

Forward and Reverse Absorption Model for EGCG, Proof for Efficacy of Anagen Grow

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Abstract

The present study reports the selective dermal absorption of Epi Gallo Catechin 3 Gallate (EGCG) than the mucosal absorption. If the absorption of EGCG is not properly achieved the therapeutic benefits that are expected out of EGCG are not likely to occur. Green tea is promoted with the proven therapeutic benefit i.e., alpha reductase inhibition. Anagen grow has been formulated after establishing the forward and reverse absorption of EGCG and other herbal actives and thus the formulation is effective for hair growth and retarding alopecia. Details are presented in the article.

Keywords: Anagen grow; EGCG; Epi gallo catechin 3 gallate; Alpha reductase; Serum; Hair fall solution

Introduction

Anagen grow is a hair growth promoting serum formulation formulated with certain select medicinal herbs such as *Murraya koenigii*, *Lawsonia alba*, *Indigofera tinctoria*, *Hibiscus rosa sinensis*, *Eclipta prostrata* and *Phyllanthus emblica*. Further the formulation has been established through intense research having hair growth promoting effect by series of *in vitro* and *in vivo* studies [1-6].

Although we have established earlier the clinical efficacy of Anagen grow in promoting hair growth and retarding hair loss, the possible underlying reason for such an effect warrants further studies [7]. The herbs that we have used in the formulation contains several phytochemicals like catechin, epigallin etc. Epigallo catechin 3 gallate (EGCG) is richly found in green tea and other herbs. EGCG is also proven to have hair growth promoting ability by suppressing alpha-reductase enzyme that converts testosterone to dihydrotestosterone (DHT) [8]. Thanks to the abundant receptors for DHT available in the dermal papillae region of hair root, the DHT selectively binds on to the receptors in the terminal hair root and progressively cause atrophy of the hair root resulting in alopecia or otherwise called as irreversible hair loss.

Subsequent to the research findings about EGCG having antagonist effect on alpha reductase enzyme, a spur in marketing activity of green tea has started to take place globally. The undeniable scientific proof about EGCG has although favored and facilitated the envious market growth and glory of green tea but the real role of green tea in offering a definite relief to those who suffer from severe hair fall and hair loss is far from near. The above paradox has triggered the scientist to revalidate why such scientific paradox being exhibited by green tea which is the rich source of EGCG. The subsequent studies have thus established that oral absorption of EGCG is extremely poor whereas the peripheral/dermal absorption is quite good.

The above scientific facet of EGCG has revealed that if EGCG is used topically may offer better solution for alopecia than the oral

intake of green tea. After understanding the scientific twist and turn of EGCG with reference to its oral vis-à-vis topical absorption, Anagen grow has been formulated with certain medicinal herbs that contains epigallin and catechin.

In order to prove and establish the peripheral absorption of EGCG which is superior over oral absorption to evidence the superior efficacy of Anagen grow an *in vitro* method was devised with mucin fibers and semi-permeable membrane prepared from chicken egg. Details are presented in the article.

Materials and Methods

For the present study we have used EGCG prepared from herbal source as well as green tea. 0.25 mg of mucin fiber was packed inside a pouch made of egg membrane. The egg membrane was prepared by treating the egg with different normality of HCL and accordingly the permeability of the membrane that is suitable for the present experiment was identified and used. In brief 0.5 N HCL was used for the preparation of egg membrane.

Two separate experiments were conducted in order to mimic the dermal absorption and oral absorption models which would be here under referred as forward absorption model and reverse absorption model.

In forward absorption model the Anagen grow sample (1%) was dissolved in a buffer in a beaker. 0.25 mg of mucin wrapped in egg membrane was then immersed into the buffer without allowing the buffer directly entering inside the pouch. A magnetic stirrer was used to keep the buffer under dynamic condition. After 1 hour the pouch was removed from the buffer, the pouch was opened and the mucin fiber was collected carefully, extracted the fluid and in the fluid the quantity of EGCG present was estimated using UV spectrophotometer. The presence and the quantity of EGCG in mucin fiber were taken as the direct indicator of forward absorption of EGCG (Dermal absorption).

