Protective effect of forskolin on DNA damage induced by ethyl methanesulphonate in somatic cells of third instar larvae of *Drosophila melanogaster*

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Introduction

Different parts of the plant *Coleus forskohlii* (Willd.) Briq. (Lamiaceae) were used in traditional medicine. Its roots and leaves are the only known natural source of the labdane diterpene forskolin (Fig. 1) which has multiple biological activities. The present study was aimed to evaluate the *in vivo* ability of forskolin to protect DNA against ethyl methanesulphonate (EMS)-induced DNA damage in somatic cells of third instar larvae of *Drosophila melanogaster* using comet assay.

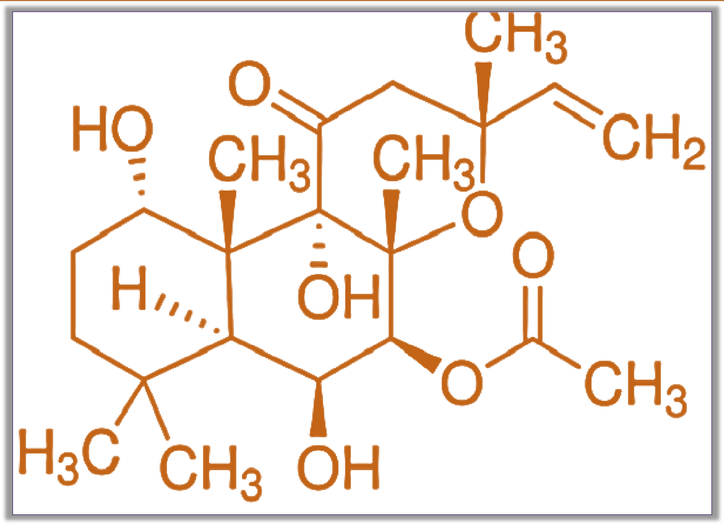

Fig 1. $C_{22}H_{34}O_7$; MW 410.50; 7β-Acetoxy-8,13-epoxy-1α,6β,9α-trihydroxylabd-14-en-11-one, **forskolin**

Materials and methods

Larvae of wild type strain of *D. melanogaster* (Canton S, available from Bloomington Stock Center, Indiana, USA) were cultured at 25°C, 60% humidity and a 12:12 h light/dark regime on standard corn medium containing agar, sugar and yeast.

Three different concentrations (0.5, 1, and 2 mg/mL of standard food for Drosophila) of forskolin were evaluated to determine potential protective effect on DNA damage induced by EMS in somatic cells of third instar larvae of *D. melanogaster*. The comet assay was performed according to Singh et al. (1988) with minor modifications as described by Mukhopadhyay et al. (2004). Immediately before use slides were stained with 80 mL of ethidium bromide (20 mg/mL). The images were visualized and captured with 40 objective lens of fluorescence microscope Nikon (Ti-Eclipse) attached to CCD camera.

TABLE 1. ***PROTECTIVE EFFECT OF FORSKOLIN ON DNA DAMAGE INDUCED BY ETHYL METHANESULPHONATE***

	Comet class					Total score[a]	%R
	0	1	2	3	4		
NC[b]	78.6±0.9	21.4±0.2	0.00±0.00	0.00±0.00	0.00±0.00	21.4±0.4‡	/
EMS[c]	55.5±0.71	5.6±0.34	11.1±0.61	5.6±0.54	22.2±0.8	133.4±1.2*	/
For 0.5+EMS[d]	75.8±0.12	20.5±0.54	3.7±0.7	0.00±0.00	0.00±0.00	27.9±0.12‡	94.2
For 1+EMS[e]	65.5±0.31	29.9±1.2	4.6±1.4	0.00±0.00	0.00±0.00	39.1±0.2*‡	84.2
For 2+EMS[f]	66.7±0.92	18.7±0.8	8.3±0.81	6.3±1.2	0.00±0.00	54.2±0.34*‡	70.7

[a]Values represented mean±SEM from three independent experiments. [b]NC; negative control group; [c]EMS; ethyl methanesulfonate, 1 mM; [d]For 0.5+EMS, forskolin 0.5 mg/mL plus ethyl methanesulfonate 1 mM; [e]For 1+EMS, forskolin 1 mg/mL plus ethyl methanesulfonate 1 mM; [f]For 2+EMS, forskolin 2 mg/mL plus ethyl methanesulfonate 1 mM. *p<0.05 when compared with the negative control group; ‡p<0.05 when compared with the EMS control group.

Results

Forskolin in different concentrations (0.5, 1, and 2 mg/mL of standard food) showed significant DNA protective activity in presence of EMS as DNA damaging agent. The greatest ability to protect the DNA against EMS was observed following co-treatment with the lowest concentration of forskolin plus EMS with a percentage reduction of 94.2. These findings suggest that the forskolin could be used in preventive therapy against diseases associated with DNA damage.

References

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