

**NOVEL MECHANISM OF ADIPOGENESIS THROUGH CROSS-TALK BETWEEN ADIPOCYTES, ADIPOSE TISSUE MACROPHAGES AND ADIPOSE STEM/PROGENITOR CELLS**

Gregorio Chazenbalk<sup>1,2,4</sup>, Joel Aronowitz<sup>3,5</sup>, James Watson<sup>4</sup> and Ricardo Azziz<sup>1,2,4</sup>.

<sup>1</sup>Department of Obstetrics and Gynecology, Cedars-Sinai Medical Center, Los Angeles, CA; <sup>2</sup>Center for Androgen Related Disorders, Cedars-Sinai Medical Center, Los Angeles, CA; <sup>3</sup>Department of Surgery, Division of Plastic Surgery, Cedars-Sinai Medical Center, Los Angeles, CA; <sup>4</sup>David Geffen School of Medicine at UCLA, Los Angeles, CA; <sup>5</sup>University of South of California, Los Angeles, CA

**Introduction:** Adipose tissue is a complex population of cells that modulate not only adipose tissue biology, but also insulin sensitivity, reproductive and endocrine systems, and inflammation. Adipose tissue is not only composed of adipocytes, adipose tissue macrophages (ATMs) and vascular tissue, but also contains adipose stem/progenitor cells (ASCs). We have previously demonstrated that co-culture of adipocytes, ATMs, and ASCs results in the robust proliferation of preadipocytes.

**Objective:** To further characterize these new preadipocytes, we studied their behavior in adipogenic medium.

**Research Design and Methods:** Human adipocytes and the stromal cellular fraction containing ATMs, ASCs were isolated from human adipose tissue and co-cultured for 24 hours. Preadipocytes generated after co-culture were treated under adipogenic conditions and characterized by Red Oil O staining and adiponectin secretion.

**Results:** Preadipocytes generated after co-culture were rapidly converted into adipocytes under adipogenic conditions. Multiple lipid inclusions were observed in these preadipocytes after only 12 hours of exposure to adipogenic medium. Many of these adherent cells start turning round and were (+) stained with Red Oil O. In addition, floating adipocytes were also observed under these conditions. Adiponectin secretion by all these cells reached a 17-fold increase compared to that from cells derived without co-culture under the same adipogenic conditions ( $p < 0.05$ ).

**Conclusions:** Accumulation of new adipocytes can be produced via cross-talk between adipocytes, ATMs and ASCs. Understanding the regulation of this novel adipogenesis pathway could lead to new treatments for obesity, inflammation and type 2 diabetes and could also have far reaching implications for tissue regeneration.

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