

ANNURTROFIL®

Clinically tested dry extract of Annurca Apple

A collection curated by the finest in their fields.

Hair health

- Hair density increase
- Hair loss prevention and reduction
- Hair mass increase

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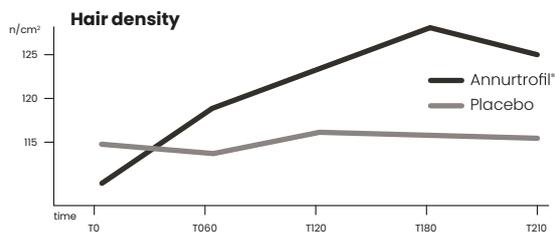
The Annurca apple is a variety of apple from the Southern Italian Region of Campania. The distinctive taste and composition of the phytocomplex depend on the ecological context in which these fruits grow and on their special ripening process that does not take place on the tree. After being harvested unripe, the apples are arranged on special structures stuffed with straw on the ground where they are turned continuously by hand until the skin has taken on a uniform blood-red color.

ANNURTROFIL® is characterized by a complex mixture of polyphenolic compounds, especially procyanidin B2 (60–90 µg/g).

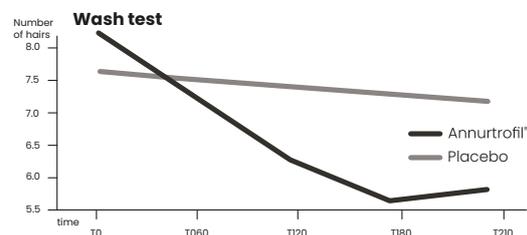
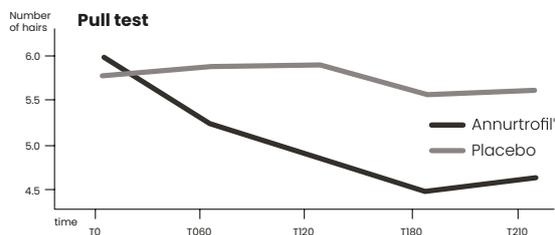
The product was tested in a clinical trial involving 80 enrolled subjects with alopecia, divided into 2 groups: 40 subjects took ANNURTROFIL® and 40 subjects took the placebo.

The ANNURTROFIL® significantly affected hair loss. Hair density and weight significantly increased and hair loss significantly decreased over time ($p < 0.001$). Moreover, a fairly good pleasantness and a good skin and gastrointestinal tolerability were observed, confirming its conformity with use.

Hair density significantly increased over time. In the group treated with the active, compared to the baseline, an increase of hair density was observed **starting from 60 days** of treatment, and after 180 days there was an increase of hair density by **14%**.



In turn, **hair loss significantly decreased** over time. In the pull and wash tests, in the group treated with the active, compared to the baseline, a reduction in the number of hairs lost was observed **starting from 60 days** of treatment, and at the end of treatment there was a reduction of hair loss by **26% in the pull test** and **33% in the wash test**.



Also, **hair weight significantly increased** over time. In the group treated with the active, compared to the baseline, an increase in hair weight was observed **starting from 60 days** of treatment, and after 180 days there was an increase in hair density by **34%**.

The effects of the Annurca apple extract were also investigated in six-weeks-old C57BL/6 mice by orally administering the extract once a day for 21 days. After three weeks of treatment, an improvement in hair length, thickness, weight and density was observed. The gene expression of two growth factors related to hair growth, vascular endothelial growth factor A (VEGFA) and fibroblast growth factor 7 (FGF-7), was significantly upregulated in the Annurca apple extract treated group. In addition, histological analysis showed that protein levels of cytokeratin 5 and 10 were increased in the skin tissues of the treated group.

Additional *in vitro* studies were carried out on Human Hair Follicle Dermal Papilla Cells (HFDPC), mesenchymal cells isolated from the hair papilla of human scalp hair follicles. They play a crucial role in the dermal-epidermal interactions that control hair production and events of the hair growth cycle.

The treatment with Annurca apple extract and its main metabolites (procyanidin B2 and chlorogenic acid) enhanced the protein expression of fibroblast growth factor 2 (FGF-2) and β -catenin compared with untreated cells. Moreover, the Annurca apple extract showed promising antioxidant ability. Oxidative stress directly influences scalp health and counteracts hair formation and growth. The Annurca apple extract increased protein expression of endogenous antioxidant enzymes, like superoxide dismutase and catalase, involved in the first line of antioxidant defense.

The potential ability of ANNURTROFIL® to increase the expression of β -catenin, fibroblast growth factors, VEGFA, epidermal cytokeratin, as well as the potential capacity to reduce oxidative stress, explain the mechanistic effect obtained in *in vivo* studies.