SKIN SODIUM, POTASSIUM AND GLYCOGEN LEVELS IN PSORIATIC PATIENTS UNDER PHOTOCHEMOTHERAPY

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Summary

Sodium, potassium and glycogen content was measured in psoriatic plaques of patients receiving photochemotherapy. Glycogen levels decreased 48 hours after photochemotherapy but again rose to the original level 7 days after therapy. The significance of this change could not be evaluated. Sodium and potassium levels of psoriatic plaques did not show any significant change either 48 hours or 7 days after photochemotherapy.

Photochemotherapy has established its role in the treatment of psoriasis in recent years[1,2,3]. In a previous communication it was reported that all psoriatic plaques clear in 8-45 days under photochemotherapy[3]. The exact mechanism by which psoralen with ultraviolet light acts in clearing psoriatic plaques is not known. Experience with viral, bacterial and mammalian D. N. A. have shown that psoralen in presence of U. V. radiation forms mono and bifunctional cycloadducts with pyrimidine bases and these can result in crosslinking of D. N. A.[4]. Subsequent experiments have shown that methoxsalen (psoralen) and U.V. light causes inhibition of D. N. A. synthesis in human epidermal cells[5]. Glycogen accumulation in involved and uninvolved skin of psoriatic patients is a characteristic feature[6]. It has been reported that changes in epidermal glycogen content are closely associated with the regulation of epidermal cell division[7]. Mazia has put forth evidence that changes in the intracellular concentration of certain small ions can trigger mitotic activity[8]. In an attempt to understand the mechanism by which psoriatic plaques clear under photochemotherapy we have measured glycogen and electrolyte (NA+ & K+) levels in psoriatic plaques of patients under photochemotherapy.

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Materials and Methods

A total of 20 psoriatic patients were the subjects of this study. None of these patients had received any oral or topical drugs three weeks prior to the therapy. Biopsies (5 mm.) were taken with a trephine before photochemotherapy and 4-8 hours and 7 days after photochemotherapy using 50 mg. of methoxsalen (trade name Mannaderm) and U. V. exposure as described earlier[3]. Na+ & K+ levels were measured by wet ashing with nitric acid and flame photometry. For the estimation of glycogen levels biopsies from 5 patients were pooled and glycogen content estimated[6]. Statistical significance was estimated by students t test.

TABLE I

Sodium potassium and glycogen levels of psoriatic plaques before photochemotherapy and 48 hours and 7 days after photochemotherapy

	Psoriatic skin before start of photochemotherapy	Psoriatic skin 48 hours after photochemotherapy	Psoriatic skin 7 days after photochemotherapy
Na mmol/g wet tissue wt	0.053±0.006 (8)	0.048±0.002 (7)	0.050±0.002 (9)
K mmol/g wet tissue wt	0.033±0.005 (8)	0.033±0.003 (7)	0.029±0.003 (9)
K/Na Ratio	0.618±0.035 (8)	0.697±0.081 (7)	0.579±0.057 (9)
Glycogen mg/100g wet tissue wt	87±8.0 (7) *	49±6 (2)	69±15 (2)

* Data obtained from reference 6.

Results

Results are given in table I. No significant changes were observed in Na+ and K+ levels either 48 hours or 7 days after therapy. The glycogen content of psoriatic plaques decreased 48 hours after therapy but again rose to its original level 7 days after therapy. The significance of this change could not be evaluated.

Discussion

The glycogen content of the epidermis is closely associated with the regulation of epidermal cell division. Glycogen appears in epidermal basal cells soon after an injury or inflammation. Following stripping of stratum corneum from normal skin with adhesive tape glycogen appeared within 4 hours and reached a maximum in 8–16 hours and then subsided within 24 hours[7]. Mier et al reported increased acid hydrolase activity in skin of normal volunteers and peak β glucosidase levels were reached about 4 days after a single large dose of U. V. radiation. After 4 days β glucosidase levels again started declining[9]. Effects of photochemotherapy on epidermal enzymes are not known. Our observations have shown a decline in skin glycogen level, 48 hours after start of photochemotherapy which again rose to its original level 7 days after therapy. It is possible that these changes in skin glycogen are accompanied by changes in skin phosphorylase and glycogen synthetase levels. Further experiments are needed to evaluate the significance of the observed changes in skin glycogen levels and to clarify the relation between these changes and the mechanisms involved in the clearing of psoriatic plaques by photochemotherapy.

Values express mean ± S. E. of the mean. Figures in parenthesis indicate number of observations. Because of the small number of observations statistical significance of changes in glycogen content was not evaluated. Changes in all other parameters were not significant at 5 per cent level.

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TRUE

A significant recent development in the study of control mechanisms of epidermal growth has been the identification and isolation of epidermal growth factor (EGF) from human urine. Human EGF has all the biological activities previously ascribed to the mouse derived EGF. With the isolation and structure determination in 1975 of the aminoacid sequence of β - urogastrine, a gastric antisecretory hormone, it is seen that the aminoacid composition of hEGF and β - urogastrone are near identical. They elicit identical biological activities; EGF inhibiting histamine - induced gastric acid secretion and β - urogastrine stimulating proliferation of epidermal tissue. The 2 molecules also can cross - compete in radio - receptor assays. Immunofluroscent staining of human tissue has demonstrated the localisation of EGF in cells of the ducts of submandibular glands and in cells of the glands of Brunner in the first part of the duodenum. These facts indicate that human EGF and human β-urogastrone are the same molecule that possess seeming unrelated biological activities.

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