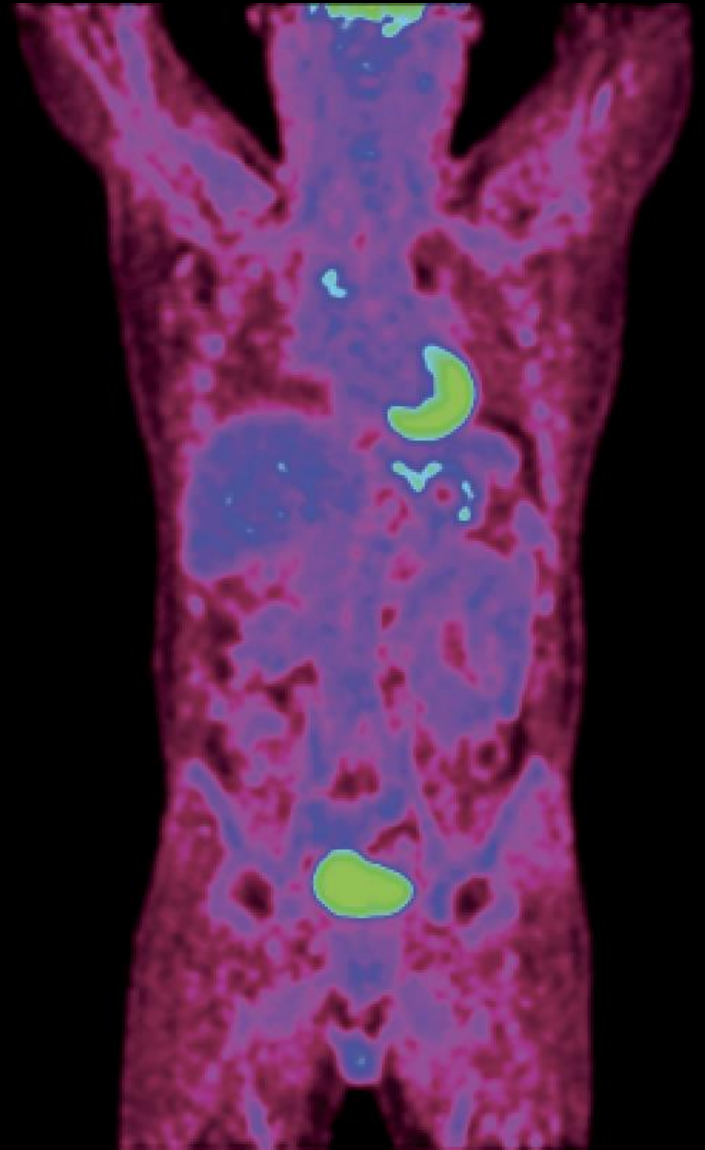


Disegnare con l'antimateria

Piergiorgio Cerello

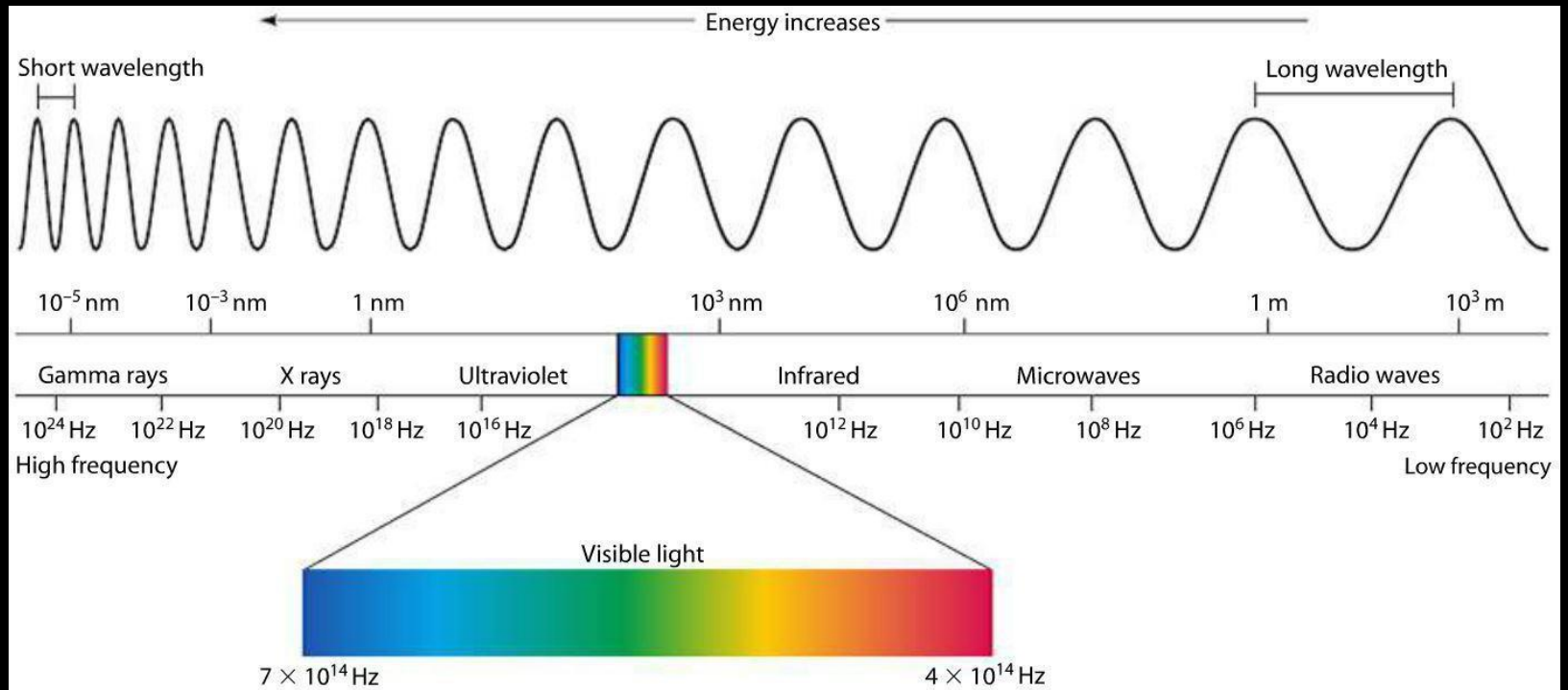


Roentgen



- 1895
- Raggi X
- Radiografia
- Guardare attraverso la materia

Radiazione Elettromagnetica



1920: Radioattività *trendy*

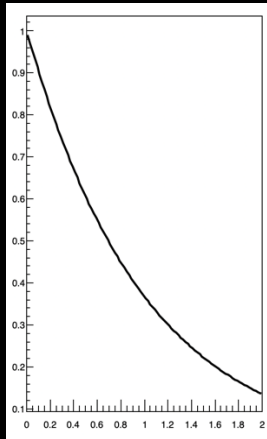


Raggi X

Sorgente



Rivelatore





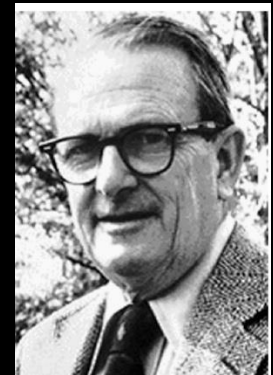
Radiografia ieri & oggi



Tomografia Computerizzata

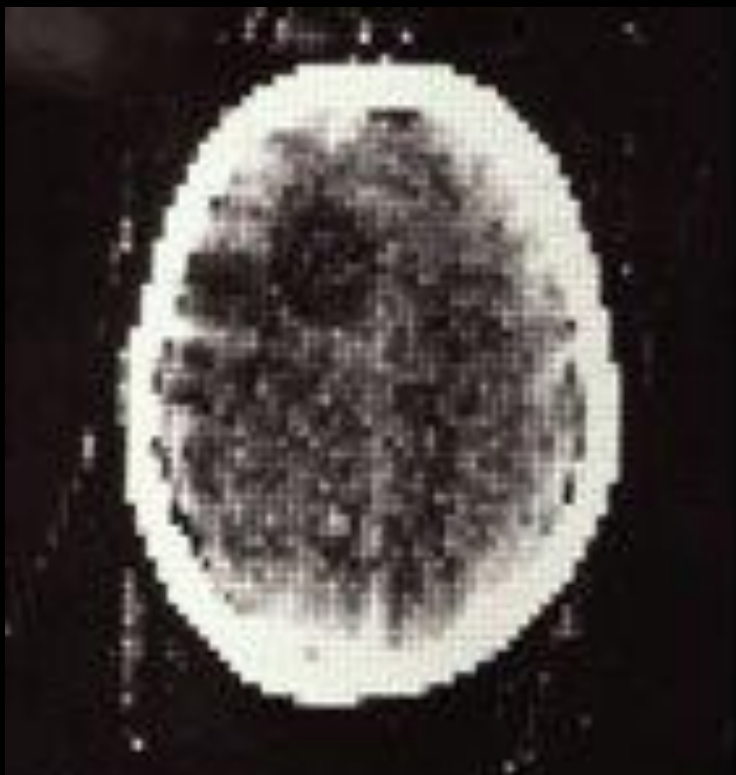


- Godfrey Hounsfield, 1971
- Premio Nobel per la Medicina, 1979 con A. M. Cormack

