PILOT CLINICAL STUDY OF NEOPUNTIA® ON FAT BINDING

Abstract
10 healthy volunteers (5 women and 5 men with a Body Mass Index of 23.3 Kg/m2; standard deviations 3.1) participated in a monocentric double-blind placebo controlled crossover study.
The test participants were randomly divided into two groups, one receiving NeOpuntia® and one receiving placebo. All the volunteers consumed 1.6g of NeOpuntia® per meal in the form of capsule, during one week and placebo during the same time with a washout period between this two test periods. A strict diet with standardized meals was followed by the volunteers to ensure a standardized intake of lipids. The effect of the product dose in intestinal absorption fat was evaluated by measuring steatorrhea in 3-day-old faeces, at the end of the two 7-day product consumption periods.
The quantity of fat content excreted compared to the quantity ingested increased on average by 27.4% in group volunteers with the dose of NeOpuntia® compared with the placebo. No side effects, or particular discomfort were observed with the dose of NeOpuntia®.
These results suggest an effectiveness for an application of NeOpuntia within the framework of meals rich in fat content.

Key Words: fat, binding, NeOpuntia®.

I. Background

The positive response to NeOpuntia® has allowed Bio Serae to conduct additional studies aiming at better understanding its mechanisms of action and its efficacy.

NeOpuntia®, regulated as a food product in Europe, is a powder made from the oval leaves (also called pads) of the prickly pear (nopal) cactus. These cactus leaves have been traditionally eaten in Mexico and southern Europe.

Several clinical studies, published by the department of internal medicine at the Hospital of Mexico City, demonstrated the health benefits on cholesterol and triglycerides levels from eating the dried or fresh leaves of the prickly pear cactus. (Frati-Munari A.C, et al., 1983 ; Frati-Munari A.C, et al., 1990, Frati-Munari A.C, et al., 1992 ; Fernandez M.L., et al, 1994).

The efficiency of NeOpuntia® (weight loss, reduction of triglycerid and LDL-cholesterol levels in the blood) was shown through two clinical trials (not published) that were carried out by existing Bio Serae customers.

NeOpuntia® was, in these two cases, the major ingredient in a multiple ingredient formulation.

NeOpuntia® is already marketed in Europe, the USA, Canada and Japan. BIO SERAE holds a patent on an original manufacturing process which makes it possible to standardize the activity of binding NeOpuntia® to fat. This activity is measured on each batch using an in vitro test.

BIO SERAE also took the initiative to perform a second internationally renowned in vitro test, the gastro-intestinal model of TNO (NL). This independent laboratory has shown that NeOpuntia®, used alone, decreases the intestinal absorption of the lipids by 28.3% in comparison with a placebo (Smeets-Peeters M.J.E., et al., 2001).

In order to confirm the hypothesis of NeOpuntia® ‘s efficacy in binding to fat in vivo, BIO SERAE wished to set up a pilot clinical study financed with assistance from the French region of Languedoc-Roussillon (PRAT- pôle Santé)

II. Methods

This pilot clinical study, designed to show the fat binding capacity of NeOpuntia®, was carried out in July 2003 in France on 10 healthy volunteers (5 women and 5 men) each having a normal body mass index.

The study was conducted double blind placebo controlled with two randomized and crossed groups (thus each volunteer is his/her own witness). The study volunteers consumed 1,6g of NeOpuntia® with each meal or placebo in the form of a capsule for one week while following a strict diet of standardized meals in order to carefully control the consumption of lipids.

Following the first week of testing, a 7-day period without any product allowed for a "washout" period before introduction of the next 7-day testing period.

