

Adipose Tissue Metabolism: An Overview

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- **Introduction**

Before earlier '50s., it was generally believed that adipose tissue was a simple repository of fat. The first report suggesting fat was an active metabolic tissue was published by Von Gierke (493), who noted that glycogen accumulation in adipose tissue took place if an animal had been fasted and re-fed or else overfed from the start. He concluded that the adipose tissue had its own internal metabolism.

However it was not until 1965 that an acceptable review on the subject was published, comprising 894 pages, 69 chapters and about 4.100 references on adipose tissue metabolism.

Now it is widely recognized that the main function of the fat cells is to act as a reservoir of energy, as tryglicerides, but it has also been implicated in sex hormones metabolism (473).

The fat cell is one of the most metabolic- active tissues all over the human body, nearly triplicating the blood circulation of any other organ (155-264-414).

Adipocytes from living species are specially adapted for the uptake and release of energy in the form of fatty acids. Fatty acids accumulate in the form of tryglicerides inside the fat cell, and released as fatty acids back to the circulation as needed (13-298-393-467).

Depending on its localization, adipocytes show different metabolic turnovers (307)

The mature fat cell contains a large lipid vacuole, which stretches the cytoplasm and displaces the cell nucleus to the periphery of the cell, showing the classic "signet-ring" appearance .

For these metabolic purposes the fat cells have two poles: a lipogenic, where fatty acids are taken up form the circulation, and a lipolytic, where tryglicerides accumulated in the fat cell are released back into the circulation (119)

Both poles are, in turn, subjected to different metabolic regulation, which we will briefly discuss.

- **The Lypogenic Pole**

Fatty acids for triglycerides synthesis are derived from hydrolysis of circulating lipoproteins by LPL (lipoprotein Lipase), an enzyme that hydrolyzes chylomichrons and very Low Density Lipoproteins to fatty acids (197-221-222-348-384-413) .

Since potentiality for blood fatty acids synthesis from capillaries is minimal, the former represents the most important metabolic pathway for triglycerides synthesis and later deposition into the fat cell.

The activity of LPL (and consequently the apposition of fat into the fat cell) exhibits different activity levels depending on:

1. Nutritional status: It decreases during fasting or diabetes, and rises in the fed state (261-374)
2. Fat topography and sex: During fertile life women tend to accumulate fat (LPL High) preferentially in the femoral region compared to the abdominal, which is difficult to mobilize (59-375-376-377-378-465).
3. During pregnancy the above mentioned findings are even more pronounced than while lactancy. In the latter condition, triglycerides are no longer taken up preferentially in the femoral region.
4. Age: LPL Activity decreases in women's femoral region during menopause. The same phenomena can be observed in males abdominal region after their sixties .

- **The Lipolytic Pole**

The lipolytic pole of the fat cell has been more researched, and obviously is more understood than the lipogenic one (212-215-439)

A complex system of hormones and enzymes controls fatty acids release from adipocytes: insulin, adrenergic receptors, thyroid hormones, adrenal steroids. Phosphodiesterase activity, Proteinkinase, Hormone sensitive Lipase (HSL) (440).

Activation of the adenylate cyclase by different substances generates cyclic AMP, which provokes a cascade of protein phosphorylations, the final step being the phosphorylation and activation of the Hormone sensitive Lipase, which proceeds in turn to the enzymatic attack of stored triglycerides (151-253-350).

An interesting, and beneficial aspect from the therapeutic viewpoint, is the finding that human adipose tissue possesses both Alfa and beta-cell membrane adrenoreceptors. Binding of agonist to the beta receptor enhances lipolysis, where an agonist that bind to alfa2 receptors inhibits lipolysis.(16-17-18-19-20-21-22-23- 88- 148- 149- 153- 284- 292 - 303-394-498-499-500)

Lipolytic response to epinephrine (both beta 1 and alpha 2 adrenoreceptors) is more marked in abdominal than in gluteal or femoral tissues. Moreover, it has been suggested that the male pattern of body fat distribution (fat mainly located in the abdominal region), may reflect greater

alpha2 activity in the abdominal tissue of men.

