Co-morbidity of metabolic disorders and neurocognitive disease is becoming a health issue of great concern. Recent findings show that diet-induced obesity and associated metabolic effect can lead to neurological dysfunction, particularly in elderly population, but the effect of a high-fat diet (HFD) on the central nervous system are not well-understood. Moreover, a different vulnerability of neural systems has been observed for female and male with high Body Mass Index (BMI), suggesting a gender effect of BMI and obesity in neurological disease, as dementia and Alzheimer's disease. In vivo molecular imaging techniques as MRI and PET-CT can monitor respectively structural changes and metabolic alterations in specific brain areas that are involved in cognitive decline. Moreover, altered metabolism and connection of brain areas can be coupled with microglia activation process (neuroinflammation) that can be measured with PET-CT. Ad hoc animal models, as the insulin resistance (IR) mouse model, can be created and monitored by MRI, [18F]FDG-PET (metabolism) and [18F]VC701-PET (neuroinflammation). In vivo imaging findings obtained on different groups of animals (male, female, aged, young, normal diet, HFD) can be related to post mortem analysis (IHC and metabolic profile) to deep understand the variations between the different conditions. Moreover, biochemical modifications induced by HFD can be associated with hemato-chemical tests used in clinical practice to fully characterize the elements involved in this multifactorial decline. In particular, glucose consumption and microglia/macrophages activation within the brain can be associated to BMI, hepatic lipid content and peri-abdominal fat.

References:

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