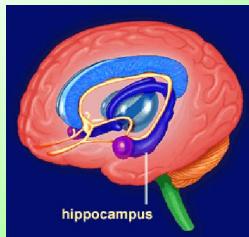
**Raz, et al., 2005 – People treated with hypertension**





### Neurogenesis and cortical reorganizations

Growth of new nerve cells: Kempermann & Gage, 1999



### Exercises and neurogenesis:

Van Praag, Shubert, Zhao, & Gage, 2008

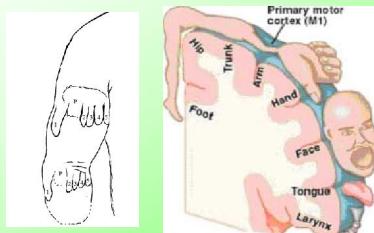
Fabel & Kempermann, 2005

### Depression and neurogenesis:

Jacob, 2004

### Cortical reorganization in adults' brain:

Ramachandra (1992):



### The adaptive brain

– Brain activations involved in cognitive tasks

Two major age-related changes are reported:

1. There are more bilateral activations in the brain (Cabeza et al., 2002; Reuter-Lorenz, 2002).
2. There are reliable increases in prefrontal activation (Park&Reuter-Lorenz, 2009).