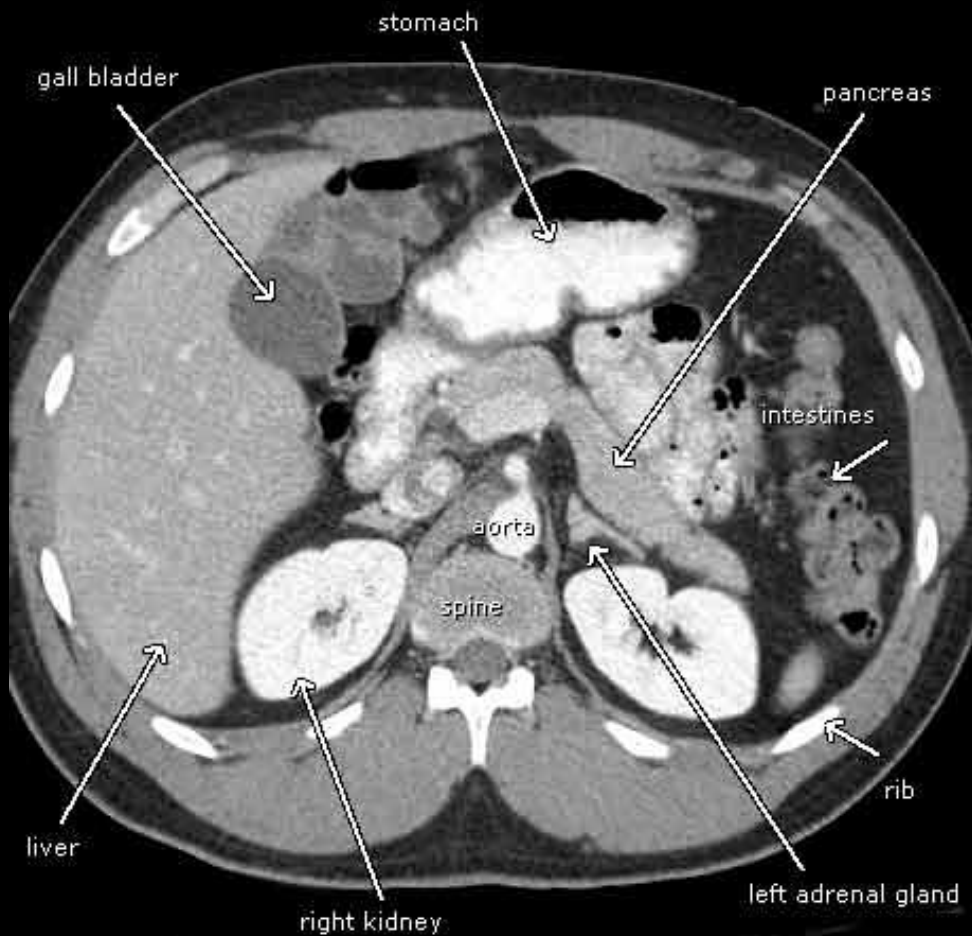


(grazie, Beatles!)

La prima CT: 1 Ottobre 1971



Tomografia Computerizzata



Immagini
Morfologiche



Antimateria

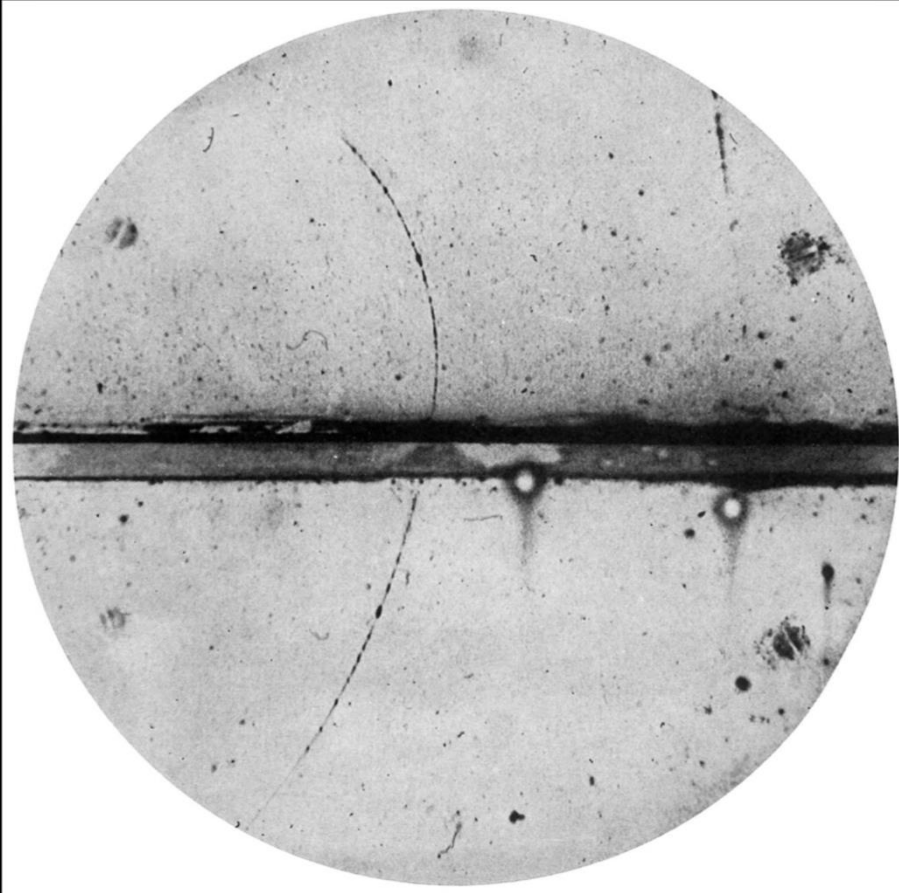
Antimateria

$$(i\partial - m)\psi = 0$$

- Dirac, 1928
- Soluzioni con energia negativa???