Recent reports have demonstrated the possibility to locally modulate those adrenoceptors, to improve Body Contour deformities.

When compared obese patients managed with a Standard Hypochaloric Diet submitted (or not) to adrenergic agents (lipolytic), regions treated with Adrenergic drugs showed greater circumference reduction in treated areas, as related to control sites.

It may be possible that these Investigations bear some relevance to the treatment of Obesity.

This approach could hit both targets at the same time: rapid weight loss and a pleasant body contour remodeling after treatment.





Daniel Belluscio M.D

Most of his medical career has been devoted to the study of the hCG method for weight loss.

He spent many years at the Bellevue Klinik- Switzerland., an institution with the most impressive record of hCG-treated patients

He has traveled extensively, lecturing on the method in the USA, Sweden, Italy, Germany and Israel. In 1991, he developed a protocol for the oral administration of hCG.

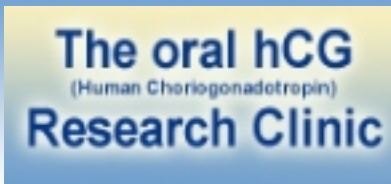
In conjunction with Dr. Vogt, head of the Bellevue Klinik, he published several **reports on the method** for Healthcare Professionals and articles on the subject **for the general public**.

He also published preliminary reports on the Clinical utility of **hCG for alcoholism problems** management

In 1987 Dr. Belluscio founded the oral hCG Research Clinic, an institution for obesity research. Records show that the Clinic has used the oral hCG approach on 6,540 patients to-date. This reliable and effective method for obesity management has been validated by **the appropriate Double-Blind studies**

Dr. Daniel Belluscio's medical qualifications

- Specialist in Internal medicine
- Specialist in Bariatric Medicine
- Researcher- **Bellevue Klinik- Switzerland**
- Researcher- **Marbert Laboratories - Germany**
- Guest Researcher-**Clínica Planas- Barcelona-Spain**
- Visitor- University of Utrecht- Holland
- Visitor- Institute of Medicine II- Gothenburg- Sweden
- Visitor- Serono Laboratories- Milan- Italy
- Director- IFCOR (International Foundation for Choriogonadotropin Research)
<http://hcgobesity.org/ifcor>
- Director- Indexmedico- <http://indexmedico.com>



Important notice

You will find three different options related to bibliographical references:

- Those corresponding to the reports on hCG and obesity. File size: 17 KB.
- The comprehensive list related to the review article on obesity and adipose tissue metabolism, plus the reports on hCG and obesity.
The size of this page is 314 KB (521 References). Due to this file size, you may:
 - **A. Download the comprehensive list : .ZIP Format**
 - **B. Browse the entire content in HTML format**
 - **C. Go to selected references**

Importante:

Existen dos páginas de referencias bibliográficas:

- La correspondiente al trabajo de revisión sobre obesidad , metabolismo del tejido graso, (el tamaño de ésta es de 314 KB) y
- Aquellas relacionadas con el uso de la hCG en la obesidad.

Usted puede descargar:

- A. La version completa en formato .ZIP**
- B. Ver todas las referencias en formato HTML**
- C. Ir a las referencias seleccionadas**

Momentáneamente Usted puede sólo acceder a la versión en Inglés del trabajo, dado que fue redactado en dicho idioma en su forma original. Próximamente estará disponible en las dos versiones (español - inglés). Gracias por su comprensión.

The oral hCG
(Human Choriongonadotropin)
Research Clinic

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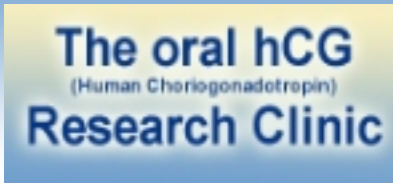
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The use of oral hCG (Human Choriogonadotropin) for the management of alcoholism: a preliminary report

Author: Daniel Oscar Belluscio MD

Introduction:

An incidental finding in our research on the clinical utility of hCG (Human Choriogonadotropin) was that several patients, with known past history of alcoholism and submitted to an hCG course of treatment, spontaneously quit drinking during the period they received the medication.

