Read Item - Normal Hair Shafts and Normal Weathering

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Abstract: Doctor's resource on hair shaft weathering

Key Point

Excessive weathering of hair is often an important diagnostic feature of congenital and inherited hair abnormalities, and while the extent of weathering may be suggestive of a particular disorder, the nature of these changes is not specific and should not be over-interpreted. When describing hair shaft abnormalities it is crucial to determine the location of that abnormality in relation to the root.

Discussion

On average hairs grow 1 cm per month. Thus the tip of a hair that is 35 cm long has been exposed to the environment for almost 3 years. During that period it is likely to have been washed and dried 1000 times, bleached, dyed, permed, and cut a half a dozen timed, and combed or brushed countless times. As a consequence the tip of the hair will show signs of deterioration.

While a normal hair will show the scars of these procedures, collectively known as weathering, it will survive this onslaught. On the other hand, a hair that has a structural weakness will not and is likely to snap off. The amount of weathering it can withstand will determine how long the hair grows before it breaks and this in turn will be determined by the nature and severity of the intrinsic structural weakness.

Many of the conditions associated with weak hair fibres are caused by single gene defects. A number of these genodermatoses will be diagnosed by examination of the fibres by light microscopy as they produce specific deformities.

If the genodermatosis not only deforms the hair but also renders is fragile, then the specific deformity will be accompanied by a constellation of environmental weathering changes. Alone these weathering changes are not specific because the changes induced by mild trauma to weak hairs are identical to that produced by severe trauma to normal hairs. When such hairs are examined microscopically, the changes occurring in the proximal few centimetres are most likely due to the intrinsic defect, while those only occurring distally are likely to be due to weathering. Hence, any description of a hair shaft abnormality should mention the location of the defect in relation to the root of the hair.

Once the clinician is familiar with the range of non-specific light microscopy features of weathering, and the specific features of the single gene disorders, then the clinical features of these disorders becomes predictable.

There are only 10 recognised alterations in the hair fibre that may be seen with light and electron microscopy that are specific for a genodermatosis. They are classified into two groups on the basis of hair fragility and susceptibility to weathering. Those associated with increased fragility present with hair that is fine, short, does not need cutting and does not grow long. Hair shaft disorders without fragility are more subtle clinically and patients present with alteration of hair form, colour or texture. Their hair may be unruly, spangled or feel coarse or tacky. Occasionally they are only discovered as an incidental finding.

In addition to the recognised developmental hair shaft disorders discussed in this chapter, increased hair fragility can be seen in certain acquired diseases such as hypothyroidism, anaemia, malnutrition, connective tissue disorders and as a drug side-effect.

Light Microscopy and Electron Microscopy of hair are valuable tools in the diagnosis of congenital and hereditary hair dystrophies. Patients who present with hair that is of poor quality, brittle, or fails to grow long should have a clump of 50 or so hairs plucked and examined with a light microscope. This is done by examining the hair along its entire length and comparing proximal with distal abnormalities. Scanning electron microscopy is not required in all cases and the decision to do electron microscopy will be influenced by the clinical picture, the findings on light microscopy and the availability of an electron microscope. If an electron microscope is not available locally, then hairs can be mailed to a tertiary referral centre for examination.