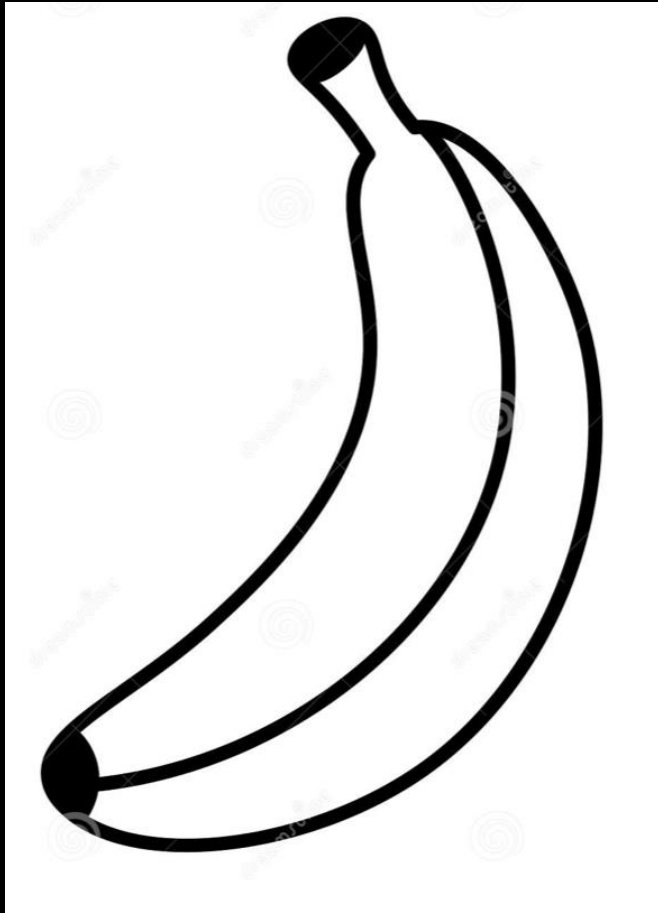


Antimateria

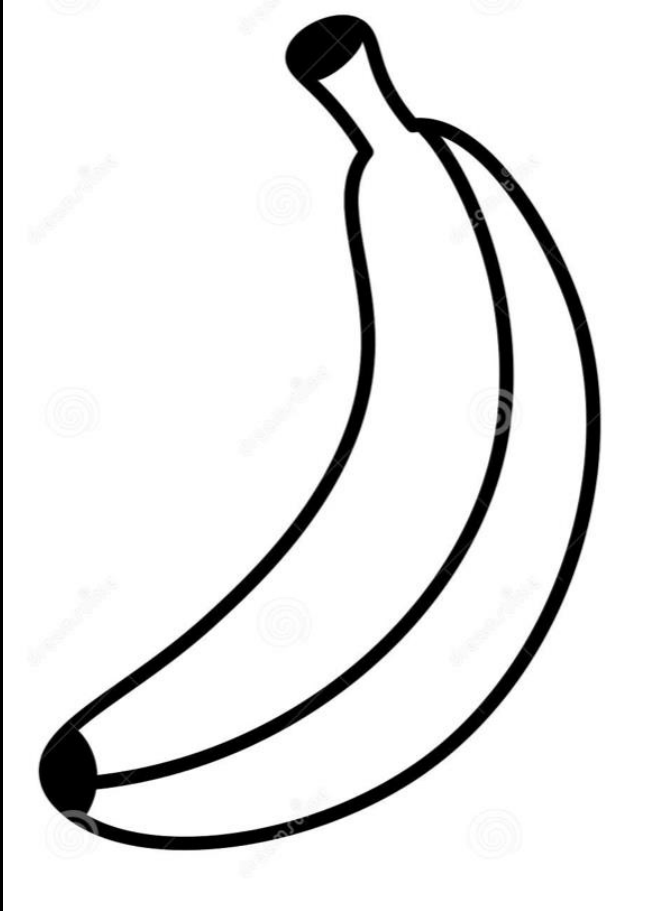


- Anderson, 1932
- il positrone (e^+)
- annichilazione

$$e^+ e^- \rightarrow \gamma \gamma$$



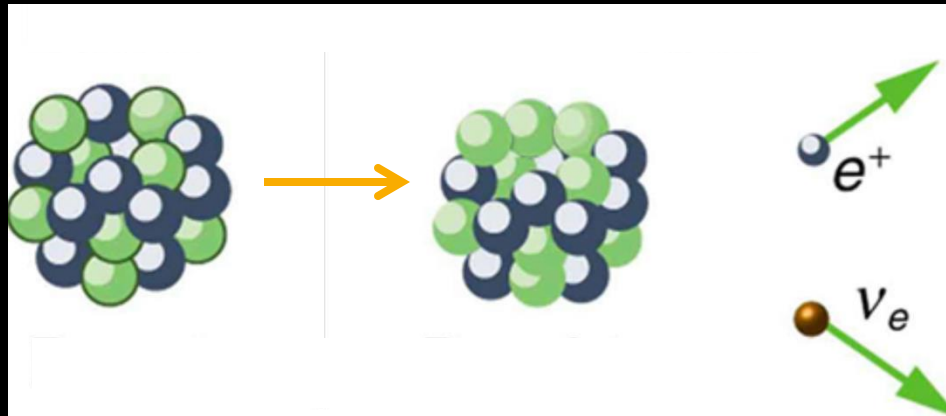
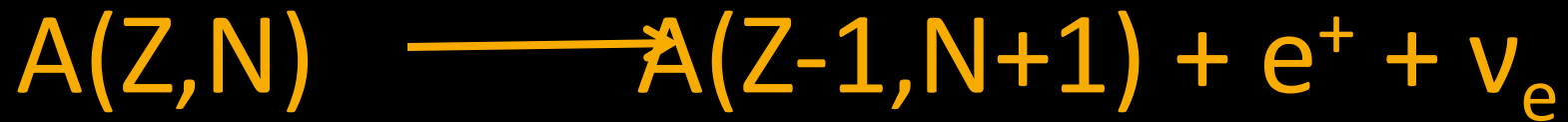
Sorgenti di positroni...

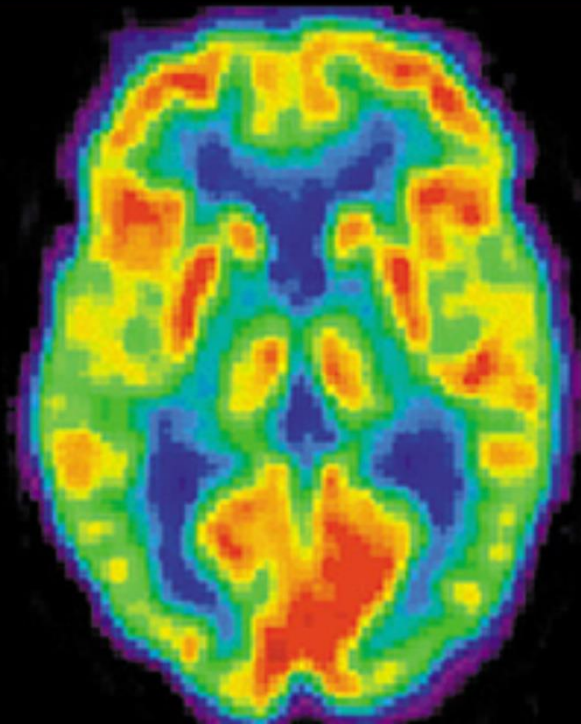


- ^{40}K
- $\sim 300 \text{ Bq}$ per una persona di 80 Kg

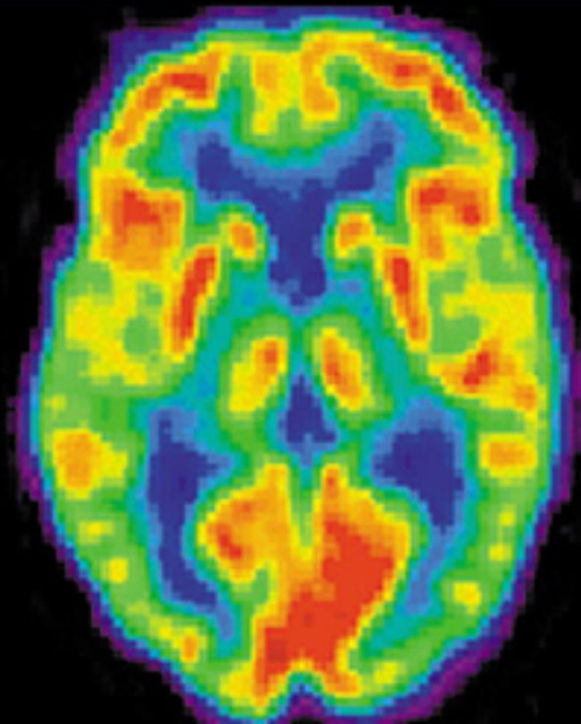
$1 \text{ Bq} = 1 \text{ disintegrazione/s}$

Il decadimento β^+



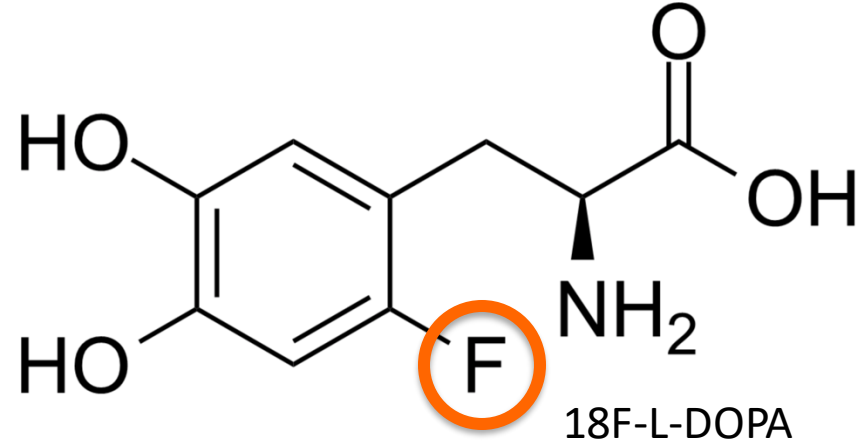
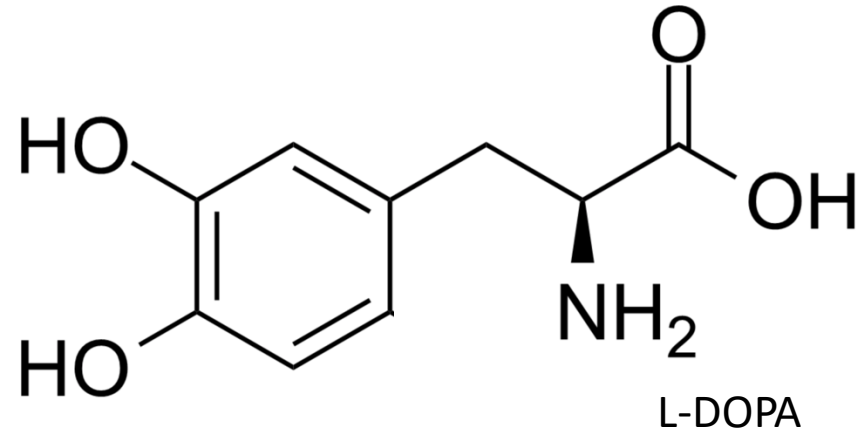
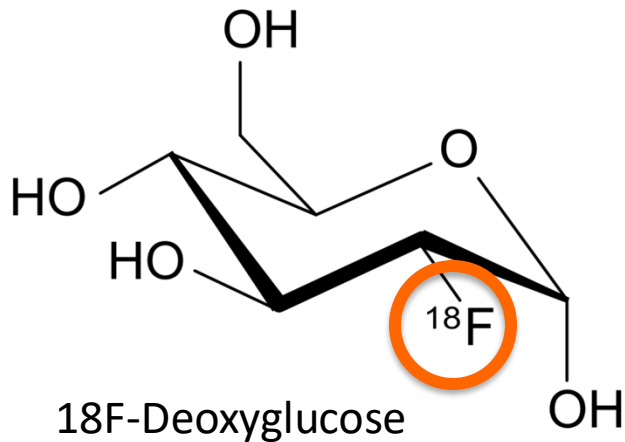
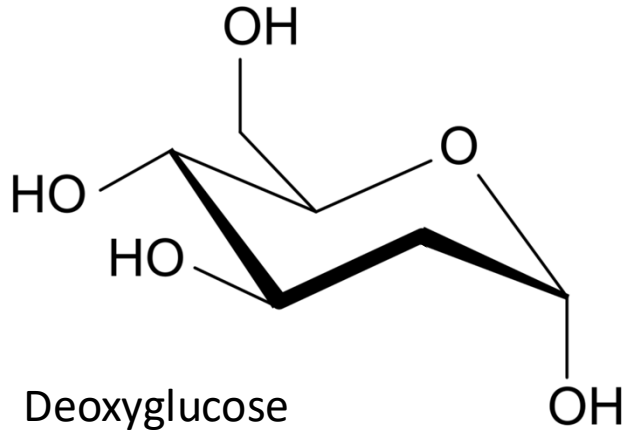