In reverse absorption the mucin fibers were initially treated with a known quantity of Anagen grow (1%) and then mucin fibers were

made into a pouch with egg membrane. Then the pouch was immersed into the buffer as described above and magnetic stirring was applied to keep the buffer under kinetic state. After 1 hour the buffer sample was taken and then read it for EGCG by spectroscopy. The quantity of EGCG present in the buffer directly reflects the reverse absorption rate of EGCG.

Anagen grow (1 g) in a semipermeable membrane pouch was immersed in the buffer as described above and the EGCG present in the buffer was taken as standard for calculating the reverse absorption rate of EGCG.

Result

The forward absorption of EGCG, i.e., from buffered medium to mucin through the semipermeable membrane was quite good and was calculated to be 45% by keeping 0.2% of EGCG incorporation in anagen grow; where 1% of anagen grow was used for testing.

The reverse absorption of EGCG i.e., from mucin to the buffer through the semipermeable membrane was quite low and the value calculated to be 5% with reference to 0.2% EGCG incorporation in anagen grow; where 1% of anagen grow was used for testing (Figure 1).

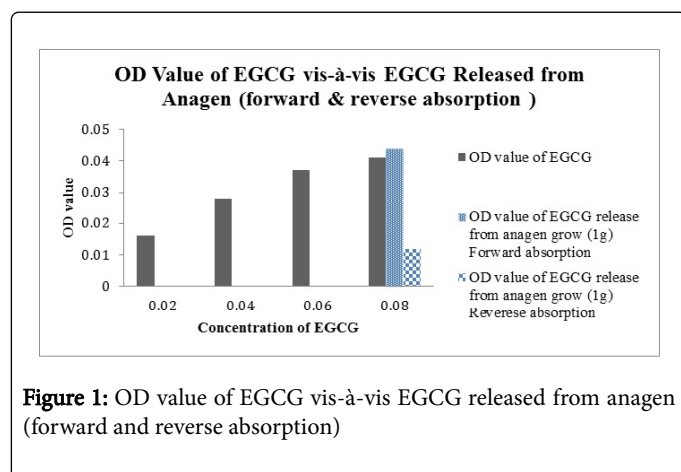


Figure 1: OD value of EGCG vis-à-vis EGCG released from anagen (forward and reverse absorption)

Discussion

Our study findings fully agree to the earlier findings that the oral absorption of EGCG is quite poor when compared to dermal absorption. The multi-various therapeutic values of EGCG are unquestionable but such therapeutic benefits would translate only when proper absorption of EGCG is achieved.

The aggressive promotion of green tea which is the most common reservoir of EGCG; for various therapeutic benefits appears to have taken place without proper understanding of the bio-absorption of EGCG through oral route [9,10].

The proven alpha reductase inhibition effect of EGCG and the resultant benefit of the prevention of alopecia have been widely exploited for promoting green tea for hair loss. However no great therapeutic benefit has come to those who suffer from hair loss from regular intake of green tea. This paradoxical situation has triggered why EGCG fails to offer the desired benefit when the scientific experiments undoubtedly establish such activity.

Subsequently it was revealed that EGCG is absorbed poorly through oral route and greater proportion of absorption of EGCG happens only through dermis. After understanding the unique therapeutic value of EGCG and its limitations, Anagen grow has been formulated with catechin, epigallin rich herbal extracts in the form of topical agent (hair serum).

Forward absorption of EGCG was greater than reverse absorption. 45% of EGCG got absorbed into mucin through forward means whereas the rate of absorption was only 5% by reverse absorption. The above findings suggest that the EGCG may be getting entrapped and immobilized in mucosal membrane therefore its further absorption is poor, whereas the topical absorption is likely to increase the bioavailability of EGCG in the blood which is essential for preventing DHT conversion.

The use of EGCG by topical means in all probability would give better therapeutic benefit than oral ingestion. The present findings clearly suggest that Anagen grow will be quite effective for hair loss because the absorption of active contents through dermis is quite high.

Conclusion

Anagen grow has been formulated in line with topical vis-à-vis oral absorption of various actives and linking with the respective bioactivity. Anagen grow may be the first hair growth serum which exploits the principles of topical absorption of EGCG with a proven science. Anagen grow would reduce hair fall by affecting alpha reductase enzyme as the active principles such as catechin and epigallin and its combination called EGCG have been already proven for the above benefits.

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