

Anagen Effluvium - Causes and Symptoms

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Editorials

A review of Anagen Effluvium. What it is, how its diagnosed, and what causes it. Dr. Richard Lee discusses the form of hair loss known as Anagen Effluvium in this two part article. What it is, what causes it, and how it is diagnosed... Anagen, catagen and telogen are the terms used to describe the major phases of the hair growth cycle in humans. These terms were first suggested in 1926 by F.W. Dry to describe the growth phases of the fur in mice. With our current knowledge of hair physiology, the division of the hair growth cycle into three phases is an oversimplification, but the terms still suffice for understandable discussion. Anagen [Gk, ana, up, again + genein, to produce] is the growing phase of the hair follicle. The duration of the anagen phase in humans shows great variation, ranging from two to six or more years. Whereas the daily loss of 50 to 100 hairs in the telogen phase may be entirely normal, it is always abnormal to lose hairs, which are in the anagen phase. Thus, the name Anagen Effluvium means just that - Hair Lost during its Growth Phase.

How is Anagen Effluvium Unique?

An anagen effluvium is extensive hair loss caused by sudden profound disturbances to the matrix cells of the hair follicles. Rather than shedding, the hair is lost by fracturing of the hair shafts at the level of the scalp. The two most common causes of anagen effluvium occur from cancer chemotherapy and from radiation therapy. There are other causes of anagen hair loss, e.g. trichotillomania (compulsive hair pulling), poisoning from toxic plants, loose anagen syndrome, certain disease states (e.g. pemphigus, discoid lupus erythematosus, etc.), heavy metal intoxication, etc. However, this type of anagen hair loss is immediate rather than delayed and the entire hair shaft including the root sheaths is shed. For purposes of simplicity, this article will confine itself to classical anagen effluvium.

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Hair growth occurs in no other phase of the hair growth cycle except in the anagen phase. The hair shaft is generated by rapid mitotic cell divisions in the hair matrix to produce hair fiber at a rate of 1 to 1.5cm (approximately ½ inch) per month on the scalp. An anagen effluvium occurs if there is sufficient injury to the rapidly dividing keratinocytes in the hair matrix. The insult damages the keratinocytes and diminishes the metabolic activity of the growing hair shaft. The stoppage of cell division results in a thin, weakened hair shaft that is susceptible to fracture with minimal trauma when it reaches the surface of the scalp. Hair breakage in an anagen effluvium occurs within days to weeks (typically 1 to 3 weeks) following the insult to the follicle.

A close examination of the hair will show that the scalp end of the hair shaft is dystrophic with a rapidly tapering configuration (bayonet hair).

Anagen Effluvium and Telogen Effluvium

There are multiple differences between an anagen effluvium and a telogen effluvium. In an anagen effluvium, hair loss occurs because the hair shafts are broken rather than shed. In contrast, the ends of the hairs that are shed in a telogen effluvium have a characteristic club shape with unpigmented proximal ends. The hair loss in an anagen effluvium occurs within days or weeks of the injury to the follicle. Hair loss in a telogen effluvium typically occurs 3 to 4 months after the systemic insult. An anagen effluvium can involve up to 90% of the hair on the head, whereas a telogen effluvium rarely involves more than 50% of the hair on the head. Since ~90% of the hair on the scalp is in the growing phase, an anagen effluvium has the potential to cause almost complete alopecia. The ~10% of the hair follicles in the telogen phase are spared from the toxic insult that results in an anagen effluvium because follicles in telogen are mitotically inactive.

Differentiating an anagen from a telogen effluvium is usually straightforward and the diagnosis of an anagen effluvium can often be made based solely on the medical history. Nevertheless, there are cases in which the exact diagnosis may be difficult because both entities involve copious amounts of hair loss in a short period of time. And, in fact, an anagen effluvium may occur simultaneously with a telogen effluvium.

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Anagen effluvium has also been referred to as “toxic alopecia”, because chemotherapeutic drugs (antimetabolites, alkylating agents, and mitotic inhibitors) for malignant diseases are probably the most common cause of anagen effluvioms in the United States. Any drug that disrupts either cell cycling or the production of a specific component of hair may cause an interruption of the development of the hair shaft. This form of alopecia is more common and severe with combination chemotherapy than with the use of any single drug, and the severity of the anagen effluvium is generally dose dependent. The hair loss characteristically begins 1 to 2 weeks after the initial chemotherapeutic dose and is most apparent 1 to 2 months after the start of treatment. .

The chemotherapeutic drugs, which are most likely to cause hair loss include:

- Amsacrine
- Cisplatinum
- Cytosine Arabinoside

- Cyclophosphamide (Cytosan)
- Doxorubicin (Adriamycin)
- Epirubicin
- Etoposide (Taxol)
- Ifosfamide
- Vincristine (Oncovin)

The chemotherapeutic drugs are less likely to cause hair loss:

- Actinomycin
- Bleomycins
- Daunorubicin
- Methotrexate
- Carboplatin
- Mitomycine C
- Vinblastine

Radiation therapy is the other major cause of anagen effluvium. The effect of radiotherapy on hair follicles is dose dependent, similar to the dose:effect relationship with chemotherapy. The radiation doses required to cause hair loss vary between individuals and in different areas of the body. Scalp hair is the most sensitive with progressive radioresistance involving hair in the axilla (armpit), beard, pubis and eyelashes. On examination with a magnifying lens, there is a progressive tapering of the growing hair after x-ray exposure in which the length of the taper is proportional to the intensity and to the duration of radiation exposure.

When hair loss occurs as a result of chemotherapy or radiation therapy, the hair loss can occur very suddenly, often overnight, with large clumps of hair on the pillow.

Treating Anagen Effluvium

If the offending agent (chemotherapeutic drug and/or radiation) is discontinued, regrowth of hair from an anagen effluvium can be expected within weeks, since matrix cell division has only been temporarily reduced. Hair that grows back may show a change in the texture and color. These changes may persist for years because the chemotherapeutic drugs and/or the x-radiation produce changes in the surviving hair matrix cells that will persist for the entire anagen phase of the hair follicle. In occasional cases, insults to the hair matrix are severe enough to cause a premature termination of the anagen phase with the induction of catagen. If catagen does occur, recovery of hair will not be seen until the end of the subsequent telogen phase, which is approximately 100 days.

Topical minoxidil has been shown to shorten the duration of hair loss due to chemotherapy and/or radiation by approximately 50 days, but it is unable to prevent hair loss due to cancer chemotherapy or radiation therapy.

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