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No systemic bioavailability of levo-thyroxine after epicutaneous administration (10 grams /daily)

M T Bevilacqua (IT) [1], V F Righini (IT) [2]

Context- thyroid hormones have been recently identified as potent endocrine regulators of mitochondrial function in isolated cultured human epidermal keratinocytes and in organ-cultured human skin (Vidali S, J Invest Dermatology 2016,136:2003-2012) as a basis for a epicutaneous employment of thyroid hormones in skin conditions characterized by reduced mitochondrial function. Objective- to evaluate a possible systemic bio-availability. Methods - Epicutaneous application of 10 grams of l-thyroxine in cream on both bottoms (skin surface about 600 cm2).Patients- 12 female volunteers evaluated after 1 hour of application, 24 hours and 30 days of daily application and blood measurements of Thyroid Stimulating Hormone (TSH), free thyroxine (fT4),, free triiodothyronine (fT3), reverse T3, thyroxine binding globulin (TBG) and 24 hrs urinary iodine (UI).Main outcome- No significant change of TSH, fT4, fT3, rT3 s , TBG and UI were observed neither in the "acute" setting (1 hour and 24 hours) nor in the "chronic" one (1 month application). Results and Conclusion- The cutaneous application of 10 grams of l-thyroxine in cream on the bottom of female volunteers does not induce modifications of thyroid hormones. The lack of systemic availability of l-thyroxine after epicutaneous application is the basis for a possible use of l-thyroxine to ameliorate mitochondrial function in skin diseases including skin aging.

[1] Endorinology, Milano, [2] Milano