Morfologico & funzionale

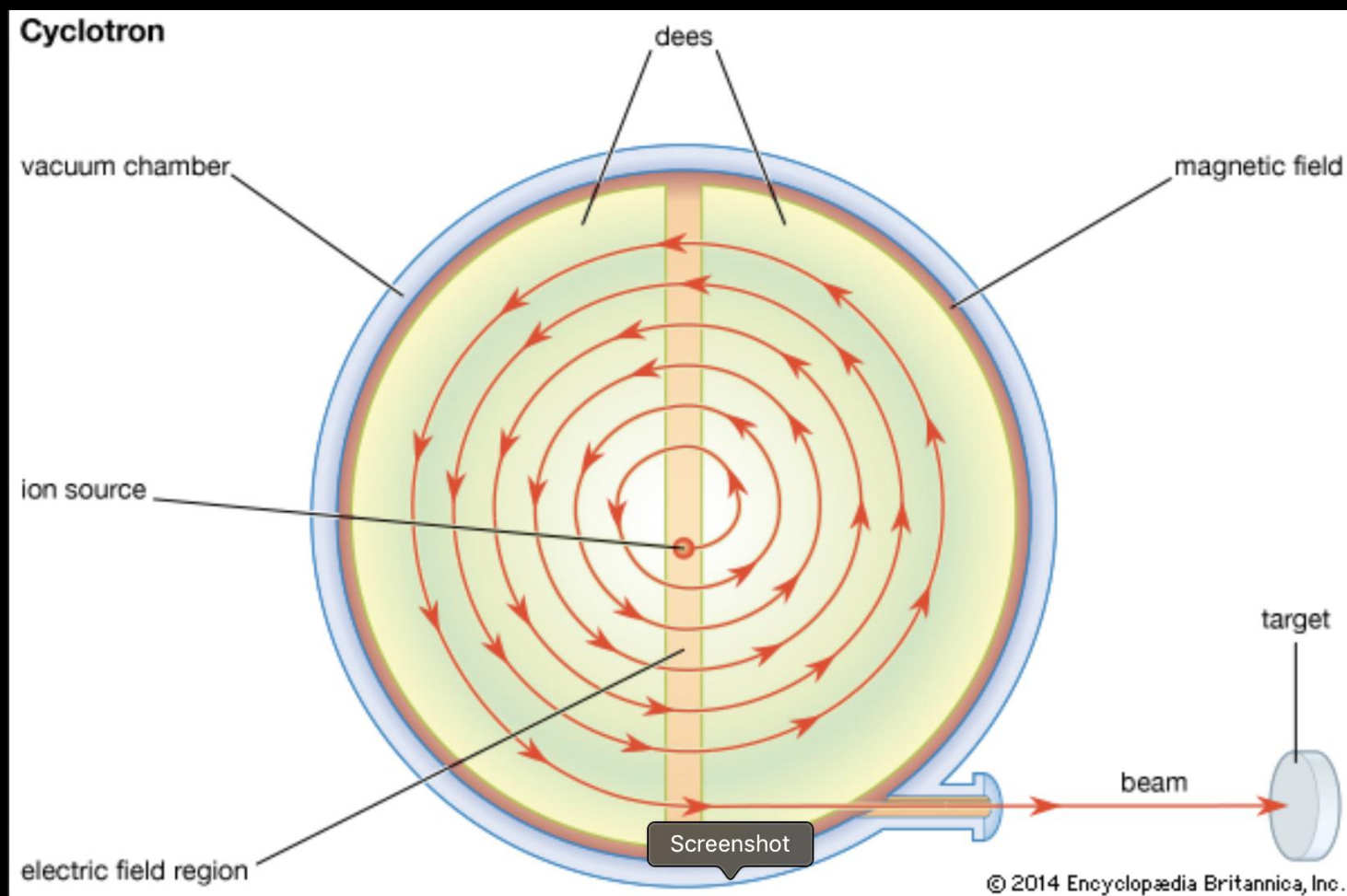


... nasce la Medicina Nucleare

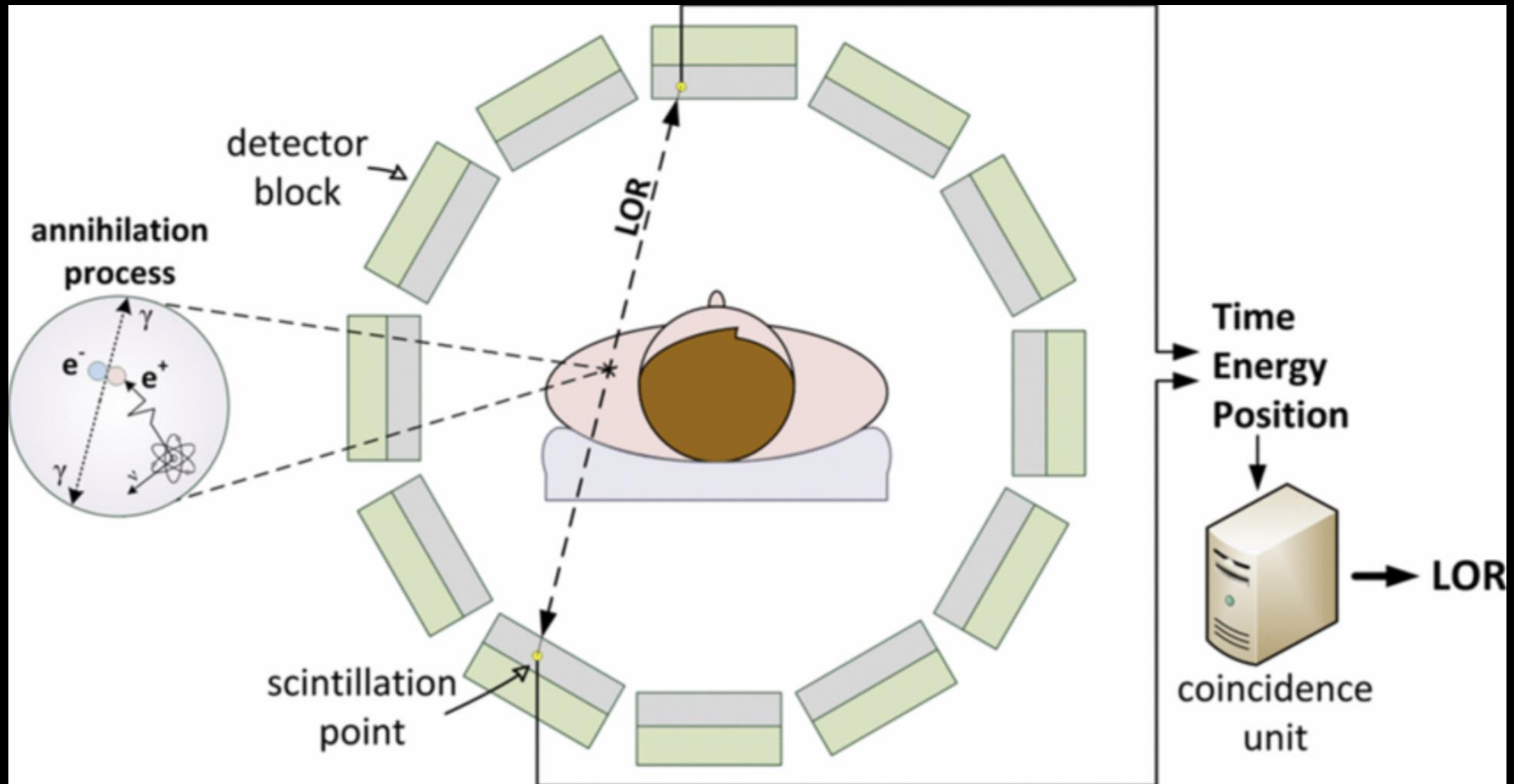
Radiotracciante



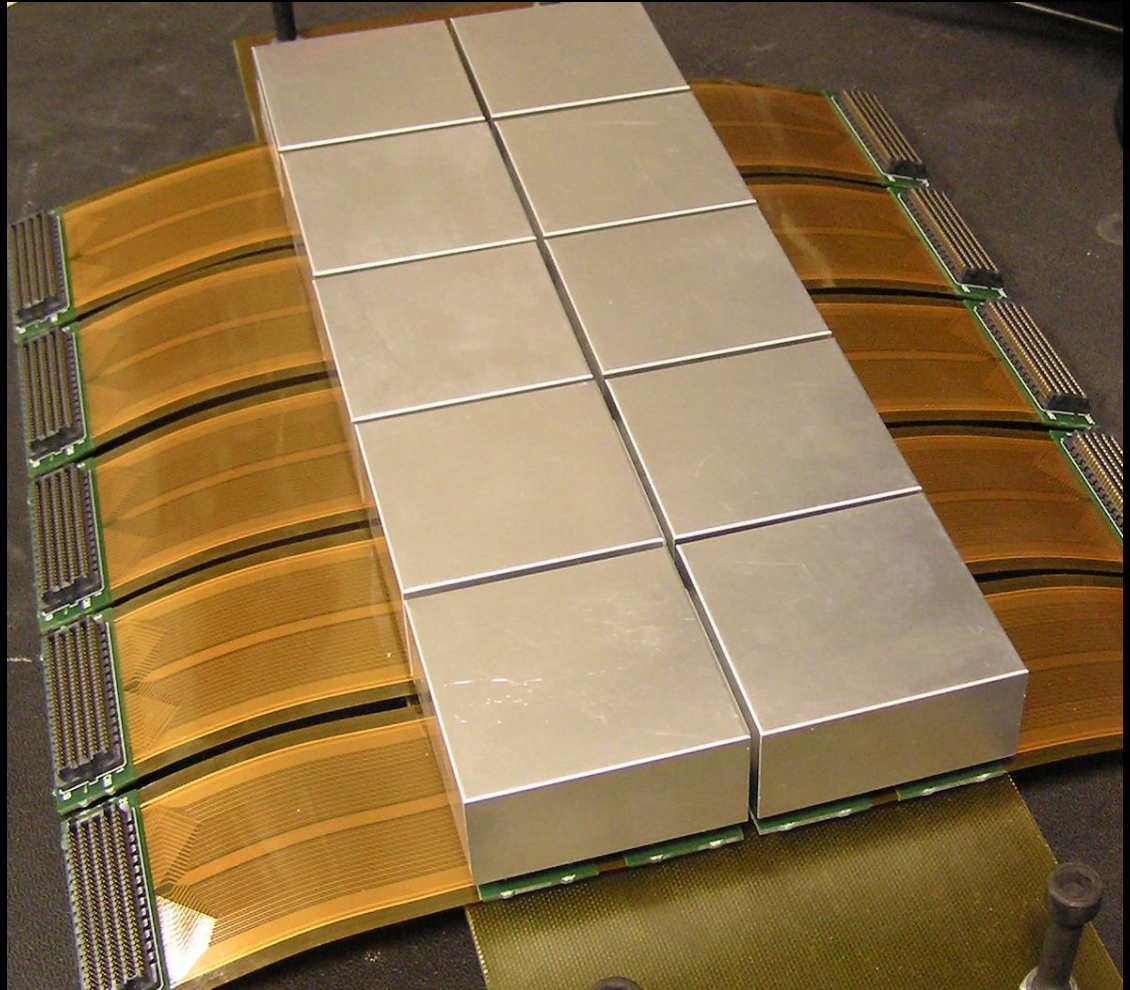
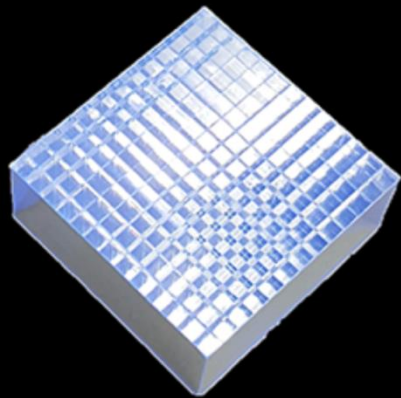
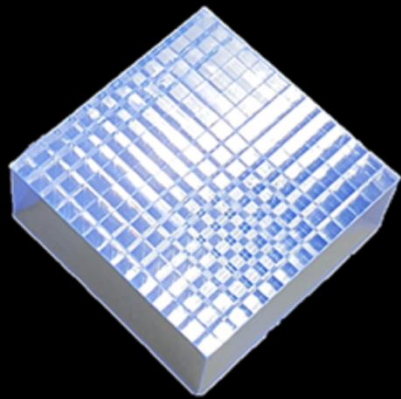
Ciclotrone



