Total and HDL-Cholesterol Levels in the Serum of UVA-Irradiated Porphyric Rats

WAKIO TORINUKI and TAKASHI MIURA

Department of Dermatology, Tohoku University School of Medicine, Sendai 980

TORINUKI, W. and MIURA, T. *Total and HDL-Cholesterol Levels in the Serum of UVA-Irradiated Porphyric Rats*. Tohoku J. exp. Med., 1983, **139** (2), 223-224 — Total and HDL-cholesterol concentrations were measured in hexachlorobenzene-induced porphyric rats before and after repeated exposure to UVA for a month. No significant change in either concentration was seen. — cholesterol; HDL; porphyria; UVA

Porphyria cutanea tarda is characterized by elevated levels of uroporphyrin in plasma, urine and faeces (Moore et al. 1973). This hydrophilic porphyrin is probably attached to albumin and/or hemopexin in the circulation (Koskelo and Muller-Eberhard 1977). It is postulated that photodynamic action of the porphyrin excited by long-wave ultraviolet light (UVA) has an influence on various blood components, because UVA energy reaches in the dermal vessels. In this report, we measured total cholesterol and high density lipoprotein (HDL)-cholesterol levels in serum after UVA exposure of hexachlorobenzene-induced porphyric rats in which the metabolic pattern seems to resemble that in porphyria cutanea tarda (Stonard 1974).

MATERIALS AND METHODS

Induction of porphyric rats. Twenty Sprague-Dawley albino female rats, weighing about 200 g, were fed a 0.25% (w/w) hexachlorobenzene-diet for two months.

UVA irradiation. Porphyric rats were divided into two groups: 8 non-irradiated rats and 8 rats irradiated for a month. Hair was shorn with an electric clipper once every week. The light source consisted of four black lights (Toshiba FL-20BLB; Toshiba Electric Co.) which emit rays between 300 to 420 nm, with a maximum at 360 nm (mainly UVA). The energy intensity was 3.9 mW/cm² at a target distance of 15 cm (radiometer UVR-305/365; Eisai Co.). The backs of the rats were irradiated with black lights for 5 hr daily at a distance of 15 cm, for a month. Blood samples were obtained from the abdominal artery of non-irradiated and irradiated rats. Total cholesterol and HDL-cholesterol levels in serum were estimated by the method of Burstein et al. (1970) and Allain et al. (1974), respectively.

RESULTS AND DISCUSSION

The following skin changes were produced in the porphyric rats after UVA irradiation for a month: Erythema, erosion, crust, skin thickening and scarring. Regarding total and HDL-cholesterol contents in serum, however, no significant difference was observed between rats kept in the dark and irradiated rats (Table 1).

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TABLE 1. Concentrations (mg/100ml) of total and HDL-cholesterol in serum of hexachlorobenzene-induced porphyric rats

	Total cholesterol	HDL-cholesterol
Before irradiation	128±25 (8)	101±21 (8)
Irradiation for a month	134±36 (8)	105±31 (8)

mean±s.d. Numbers of observations in parentheses.

Recently, it has been indicated that there is an interaction between photo-excited porphyrin and blood components. Albumin inhibited the rate of photohaemolysis in erythropoietic protoporphyria, and a significant part of the albumin effect could be ascribed to its porphyrin-binding capacity, though most of the effect seemed due to an as yet unidentified property of this protein (Joenje et al. 1981). Irradiation of serum samples from patients with porphyria cutanea tarda resulted in activation of complement and generation of C₅-derived chemotactic activity (Lim et al. 1981). Our data may suggest that active oxygen generated through energy transfer from photoexcited porphyrin in vivo has an influence on plasma proteins rather than on plasma lipids including cholesterol.

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