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Letter to Editor

Dermatology Section

A Brief Overview of the Role of Drugs and Novel Methodologies on the Stability and Growth of Hair Follicles: An Approach Towards Hair Regeneration

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Sir,

In the present world, hair loss is a problem faced by individuals of all age groups and ethnicity. Environmental, psychological, genetic, and pathological factors are associated with hair loss [1]. Hair follicles undergo periodic growth phases consisting of anagen (active phase), catagen (transitional phase) and telogen (rest phase), where hair growth takes place followed by shedding. The techniques and compounds that are developed to tackle hairloss are discussed subsequently.

Apart from the treatment using minoxidil and finasteride, stemcell therapy is gaining importance at present. Adult stem cells play an important role in regenerative medicine. Whisker follicle of the rat has been used as a model system in a study to demonstrate clonogenicity, an intrinsic property of the adult stem cells of the hair follicle. Hair follicles can be bioengineered with correct structures from the adult tissue-derived follicular stem cells, which form proper connections with surrounding host tissues such as the epidermis, arrectorpili muscle and nerve fibre. Also, Follicular Unit Extraction (FUE) is an exciting advancement that propels, the field of hair transplant surgery one step closer to the elite minimally invasive status. In FUE, the grafts are extracted as individual follicular units in a two-step/three-step technique whereas the method of implantation remains the same as in the traditional Follicular Unit Transplantation (FUT) [2]. Besides stemcell therapy, low-level laser therapy and diode-laser therapy are found to increase the number of follicles and diameter of hair shaft [3]. These are used for treating patients who do not respond to either finasteride or minoxidil, and who do not want to undergo hair transplantation. Mesotherapy, which involves the injection of cocktail of medications such as natural plant extracts, vasodilators, finasteride, and vitamins, is being considered by many dermatologists as an alternative treatment for baldness [4]. However, many side effects with its use have been reported. Compounds such as nestin and noggin have also found potential application in slowing down hairfall. Studies were carried on patients with alopecia areata and data showed that middle anagen and early anagen hair follicles with growing cells were found to be nestin positive which suggests that the nestin-positive cells might play a role in the regenerating hair follicles. Noggin is an inhibitor of the bone morphogenetic protein-4 (BMP4), which physiologically induces selective arrest of anagen development in the non-tylotrich (secondary) hair follicles. Experimentally, the administration of noggin protein was found to induce new hair growth phase in postnatal telogen skin in vivo.

Finally, reconstitution of hair producing skin in animal models has now caught the attention of researchers to cure hair loss [5]. However, in-depth clinical investigations need to be done so that its application could be extended to treat baldness in humans.

Although the above procedures and compounds reduce hair fall due to environmental and nutritional factors, they are less effective when genetic factors are the contributors. Research is being carried out to identify novel drugs acting via novel mechanisms to tackle and reverse alopecia. Through developments in technology; we might be able to permanently solve this issue in the near future.

REFERENCES

[1] Hunt N, McHale, S. The psychological impact of alopecia. *BMJ.* 2005; 331(7522): 951-53.
[2] Dua A, Dua K. Follicular unit extraction hair transplant. *J Cutan Aesthet Surg.* 2010; 3(2): 76-81.
[3] Waiz M, Saleh AZ, Hayani R, Jubory S.O. Use of the pulsed infrared diode laser (904 nm) in the treatment of alopecia areata. *J Cosmet Laser Ther.* 2006; 8(1): 27-30.
[4] Mysore V. Mesotherapy in management of hairloss - Is it of any use? *Int J Trichology.* 2010; 2(1): 45-46.
[5] Lee LF, Jiang TX, Garner W, Chuong CM. A simplified procedure to reconstitute hair-producing skin. *Tissue Eng Part C Methods*. 2011; 17(4): 391-400.

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