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Seed oil from *Pinus radiata* promotes beneficial morphological and inflammatory changes in visceral adipose tissue from high-fat diet-induced obese mice

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Obesity and overweight are increasingly common conditions associated with poor-quality diet. These conditions trigger hyperplasia and hypertrophy of adipocytes and inflammation, therefore targeting this tissue and its local inflammation became the most effective therapeutic approach to overcome obesity. Previous studies have revealed that oils derived from the *Pinaceae* family, commonly used as a dressing in the Asian cuisine, suppress appetite, however it remains unknown whether seed oil from *Pinus radiata* exhibit any beneficial effect on adipose tissue morphology or inflammatory state. In this study, we analysed the effect of a *P. radiata* seed oil-based supplement (SuplD) on a murine model of high fat diet (HFD)-induced obesity. Female C57BL/6J mice were fed with HFD for 3 months until obesity was established. Then, obese mice were randomized and divided into 3 groups: under HFD supplemented with 15% w/w SuplD, under HFD supplemented with 15% w/w Glycine max oil as a negative control, and under HFD without supplementation as untreated control. After 3 months post supplementation, mice treated with SuplD showed increased frequency of small adipocytes within the visceral adipose tissue in comparison with controls. Moreover, increased presence of small adipocytes niches containing pre-adipocytes, identified as CD34⁺, CD29⁺ and CD45⁻, and increased Von Willenbrand Factor expression, indicating increased adipose vascularity, were also observed in tissues from mice treated with SuplD. Finally, when immunological parameters were evaluated, we observed increased IL-10 and Arginase-1, and reduced TNF- α and IL-6 expression in visceral adipose tissue samples from mice treated with SuplD compared to control groups. Altogether, our results suggest that oral administration of a *P. radiata*-based supplement in obese mice promotes hyperplastic growth of small adipocytes, increases vascularity in the visceral adipose tissue and an anti-inflammatory local environment. These observations suggest that *P. radiata* seed oil could be clinically relevant in human obesity.

Recent Publications

1. Wensveen, F M, Valentić S, Šestan M, Turk Wensveen T and Polić B (2015) The “Big Bang” in obese fat: Events initiating obesity-induced adipose tissue inflammation. Eur. J. Immunol. 45(9): 2446-2456. Doi:10.1002/eji.201545502.
2. Sanchez Gurmaches J and Guertin D A (2014) Adipocytes arise from multiple lineages that are heterogeneously and dynamically distributed. Nature Communications. 5: 4099. Doi:10.1038/ncomms5099.
3. Xiao Yu, Yuhua Tang, Peiyi Liu, Lin Xiao, Liegang Liu et al. (2017) Flaxseed oil alleviates chronic HFD-induced insulin resistance through remodeling lipid homeostasis in obese adipose tissue. Journal of Agricultural and Food Chemistry. 65(44): 9635-9646. Doi: 10.1021/acs.jafc.7b03325.
4. Jeffery E, Church C D, Holtrup B, Colman L and Rodeheffer M S (2015) Rapid depot-specific activation of adipocyte precursor cells at the onset of obesity. Nature Cell Biology. 17(4):376-385. Doi:10.1038/ncb3122.
5. Amano S U, Cohen J L, Vangala P et al. (2014) Local proliferation of macrophages contributes to obesity-associated adipose tissue inflammation. Cell Metabolism. 19(1):162-171. Doi:10.1016/j.cmet.2013.11.017.

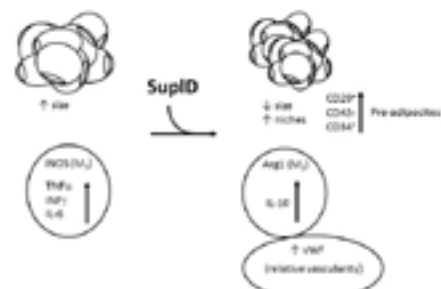


Figure : *Pinus radiata* seed oil supplementation induces favourable morphological and anti-inflammatory effects on visceral adipose tissue. In a murine model of high fat diet (HFD)-induced obesity, *P. radiata* seed oil-based supplement (SuplD) administration increased the number of niches with small pre-adipocytes, improved vascularity and reduced inflammation in visceral adipose tissue.

Biography

Daniela Rojas is a Medical Technologist working at the Department of Veterinary Pathology, University of Concepción. She has worked with different research groups in the Faculty of Veterinary Science for over 15 years.

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