

# AFES INVESTIGATOR AWARDS

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## Browning Effect of Differentiating 3T3-L1 Preadipocytes by Osteopontin

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### Objective:

Obesity is a worldwide metabolic disease that is induced by excessive energy consumption and accumulation of white adipocytes. On the other hand, brown adipocytes can expend energy to suppress obesity. In this study, we investigated whether osteopontin (OPN), a cytokine secreted primarily from bones known for triggering adipose tissue remodeling, induces browning on differentiating 3T3-L1 preadipocytes.

### Materials and Methods:

3T3-L1 preadipocytes were differentiated for 5 days and treated with OPN (0M, 1nM, 10nM, and 100nM) for either 2 hours or 2 days. After each treatment, lipid accumulation was measured by Oil Red O staining. At day 7, cells were harvested and lysed in RIPA buffer. Western blot analysis was conducted for the assessment UCP1, PGC-1 alpha, PRDM16, PPAR gamma, C/EBP beta, and p-ERK proteins. GAPDH was used as a control.

### Results:

OPN treatment significantly decreased the size of lipid droplets, especially in the 2 hour group. OPN treatment increased UCP-1, PGC-1 alpha, PRDM16, and p-ERK expressions compared to control. Cells treated with 10nM appeared to be the most responsive. There were no significant changes in the expressions of PPAR gamma or C/EBP beta.

### Conclusion:

OPN induced activation of brown adipogenesis marker proteins from white adipocytes. Normal physiological levels of osteopontin promoted the maturation of preadipocytes into brown adipocytes. These results indicate that physical exercise may help treat obesity by turning white adipocytes into brown adipocytes by osteopontin.