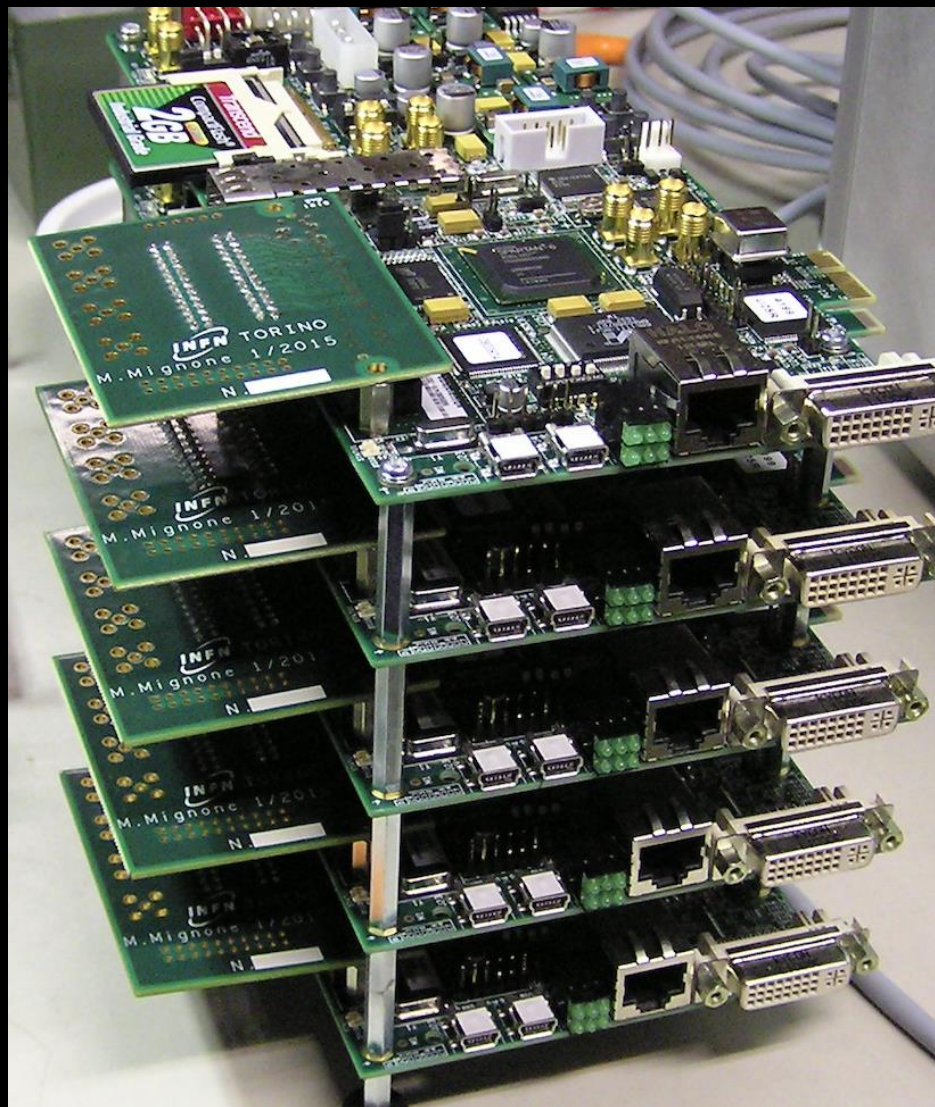
Positron Emission Tomography



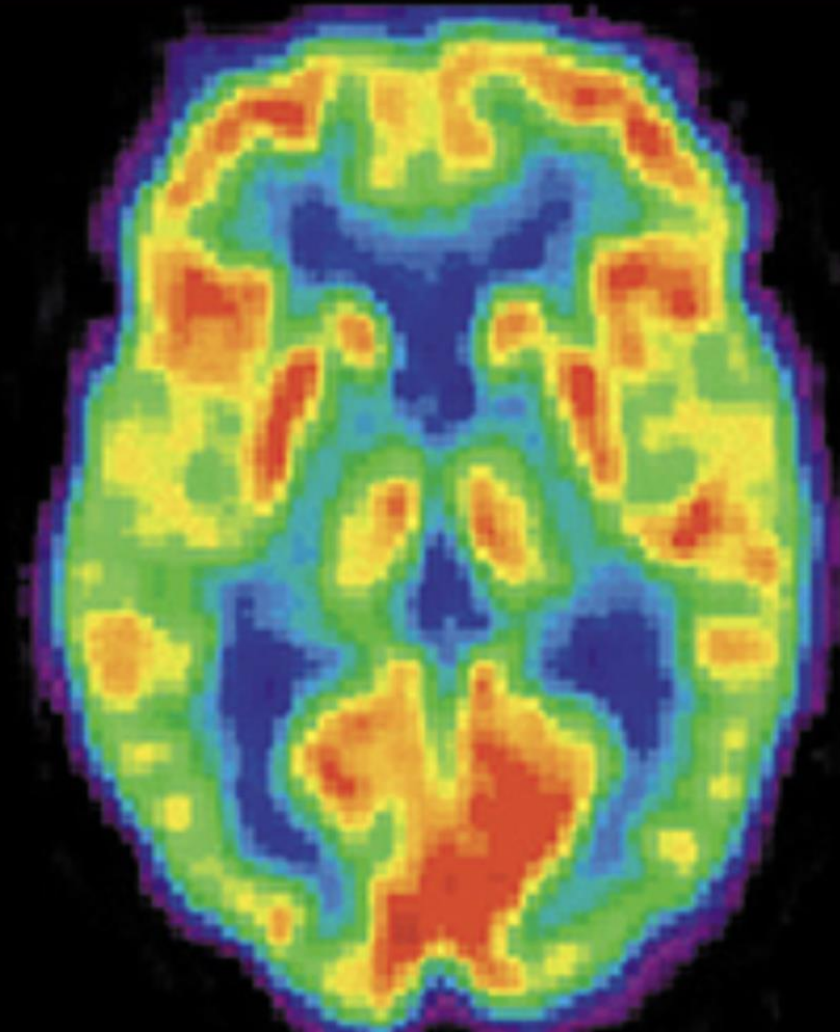
PET detectors

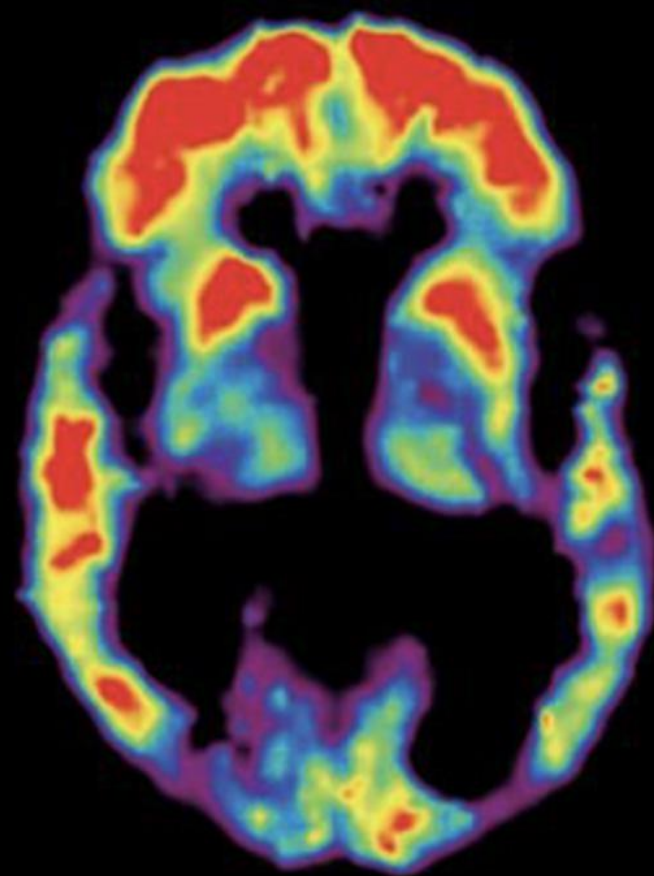
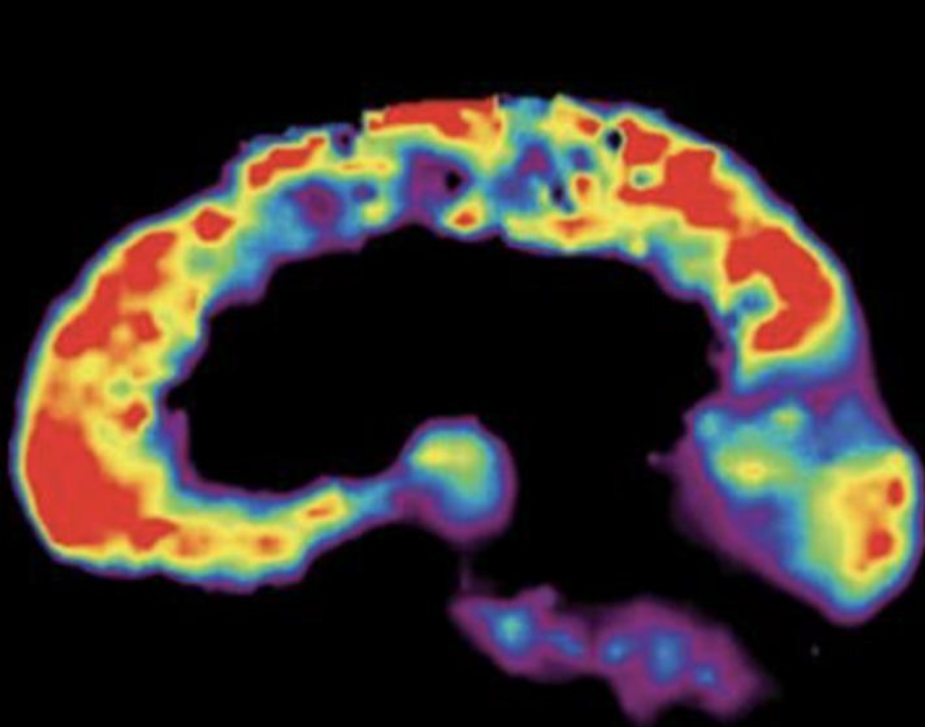


