

# CONSIDERING A NEW HYPOTHESIS ABOUT THE INFLUENCE OF SOME DRUGS ON HAIR

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## Summary

Drug-induced hair loss is one of the most common reasons for the development of diffuse alopecia. Oral contraceptives intake can also give rise to increased hair shedding. We noticed the change of the shape of the hair shafts that developed during the pills intake. Changes of the shape of the hair shaft transverse sections were also seen in the transmission microscope. The above changes remained stable for several years. We suggested that the phenomenon resulted from mutation in hair keratin genes.

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## Riassunto

La perdita dei capelli indotta dal consumo di farmaci è una delle ragioni più comuni nello sviluppo dell'alopecia diffusa. L'uso di contraccettivi per via orale può anche facilitare l'incremento della caduta dei capelli.

Sono stati osservati cambiamenti che si verificano a livello dello stelo del capello durante il consumo di contraccettivi orali.

Le modificazioni dello stelo del capello, sezionato trasversalmente, sono state osservate anche mediante l'utilizzazione del microscopio a trasmissione.

I suddetti cambiamenti restano immutati per diversi anni.

Riteniamo, dunque, che tale fenomeno possa essere imputabile ad una mutazione avvenuta a livello dei geni della cheratina.

It is very well known that certain groups of drugs, widely used by dermatologists, cardiologists, psychiatrist, neurologists, etc. in their clinical practice may produce a negative effect of the hair growth, resulting in development of alopecia, not equally severe in all cases, through different mechanisms. Basically most of the drugs interfere with the cycle of the hair follicle by the disturbance of the reactions between matrix and dermal papilla cells, shortening the duration of the anagen phase of its development thus leading to the premature entering of the follicle into catagen and telogen phases. It results in excess hair shedding (telogen effluvium) with subsequent development of the clinical condition, termed as "diffuse hair loss". Light microscopic examination reveals the increased number of telogen hair roots and sometimes dystrophic anagen hair roots are also seen. It was noticed that oral contraceptives have the same effect on the hair.

Increased hair shedding is seen in the majority of women during the pills intake or 3-4 weeks after their withdrawal (1-3).

According to different authors' data the trichogram analysis not always reveals significant changes in anagen/telogen ratio (3, 5). As for our studies, we found that in 87% of women taking the contraceptive pills the amount of telogen hairs was increased up to 40%. In the patients observed no other reasons for the hair loss could be found. It was shown by A.M. Kligman (4), if the amount of telogen hair roots is more than 25%, it is diagnostic for telogen effluvium.

During our studies we observed a very interesting phenomenon, which has not yet been described. Besides the mentioned above changes in trichogram, oral contraceptives also cause the changes in the shape of the hair shaft, in other words, wavy hair becomes straight. The comparison in the transmission microscope of the shape of the transverse sections of the hair shafts, plucked from the same scalp area before and during the contraceptive pills intake shows the

results, which also correspond to the visual cosmetic changes.

Association of diffuse hair recession with changes of the hair shaft shape in some individuals can create cosmetic problems due to sometimes dramatic decrease of the hair volume and difficulties in hair styling. As we could see during our observations, most of the patients looking for the means to solve their hair problems, in order to improve the hair condition start making rather vigorous cosmetic procedures, mostly very damaging even for healthy hair. Needless to say, they only worsen the situation.

Interestingly, that not all the scalp hairs are involved in the process. Hair shafts changes are seen only in the frontal, temporal and parietal regions, that is in the areas involved in male pattern baldness, whereas the hair recession caused by contraceptive pills has a diffuse pattern.

As the shape of the hair shaft depends upon the presence of S-S bonds between the adjacent aminoacid residues with high sulfur content in the polipeptides forming the hair keratin, we suggested that the hair shaft shape changes may occur as a result of disruption of those bonds. Seemingly, it may happen in case of the changes in the consequence of aminoacid residues, or, in other words, the native structure of hair keratin. It is known that after the withdrawal of contraceptive pills, like any other drug, that caused the hair recession, the process of hair shedding ceases and the hair regrows spontaneously within several months (5). However, we noticed, that hair shafts retain their new straight shape even after the withdrawal of the pills for rather a long period of time (four years and even longer). That fact served a reason for us to suggest the mutation in hair keratin genes. DNA-analysis might reveal that mutation.

## REFERENCES

1. **Cormia F.E. (1967)** Alopecia from Oral Contraceptives. *Journal of the American Medical Association*, **201**:635.
2. **Dawber R.P.R. (1997)** Oral Contraceptives and the Hair. In: Diseases of the Hair and Scalp. Third Edition, *Blackwell Science*, 130-131.
3. **Griffiths W.A.D. (1973)** Diffuse Hair Loss and Oral Contraceptives. *British Journal of Dermatology*, **88**:31.
4. **Kligman A.M. (1961)** Pathologic Dynamics of Human Hair Loss. *Arch. Dermatol.*, **83**:175-198.
5. **Dawber R.P.R., Connor B.L. (1971)** Pregnancy, Hair Loss and the Pill. *British Medical Journal*, **IV**:234.