



Importance of nutritional fatty acids in thermogenic adipocyte metabolism: Fighting obesity using fat

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The increasing prevalence of **overweight** and **obesity** has reached “epidemic” proportions with more than 2 billion of overweight persons (BMI>25 kg/m²) and 650 million of obese persons (BMI>30 kg/m²) in the World (World Health Organization). In most cases, this situation is induced by **imbalance between entries and energy expenditure** leading to increase of **white adipose tissue** (WAT) mass with metabolic and inflammatory comorbidities. The recent discovery of functional **brown and brite (brown-in-white) thermogenic adipocytes**, in adult humans, has led to the consideration of their use to increase energy expenditure in the treatment of overweight, obesity and associated diseases.

Nutritional lipids and fatty acids stored into adipocytes are the main substrates for adaptive thermogenesis but are also involved in brown adipose tissue (BAT) development and function. **Quality and quantity of dietary fatty acids**, mainly poly-unsaturated (PUFA) **ω6 and ω3**, control the kind of metabolites synthesized that are involved in several physiological and inflammatory processes. Recently, our laboratory showed an inhibitory effect on thermogenic activity by a PUFA ω6 arachidonic acid and some of its metabolites called **oxylipins**.

We aim to detect distinct oxylipins which are associated with thermogenic adipogenesis and thus potentially able to increase energy expenditure. For this purpose, we performed **omics analysis** on **murine and human adipose tissue** biopsies and on our **human cell model** (human Multipotent Adipose Derived Stem cells, hMADS). We analyzed data from **RNAseq** and **lipidomic profiles (LC/MSMS)** of our biological samples to identify oxylipin candidates. The technical discussion will address several questions on **sample preparation** due to adipose tissue and thermogenic phenotype specificities.

We identified several interesting compounds which displayed high levels in murine and human thermogenic tissues and exhibited significant **correlations with thermogenic markers**. Using our human cell model (hMADS cells), we performed molecular and functional analysis to shed some light on potential role of these oxylipins. During my technical presentation, I will discuss the lipids available **commercially for in vitro use**.

Talk in French. Q&A in French and English.