A new scientific era in biomedicine – regenerative surgery based on lipotransplant. New therapeutic horizons for HIV-positive patients

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Editor

Very often the psychological repercussions of lipodystrophy in HIV infected patients are important to a level that can reach reluctance to antiretroviral therapy or lead to depression and anxiety. In some patients' opinion, it is easier to live with HIV than with lipodystrophy. The facial appearance is perceived by the patient and the society as a stigma of this particular condition, with all negative consequences. We know that HIV-related lipodystrophy (first described in '97 and '98) is expressed by peripheral atrophy of the face, limbs and buttocks, simultaneous with central fat accumulation (visceral), as well as in the breasts, neck and dorsocervical area (the so-called "buffalo hump"). These features coexist with subcutaneous lipomas and metabolic disturbances such as insulin resistance, hypercholesterolemia and hypertriglyceridemia.

Although the distribution of the adipose tissue is unbalanced (visceral increase and peripheral decrease) with overall fat loss, the mean body mass is preserved.

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The pathogenesis of HIV lipodystrophy remains unclear. Consistent studies (cohort and in vitro) of adipocytes, skeletal muscle and hepatocytes point toward a complex of factors involving antiretroviral theories, environmental and host-related aspects.

The most effective treatment for facial lipodystrophy in HIV positive patients is still to be found; numerous treatment attempts have been made, based on changes in antiretroviral therapy, addition of other drugs (such as growth hormones, insulin, steroids), lipid-lowering drugs, diets or exercising, but these attempts have often proved disappointing. Even the nonresorbable or (slowly) resorbable fillers came with their high rate of complications.

In this light, the newly born regenerative plastic surgery seems to be a very promising therapeutic solution. It is important to mention the brilliant scientific and practical contribution of pioneers in this field: S. Coleman, J.M. Serra-Renom, J. Fontdevila, M. Eisenmann-Klein, G. Rigotti, N. Pallua, P. Rubin, W. Futrell, R. Khouri, R. Mazzola, K. Yoshimura.

Although facial fat grafting for HIV infected patients began in the late '90s, the techniques (and instruments) have only recently become more refined, more precise, with a higher degree of predictability. And very importantly – there is more (although still not enough) science behind this approach, leading to a better understanding of the composition and behavior of the various cellular populations and other components

generically called "adipose tissue", which will soon probably be named "adipose organ".

The new researches and applications on adipose tissue revealed a whole fascinating universe of new therapies and scientific paths. "Adipocytes", "preadipocytes", "ADSC's" (adipose-derived stromal cells), "niche", scaffold, cell-cell interaction, blood circulating factors, paracrine factors, cell-matrix interaction, neurotransmitters, are key terms and, in the same time, key elements involved in regenerative surgery using fat transplant, leading to healing processes in facial HIV lipoatrophy. This novel type of closed surgery requires harvesting of the fat from the excessive deposits, which is then slowly centrifuged and transplanted with very fine instruments. The transplanted fat is stimulated with Fractional CO_2 LASER (λ10600 nm) and with diode LASER (λ860 nm) as promising additional therapy due to LLLT (low level laser therapy). The LASER has at least two effects, acting to improve the quality of the skin (which is often very damaged) and optimize the take of the adipose graft.

Due to the systemic effect of LLLT (and the derived photoproducts described by Mester and Oshiro), it is possible to record normalizations of remote tissue (cellular) disturbances. To improve skin condition and fat graft survival, one other additional simultaneous therapy can be performed – PRP (platelet-rich plasma), which contains growth factors.

The science has still to deepen the good, often remarkable clinical results.

The therapies based on self cellular regeneration with autologous products (adipose tissue transplant and stem cells, PRP) acting in synergy with light (LASER) energy and the science behind them, appear as an interesting, vast "station" for treating various conditions including HIV lipoatrophy, until the next scientific challenge, such as gene engineering therapy, becomes available.

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