

HAIR DISORDERS

IDENTIFICATION OF THE SULFOTRANSFERASE PRIMARILY RESPONSIBLE FOR THE BIO-ACTIVATION OF TOPICAL MINOXIDIL

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Introduction: Topical minoxidil is a pro-drug converted to its active form, minoxidil sulfate, via sulfotransferase enzymes located on the outer root sheath of hair follicles. There are currently eight members of the SULT1 family known to exhibit substrate specificity toward minoxidil. Of these, three are known to be present in the scalp; SULT1A1, SULT1A3, and SULT1E1.

Objective: To improve topical drug development for androgenetic alopecia, it is important to elucidate the isoform of sulfotransferase responsible for the bio-activation of minoxidil in hair follicles. In this communication, we report the minoxidil sulfonation capacity of the various SULT1 isoenzymes.

Methods: Purified recombinant SULT1A1, SULT1A3, and SULT1E1 were studied kinetically with a sulfotransferase activity assay utilizing minoxidil as a substrate. In addition plucked hair was collected from several human subjects and reacted with the sulfotransferase activity assay over 24 hours.

Results: Kinetic data from the pooled human subjects was compared to the data obtained from each of the SULT1 isoforms studied. Human samples did not correlate with the kinetic data obtained from recombinant SULT1A3 or SULT1E1. The human data closely correlated with the kinetic data obtained from recombinant SULT1A1 (correlation coefficient = 0.9712, $p < 0.001$).

Conclusion: SULT1A1 is the most likely SULT1 isoenzyme responsible for the sulfonation of minoxidil in hair follicles.