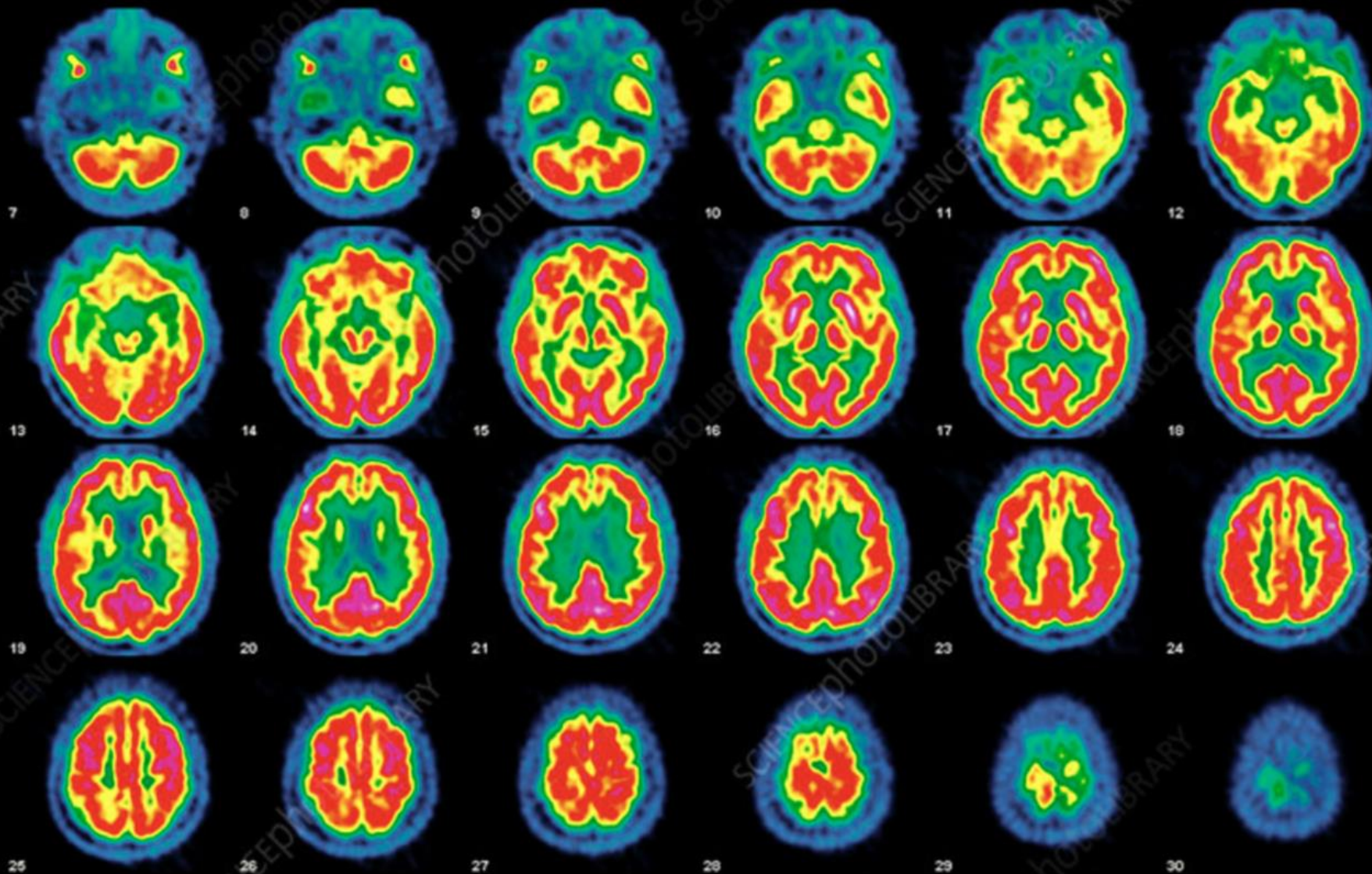
PET detectors



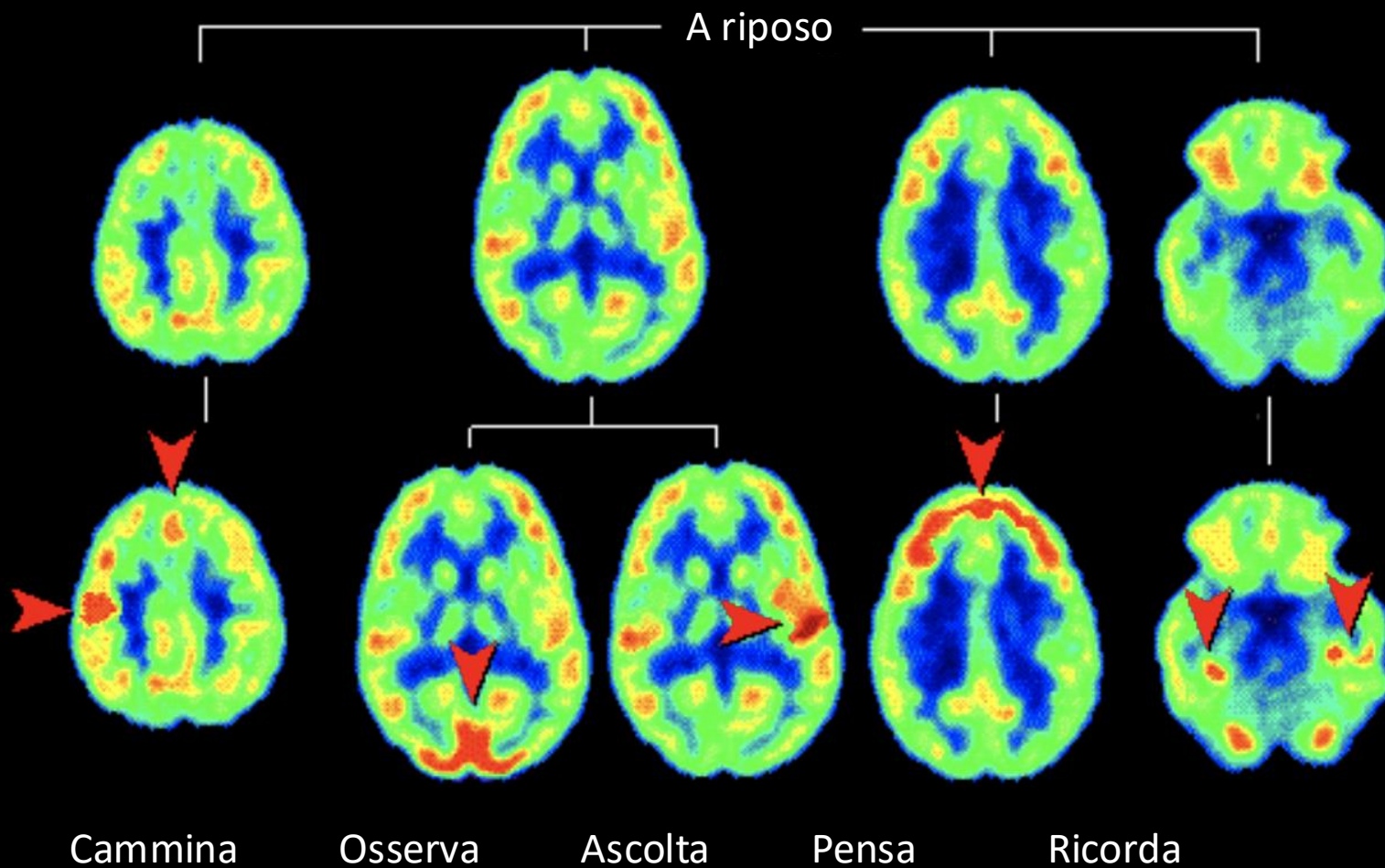
Il cervello, con le prime PET





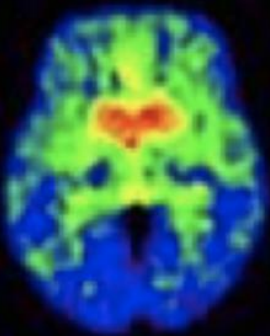


Cervelli al lavoro

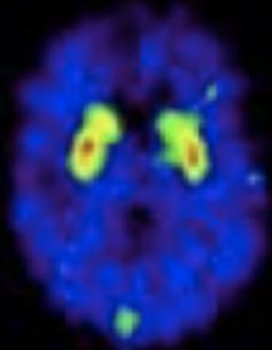


Phelps & Mazziotta, UCLA

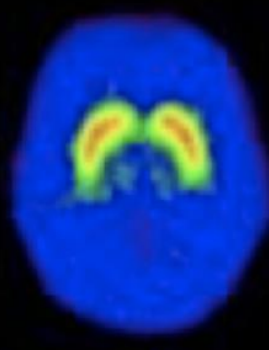
Problemi vari...



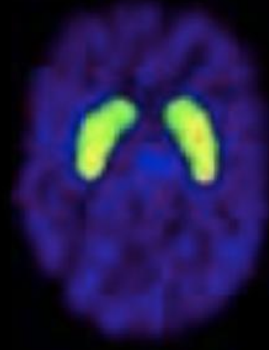
Fumatore



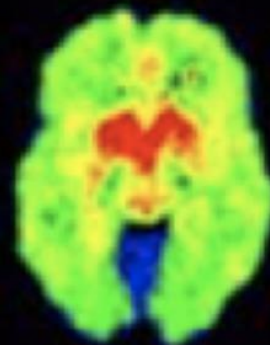
Alcolista



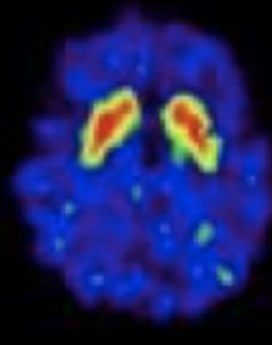
Obeso



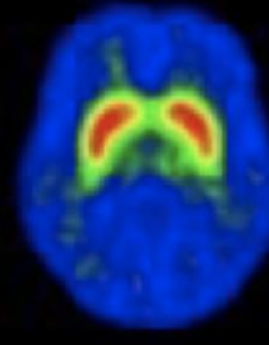