The evaluated parameters was steatorrhea (lipid levels in stool samples)

Table 1 : Nutritional facts of NeOpuntia®

Nutriments	100 g of NeOpuntia®	5 g of NeOpuntia®
Energy - in kcalories - in kjoules	 340 1423	 17 71,15
Protids (g)	4	0,2
Lipids (g)	2,5	0,1
Total Fibers*(g)	43,7	2,2
Cellulose and Hemicellulose** (g)	19,2	0,96
Soluble sugar (g)	12,4	0,6
Calcium (g)	6,2	0,3
Vitamin A (µg)	130	6,50
Dry matters (%)	93,5	4,7
Ashes (g)	19,8	0,99

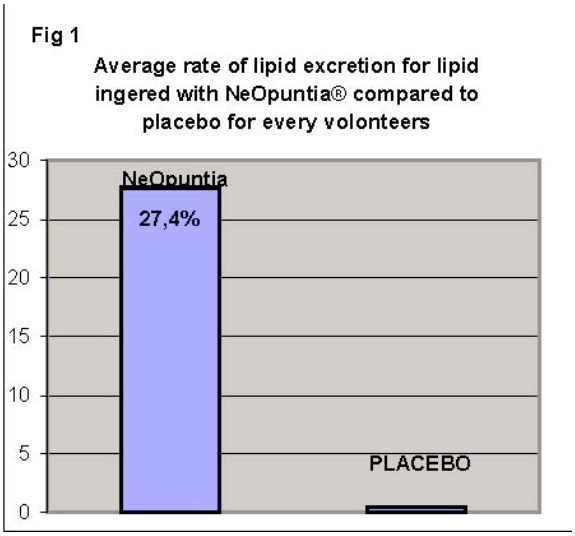
* Analysis method : AOAC 1997 (Sigma TDF 100A)
** Analysis method : NF V03-040 (cellulose)
Van Soest P.J. (1963;1967)

III. Results

The following results were observed:

NeOpuntia® increased on average by 27.4% the rate of lipids excreted for lipids ingested, compared with placebo in the group of volunteers.

Fig 1



·No particular side effects were observed with the dose of NeOpuntia®.

·The administered dose caused no particular discomfort during the test.

Table 2 : extract from tolerance interview about the product

Does taking the product induce modification in your general mood, emotional, sensorial or physical feeling?	
YES 0%	NO 100%

IV. Analyses of Results

The results suggest that NeOpuntia® affects on average the assimilation of fat following a heavy meal.

The consumption of 5 g of NeOpuntia® per day increases elimination of fat in feaces in certain subjects having an BMI (Body Mass Index) considered as normal, without awkward side effects.

The effect of NeOpuntia® on the capacity to bind fat is related to its composition of insoluble fiber (NeOfiber™) and soluble fiber (NeOmicel™).
Its rich composition of soluble and insoluble fibers triggers two mechanisms of action:

- First, the NeOfiber™ fiber establishes hydrophobic connections with part of the food lipids in the upper part of the stomach. These connections are irreversible, thus preventing the effects of pancreatic lipases and reducing absorption of the lipids in the intestines.

- Next, the NeOmicel™ fiber and in particular the mucilage, form a gel in the stomach allowing stabilization of the hydrophobic interactions and the natural elimination of trapped lipids.

Indeed Neopuntia® is particularly rich in fibers with an average content of 43.7% fiber compared with, for example, 10% in oat flakes. (Sources : Répertoire Général des aliments du Ciqual – édition Lavoisier)

Moreover, the *in vitro* study on a dynamic TNO gastro-intestinal model which simulates the real conditions of digestion showed, everything being equal, that NeOpuntia® had an effect of retention of 28.3% of lipids.

No matter how conclusive the results of this model were, BIO SERAE was not fully satisfied with this modeling of the digestive system, which is a very complex organ but do not reproduce the *in vivo* reality.

In addition, NeOpuntia® does not bind to a significant degree to the liposoluble vitamins A and E (results of studies conducted by an independent laboratory).

This pilot study made it possible for BIO SERAE to reorient and refine the protocol for the next stage. The second part of the study is being prepared and will take into account anthropometric measurements, the blood triglycerides and cholesterol levels. The end of 2004 expects the results of the next study.