(For info on our Research visit: <http://indexmedico.com/english/obesity/hcg.htm>)

Since we have found no data in the medical literature regarding this aspect, we initiated a serial of studies to ascertain whether this finding could have any clinical and therapeutic significance.

This preliminary communication reports the results of an uncontrolled and preliminary Research carried out to test the validity of our clinical suspicions.

Material and Methods:

A group of 30 patients were randomly assigned for evaluation. They consisted of 22 males and 8 females, with ages ranging from 35 to 60 years old. All of them had a known past history of alcoholism, 10 of them regularly assisted to AA (Anonymous Alcoholics) meetings.

Since all our subjects were overweight (ranging from 25 to 42 BMI, Body Mass Index) they were indicated an hCG course of treatment, consisting of a daily oral dose of hCG (from 250 to 600 IU/day), plus a Very Low Calory Diet (VLCD) furnishing 500 Kcal/day.

The study lasted seven weeks. After that period they were prescribed a maintenance diet, and hCG was discontinued.

Results:

Patients received a dose ranging from 250 to 600 IU of hCG orally administered diluted in saline Solution, plus a diet furnishing about 500 Kcal/day (They requested assistance for their overweight).

After four weeks of treatment, 40% of treated patients reported that they spontaneously quit heavy drinking. The referred subjective sensation was they "do not feel the desire to drink", refraining from drinking even when social pressures usually forced them to drink . About 10% of patients absolutely quit alcoholic beverages during the treatment period. All of them slowly resumed their habits 2-3 months after discontinuing the treatment.

Since these incidental findings merit further investigations, we have outlined a research protocol on the subject, where we will intend to disclose the real significance of this clinical report.

Conclusions:

Alcoholism is a serious social and health problem with no pharmacologic solutions on sight. Since oral administration of hCG proved no side effects, it might be tempting to carry out a serious controlled study on the topic, including a long term follow-up of treated patients, to ascertain whether a prolonged administration of hCG might be of use in these patients.

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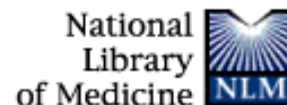
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Controversies in plastic surgery: suction-assisted lipectomy (SAL) and the hCG (human chorionic gonadotropin) protocol for obesity treatment.

Vogt T, Belluscio D.

The advent of SAL (suction-assisted lipectomy) has dramatically increased the number of obese patients coming to our consultation offices. Despite several articles suggesting a conservative approach to fat suction, some reports insinuate that SAL might be a useful tool for obesity treatment. This hypothesis is refuted by a vast body of evidence that concludes that the adipose tissue may regenerate in adult humans. Therefore, surgical procedures are not advised as the method of choice to manage the disease. On the other hand, the terms obesity and being overweight may not be interchangeable. Obesity may be a disease whereas being overweight is a sign of the disease. Consequently, proper preoperative selection of candidates for SAL becomes mandatory. The hCG (human chorionic gonadotropin) method for obesity treatment appears to be a complete program for the management of obesity. It contains pharmacologic, dietetic, and behavior modification aspects in a 40-day course of treatment. Some data suggest hCG to be lipolytic, thus explaining former clinical observations regarding body fat redistribution in treated patients. hCG commercial preparations contain beta-endorphin, an opioid peptide linked to mood behavior. This article speculates on the possible actions of the complex hCG beta-endorphin in the neuromodulation of mood and energy metabolism. The method comprises a behavior modification that helps in handling the patient better. There are some correlations between a current behavior modification program and the basic guidelines contained in the hCG protocol. Thus, the hCG method appears to be a reasonable alternative in the management of a long-standing, unsolved problem of human metabolism.

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