Cocainomane



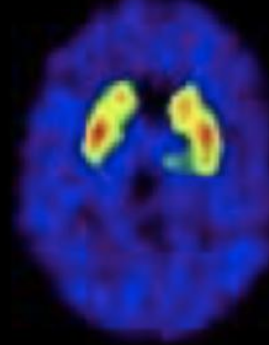
Non- Fumatore



Normale



Normale

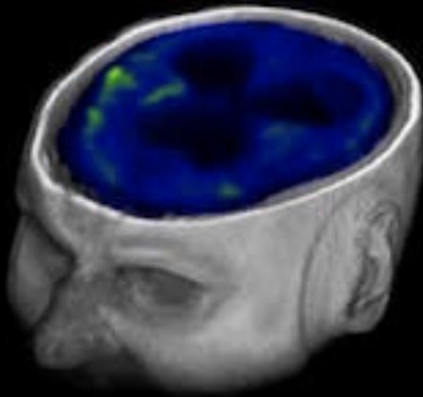


Normale

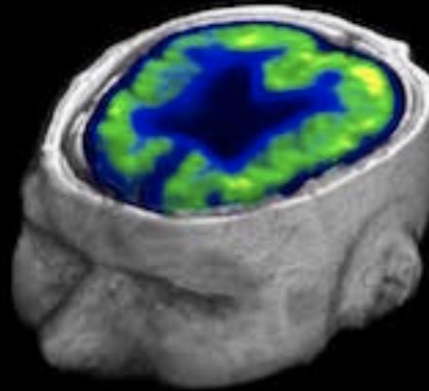
Volkow N, Fowler J, Wang G (May 2003). ["The addicted human brain: insights from imaging studies". J Clin Invest. 111 \(10\): 1444-1451](#)

Stato di coscienza

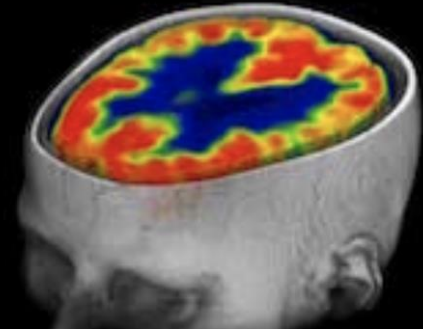
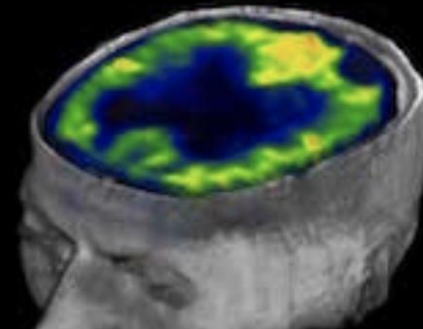
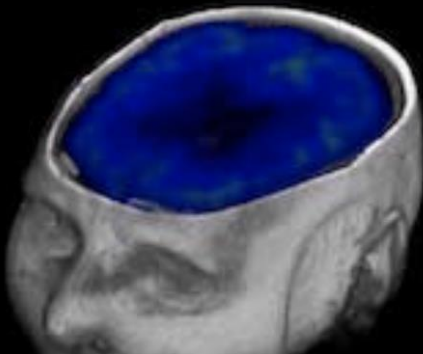
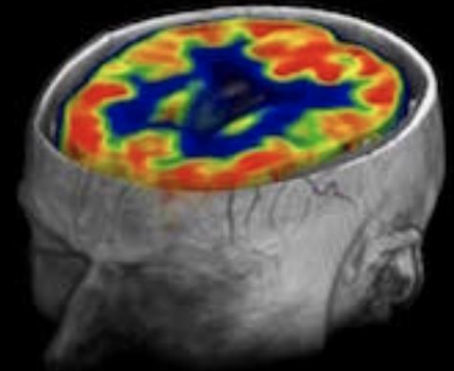
Vegetativo



