Modulating PGC-1α Expression to Model Body Shape

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Abstract

Modelling body shape is a common concern of modern society and the amount of subcutaneous fat and its distribution greatly influences physical appearance.

As we age, the amount of fat decreases and is redistributed from the subcutaneous stores to visceral depots, diminishing the volume of several regions of the body. On the other hand, due to several factors such as genetics or high caloric intake, fat deposits of human white adipose tissue (WAT) can expand to such a great extent that they push and distort the connective tissue, inducing irregularities in the dermo-hypodermal junction line and leading to an increase of local volume and to the appearance of cellulite.

Mature white adipocytes have the capacity to store fat, so that acting on their differentiation cycle could help to locally diminish or increase lipid storage in WAT. The differentiation process from preadipocytes to mature adipocytes is a complex process known as adipogenesis in which many factors and genes participate.

It was reported that in WAT, PGC-1α interacts with PPARγ, which regulates gene expression in cellular differentiation, potentiating the expression of relevant genes related to adipocyte differentiation, thus stimulating adipogenesis.

Two new products have been developed to modulate PGC-1α expression and so influence in adipogenesis and lipid accumulation. Adifyline™ (INCI name: Acetyl Hexapeptide-38) induces PGC-1α expression, thus stimulating adipogenesis and leading to an increase in lipid storage. In contrast, Silusyne™ contains a hexapeptide (INCI name: Acetyl Hexapeptide-39) included in a novel delivery system, which decreases PGC-1α expression and shortens the dermo-hypodermal junction.

Introduction

Nowadays, age-related effects on the human body are not considered attractive. As we grow older, skin gets thinner, it loses firmness, it is pulled downwards by gravity and there is a loss of the skin-connected adipose tissue, which acts as a supporting element. All these factors turn the skin looser, laxer and saggier, altering facial morphology and provoking undesired and visible changes when ageing[1]. As the face is the most exposed area of a person, undesired facial alterations can result in related effects on personal appearance.

Modelling body shape is a common concern of both women and men in modern society and the amount of subcutaneous fat and its distribution greatly influences physical appearance. Lipid storage and arrangement in the body depends on eating habits, exercise, age and hormone levels. In women, fat is mainly stored in the buttocks, thighs and hips due to the influence of oestrogens. However, in men and menopausal women fat accumulates at the waist and in the abdominal area.

On the other hand, the amount of fat decreases and is redistributed from the subcutaneous stores to visceral depots with age. Consequently, the volume of several regions of the body (such as the cheeks, breast or hands) diminishes, which results in a visibly older appearance[1]. Stimulating adipose tissue growth in some areas could help to recover the volume lost as a consequence of ageing.

The relevance of the breast in the silhouette becomes an aesthetical concern for all women. The adipose tissue represents a high percentage of the total gland composition, so a variation in adipose tissue volume provides a substantial effect on the gland as a whole, becoming a basic for determining breast shape and size.

The main role of fat is to store calorically dense fatty acids. Subcutaneous fat tissue is not subject to anatomic constraints to growth, so it is able to experience rapid and extensive changes in size. Growth is accomplished through changes in fat cell size or number that vary in magnitude among fat depots[2].

Adipose tissue is a specialised connective tissue strategically located beneath the skin. Two types of adipose tissue have been described according to their main function and their kind