Ramos Paulo (Orcid ID: 0000-0002-1561-414X)
Goren Andy (Orcid ID: 0000-0002-8190-2289)

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SULFOTRANSFERASE ACTIVITY IN PLUCKED HAIR FOLLICLES PREDICTS RESPONSE TO TOPICAL MINOXIDIL TREATMENT IN BRAZILIAN FEMALE PATTERN HAIR LOSS PATIENTS

Authors:

Paulo Müller Ramos, MD, MSc¹; Rodney Sinclair, MD, PhD²; Hélio Amante Miot, MD, PhD¹; Andy Goren, MD³

¹ Department of Dermatology and Radiotherapy, São Paulo State University - UNESP, Botucatu, SP, Brazil.

² Sinclair Dermatology, Melbourne, VIC, Australia

³ Applied Biology, Inc. Irvine, California, USA

Correspondence:

Paulo Müller Ramos

Av; Prof. Mário Rubens Guimarães Montenegro, sn

UNESP – Campus Botucatu

18618687 – Botucatu - SP

Email: dermato.paulo@gmail.com

Phone/FAX: +55 43 99912 5333

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Short title: Sulfotransferase Activity in Brazilian Female Pattern Hair Loss Patients

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Topical minoxidil is the only medication approved by US Food and Drug Administration for the treatment of female pattern hair loss (FPHL). Less than 40% of patients achieve clinical improvement with the treatment.

Minoxidil is a prodrug converted to minoxidil sulfate by the sulfotransferase enzyme in the hair follicle outer root sheath (ORS) (Buhl, Waldon, Baker, & Johnson, 1990). There is a correlation between sulfotransferase enzyme activity in plucked hair samples and response to minoxidil therapy in androgenetic alopecia patients (Roberts, Desai, McCoy, & Goren, 2014).

Considerable inter-individual variation in sulfotransferase activity is observed in human due to polymorphisms in the coding regions of sulfotransferase genes (Gamage et al., 2006). The percentage of subjects with low levels of sulfotransferase enzyme activity varies in different populations (Chitalia et al., 2018).

In this communication, we aim to evaluate ORS minoxidil sulfotransferase activity in relation to change in hair density in Brazilian patients with FPHL using 5% minoxidil for 24 weeks.

Eight female subjects with Sinclair Stage II-IV FPHL were recruited from a hospital dermatology department to participate in an open label study applying 5% topical minoxidil once a day for a period of 24 weeks. Hair density was assessed by phototrichogram. Participants received a mini tattoo in the

parietal region that was representative of the area of patient hair loss prior to treatment (week 0). A circular template of 2.2 cm² was centered over the mini tattoo. Hairs inside the template were clipped to approximately 0.5 mm in length. A 10-fold enlargement dermatoscopic digital image was performed. The tattoo was used to ensure that the phototrichogram repeated after 24 weeks of treatment was taken from the same area of the scalp.

At the end of the study, 10 anagen hairs were plucked from the border between the most prominent area of thinning and non-thinning at the vertex scalp from each subject for assessment of sulfotransferase enzymatic activity. The sulfotransferase assay was performed according to prior description (Roberts et al., 2014). We used the previous validated value of less than 0.4 absorbance unites (AU) as a marker for low follicular sulfotransferase activity (Roberts et al., 2014).

The descriptive data of the sample is summarized in Table 1. Participants with increased hair counts were classified as responders and participants with decreased hair counts were classified as non-responders. The prevalence adjusted negative predictive value (NPV) and positive predictive value (PPP) were calculated using Bayes Theorem with a responder prevalence of 39% to topical minoxidil. The NPV was 82.43% (95% CI: 43.95%, 96.56%) and the PPV was 65.73% (95% CI: 24.27%, 91.99%).

The sulfotransferase enzyme activity in plucked hair follicles is a predictive marker for minoxidil response in Caucasian, Asian, and Indian

populations. While our study size was small, the large NPV observed in our Brazilian population is consistent with a previous study that presented NPV of 95.94% (Goren et al., 2015); therefore, among Brazilian women with FPHL, determining the sulfotransferase activity in plucked hair follicles provides clinical utility in guiding treatment regimen.

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Table 1. Descriptive data of the sample.

Pt. No	Age (years)	AU	Hair Count Before	Hair Count After
1	41	0.158	200	190
2	49	0.180	180	192
3	57	0.404	82	97
4	54	0.410	95	105
5	65	0.419	127	125
6	59	0.285	113	110
7	32	0.466	120	130
8	48	0.168	122	118

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Author/s:

Ramos, PM;Sinclair, R;Miot, HA;Goren, A

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