Parzialmente Cosciente

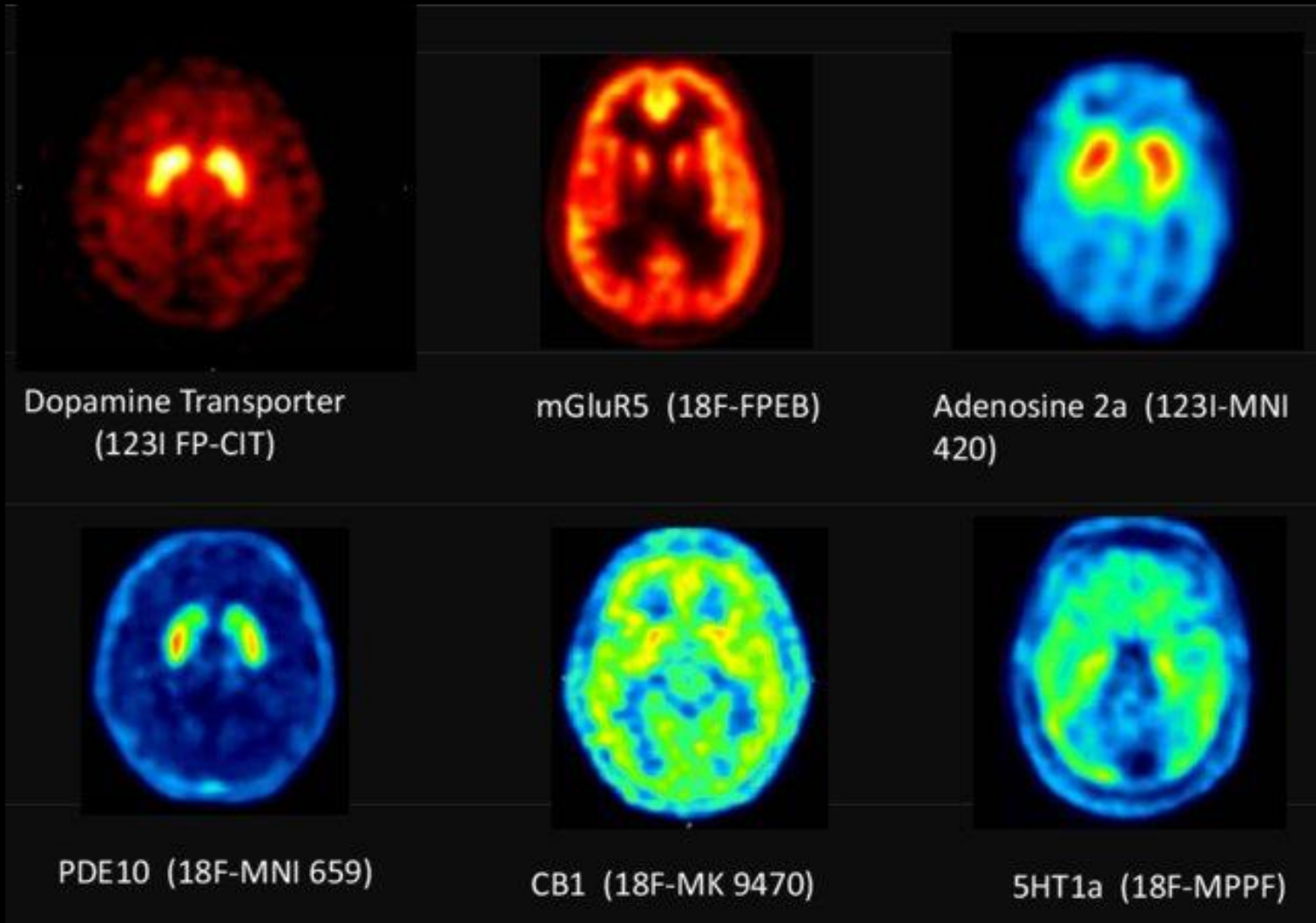


Cosciente



[The Minimal Energetic Requirement of Sustained Awareness after Brain Injury](#)
Johan Stender, Kristian Nygaard Mortensen, Aurore Thibaut, Sune Darkner,
Steven Laureys, Albert Gjedde, Ron Kusters
Current Biology, Vol. 26, Issue 11, p1494–1499

Cervelli colorati

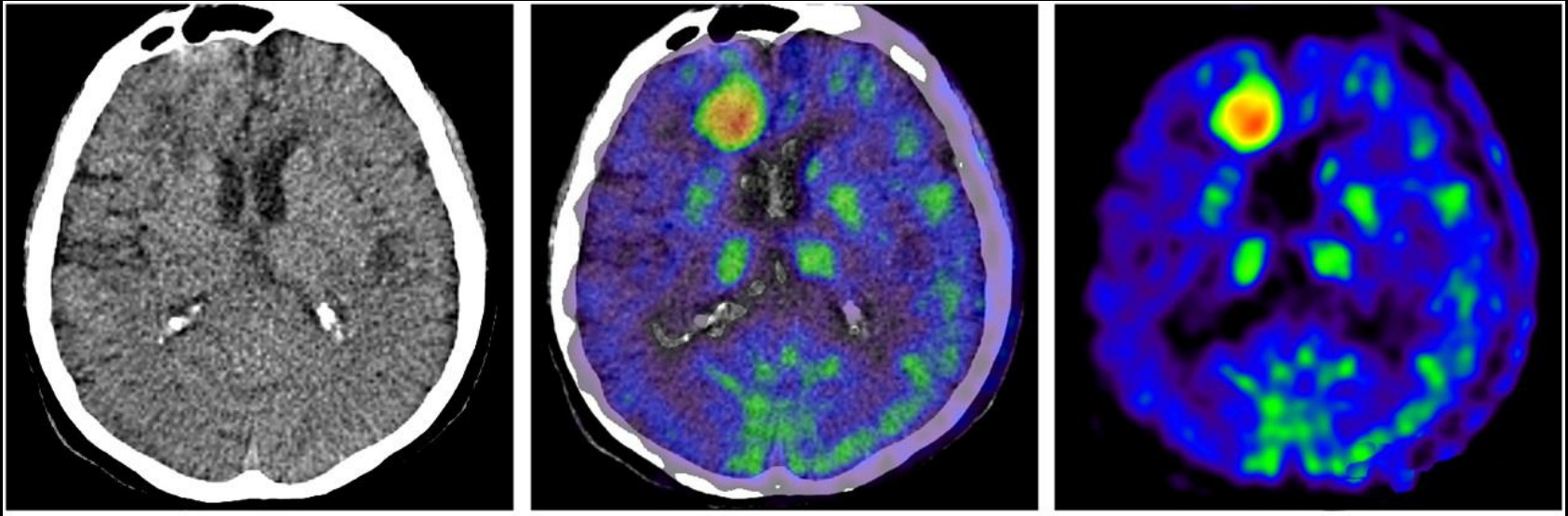


Cervelli colorati

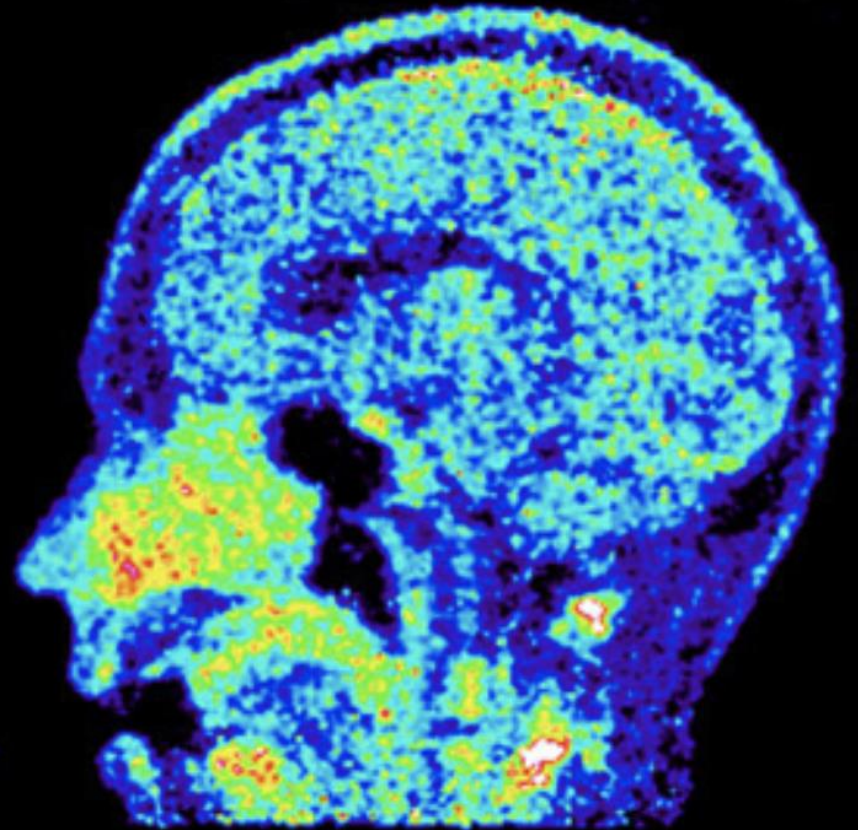


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PET/CT – Hybrid Imaging



Art & Science



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