Patterned cycle of a relatively long-lasting anagen

Patterned hair loss isthought to be caused by both inherited and physiological backgrounds. Patternedhair loss gradually proceeds following a specific pattern in front and on topof the scalp. Among males, hair shedding often begins after puberty due to theeffect of the male hormone, androgen, and is named male pattern baldness, alsoknown as androgenetic alopecia (AGA). The major cause of AGA in human isthought to be as follows; the human hair follicle follows a cycle of arelatively long-lasting anagen phase and relatively short catagen and telogenphases. Each hair follicle is replaced with a revitalized newly generated hair, but when AGA occurs, the anagen phase becomes shorter and the hair follicledoes not fully grow and enter the next hair cycle, which results in increasingamounts of short and thin hairs (miniaturized hairs), and eventually the temporalor forehead scalp surface skin becomes visible (Sakamoto et al., 2017). Androgen are known tocause cell regression and balding of the scalp in AGA individuals.

Testesteroneand dihydrotesterone (DHT), which is formed by action of 5?-reductase (5? R), are two majorandrogens and DHT are considered more potent to trigger hair loss. Androgensalso affect the dermal papilla (DP) of hair follicle, which produces paracrinesignals that stimulate or inhibit the growth of follicular epithelium. Theseinclude insulin-like growth factor-1 (IGF-1) and vascular endothelial growthfactor (VEGF).

Other growth factors are also found to be involved in the hairgrowth regulation such as keratinocyte growth factor (KGF) and hepatocytegrowth factor (HGF) have a stimulatory effect on hair follicle growth, whileepidermal growth factor (EGF) and transforming growth factor-b (TGF- b) have aninhibitory effect on hair follicle growth (Roh et al., 2002). 1.

1 TREATMENTOF HAIRLOSS 1. 1. 1 Approveddrugs for hair loss treatmentAtpresent there are few drugs are used to treat androgenic alopecia (AGA). Thefirst drug approved for enhancing scalp hair growth was minoxidil (RogaineR). It causes vasodilation (widening of blood vessels), thus increasing circulation.

In about a third of the people who try it, minoxidil improves hair growth, causingscalp follicles to enlarge and lengthening the growth cycle. For many, however, the hair growth is meager. Minoxidil does not help people who already are bald (Tortora & Derrickson, 2009). Minoxidil was first used as avasodilator to treat cardiovascular disorders, but the unexpected side effectof hirsutism led to its topical use as a hair-growth stimulator. The mechanismsinvolved in AGA treatment are still unclear. It seems to open potassiumchannels and increase the proliferation and differentiation of epithelial cellsin the hair shaft. However, local irritation, itching, dryness and erythema mayoccur when minoxidil is topically used, as well as systemic side effects suchas dizziness and tachycardia.

Serious side effects, such as an increase in leftventricular end-diastolic volume, cardiac output, and left ventricular mass, have been reported with the use of 2% minoxidil solution. Unfortunately, another potential drawback of minoxidil therapy is the loss of newly grown hairwithin one to three months after discontinuation of the medicine (Kumar, Rungseevijitprapa, Narkkhong, Suttajit, &Chaiyasut, 2012). A low strength of finasteride isalso licensed in treatment of AGA. It is specific 5?-reductase inhibitors whichmetabolizes testosterone into more potent androgen, dihydrotestosterones (DHT). The active metabolite of dihydrotestosterone

(DHT) will binds to androgenicreceptors in the hair follicle and then activates the genes responsible forhair follicle regression (Herman & Herman, 2016) . But thesedrugs may possess certain side effects include impotence, decreased libido, ejaculation disorders and breast tenderness and enlargement (Committee, 2013).