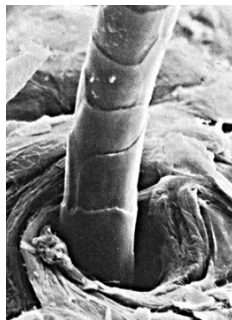


# Tests regarding the penetration of caffeine from a shampoo formula

**Following successful tests at the University of Jena on the hair organ culture model regarding the efficacy of caffeine as a hair growth stimulant in hereditary hair loss, the availability of caffeine after hair washing was examined. In these tests, the preferred method of caffeine penetration was particularly important.**

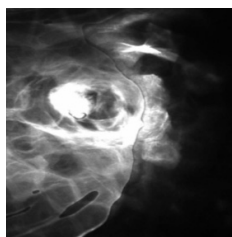


*Image 1: GEM image of a hair follicle*

Previously, it was assumed that the skin forms a barrier against the supply of substances from the outside due to its protective function. The same was assumed with regard to the hair follicle (Image 1). As a result, only external effects were attributed to the active ingredients in shampoos.

Based on two novel measuring methods, the staff of the Center for Experimental and Applied Skin Physiology at the Charité in Berlin succeeded in proving that caffeine penetrates the hair follicle after just a brief processing time and remains detectable there after 24 hours.

During an initial test series, the caffeine-containing shampoo was applied to the scalp of the test subjects and left on for 2 minutes while a scalp massage was performed. Afterwards, the excess product was rinsed off. To make the shampoo visible under the microscope, a fluorescent marker substance was added.



*Image 2: Fluorescence measurement at the hair follicle through laser scan microscopy*

Using innovative laser scan microscopy, the researchers ascertained that parts of the shampoo penetrated the hair follicle after a processing time of 2 minutes and the subsequent rinse process (Image 2).

The hair follicle clearly demonstrated fluorescence in all of the test subjects. Over the course of 24 hours, fluorescence decreased successively but was still clearly recognizable.

The caffeine-based shampoo was also examined for the first time anywhere with a caffeine measuring probe during two additional test series. First the hair follicles were closed off with a special varnish to examine the penetration of caffeine via the skin. After 30 minutes, caffeine was detected in the blood vessels for the first time. Even after 24 hours, the caffeine applied through the shampoo remained detectable.

During the second test series, the hair follicles remained open. During these tests, caffeine penetration accelerated significantly, and the caffeine was detected after only 5 minutes (Figure 1). Both tests showed that caffeine preferably penetrates via the hair follicle and is therefore quickly available at the hair roots.

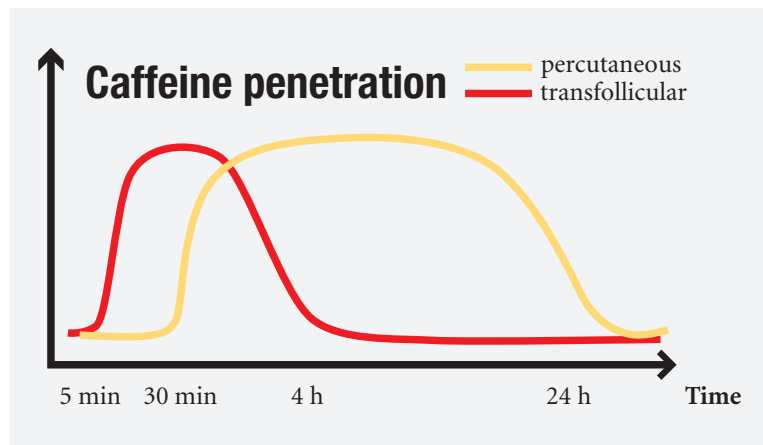


Figure 1: Caffeine penetration in skin and hair follicle over the course of 24 h

The tests at the university clinics in Berlin and Jena point to the fact that caffeine shampoo may be an appropriate product to prevent premature hair loss, since caffeine from a shampoo formula can penetrate the skin and the hair follicle to create a depot effect with availability for up to 24 hours.