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**Title**: ‘The effect of fatty diets during puberty on energy metabolism and conduct: a problem associated to fats or to metabolic alterations’ (Efecto de las dietas grasas durante la adolescencia en el metabolismo energético y la conducta: un problema asociado a la grasa o a las alteraciones metabólicas).

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**Summary:**

The high consumption of fatty diets induces metabolic disorders such as resistance to insulin and leptin with the resulting development of obesity. Additionally, these diets are related to important deficits in learning and memory and specially when the consumption starts at an early age. Despite that there is a large literature on the subject, many issues related to the consumption of high fat diets (HFD) remain to be clarified. Therefore, we can consider that the effects of HFD consumption are related to 1) the high palatability of fats, which could have a major impact on sensory and motivational aspects of eating; ii) the effect of the fatty acids themselves on specific cellular receptors or targets; iii) the adaptation of energy metabolism to HFD which could be associated with hyperleptinaemia; and iv) inflammation, insulin/leptin resistance and adiponectin hypo-production, etc.... that could occur after consumption of these diets. We hypothesise that the deleterious effects of HFD on brain processes are initially associated with factors related to diet composition and secondly to pathophysiological adaptations such as insulin and leptin resistance or decreased adiponectin production in fat tissue (WAT) and all inflammatory processes.

Based on our previous experience in which we showed that HFD have a direct impact on the hippocampus and prefrontal cortex that explained the deleterious effects of these diets on memory and learning, our main objective is to identify i) the contribution of fats, and ii) the influence of metabolic factors, on the metabolic, functional and behavioural remodelling induced by HFD. The specific objectives of the study are based on understanding the effects of a high oleic (OARD) or palmitic (PARD) diet on i) the emotional brain, to characterise the acute and chronic effect of such diets on eating behaviour and learning and memory processes; ii) brain energy metabolism to characterise the effect of these diets on leptin receptor functionality in the brain areas under study as well as on glial cell energy metabolism, and iii) the contribution of adipose tissue to brain alterations, characterising the effects of these diets on the expansibility and pathological consequences of HFD in the WAT by focusing on the mechanisms of leptin and adiponectin production in adipocytes. The novelty of our project lies in that i) we will compare OARD vs PARD diets in the absence of sucrose as most diets currently in use contain high oleic and palmitic animal fat and large amounts of sweet and rapidly assimilated carbohydrates; ii) we will investigate the influence of hyperleptinaemia and leptin resistance on limbic brain damage using a genetic model that lacks leptin receptors in astrocytes. This study will provide relevant information on the role of leptin and glia in brain damage; iii) we will characterise the effect of the OARD and PARD diets on adipose tissue, studying the expandability, adipocyte differentiation and expression of leptin and adiponectin.