

Peng *et al.* (2009) have showed that black tea extract, a mixture of epicatechins and theaflavins, when added to the culture medium, prolonged the survival of wild-type *Drosophila* exposed to paraquat or hydrogen peroxide. Similar beneficial effects on survival were observed with combinations of catechin, epicatechin, and glutathione, which have high superoxide-scavenging activity (*cf.*, Kim *et al.*, 1997). It has been earlier shown that the root extracts of *D. hamiltonii* contain at least a dozen distinct antioxidant compounds that scavenge free radicals and chelate metal ions (Harish *et al.*, 2005; Srivastava *et al.*, 2006). In the present study, we have found that the aqueous extract of *D. hamiltonii* significantly extends the lifespan of *D. melanogaster*, which could be attributed to the free radical scavenging and cytoprotective property of the bioactive molecules. Further, we have recently shown that *D. hamiltonii* root extract shows neuroprotective potential in *Drosophila*, which strongly implies that neurodegenerative changes associated with aging are delayed (Haddadi *et al.*, 2013). Therefore, *D. hamiltonii* roots could be useful natural antioxidant-rich supplement that exhibits therapeutic potential in aging individuals.

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Radiation induced toxicity in *Drosophila melanogaster*.

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Radiotherapy is an important treatment regimen for cancer that could be used as a single treatment or along with surgery and/or chemotherapy. However, use of ionizing radiation is compromised by the side effects that result from radiation-induced damage to normal tissue. Radiation treatment leads to destruction of proliferating cells in tissues, such as lymphoid organs, bone marrow, intestinal crypts, testes, and ovaries, and long-term fibrotic damage to the soft tissues that limit their function (Hall, 2000). *Drosophila melanogaster* is an excellent model organism for

varied kinds of biological investigations in human disease and toxicological research (Sharma *et al.*, 2011; Mukhopadhyay *et al.*, 2003; Siddique *et al.*, 2008). It is also used by radiation biologists as an *in vivo* model to study radiation induced oxidative stress and radioprotective agents (Bozuck, 1972; Ducoff, 1972). In order to evaluate radioprotective agents, we have investigated the *Drosophila* model for radiation sensitivity and we report herein the radiation toxicity of gamma rays and electron beam in *D. melanogaster*.

D. melanogaster (Oregon K) strain was obtained from the *Drosophila* Stock Center, Department of Studies in Zoology, University of Mysore, Mysore. Experimental stocks of 5 day old flies were built up by the serial transfer method, and these flies were maintained on standard wheat agar medium at $22 \pm 1^\circ\text{C}$ and 70–80% relative humidity in a vivarium.

The flies were irradiated with 100 Gy, 200 Gy, 400 Gy, 600 Gy, 800 Gy, 1000 Gy, 1200 Gy, and 1400 Gy of Cobalt-60 Gamma radiation (Gamma chamber 5000) at Centre for Application of Radioisotopes and Radiation Technology (CARRT), (Mangalagangothri, Konaje, Karnataka, India) at a source strength of 14,000 Ci (Curie) that delivers about 9 kGy/hr (kilo Grey per hour), and electron beam current of 50 mA and dose rate of 2 kGy/min was administered to whole body of the *Drosophila* enclosed in the polypropylene tubes of 65×25 mm size.

The median lethal dose (LD_{50}), the dose that causes 50% mortality in 24 hrs, was determined. After the exposure of the flies to the radiation they were transferred to new media bottles and the number of dead flies in each dose was counted at 24 hrs and LD_{50} was calculated by using probit analysis.

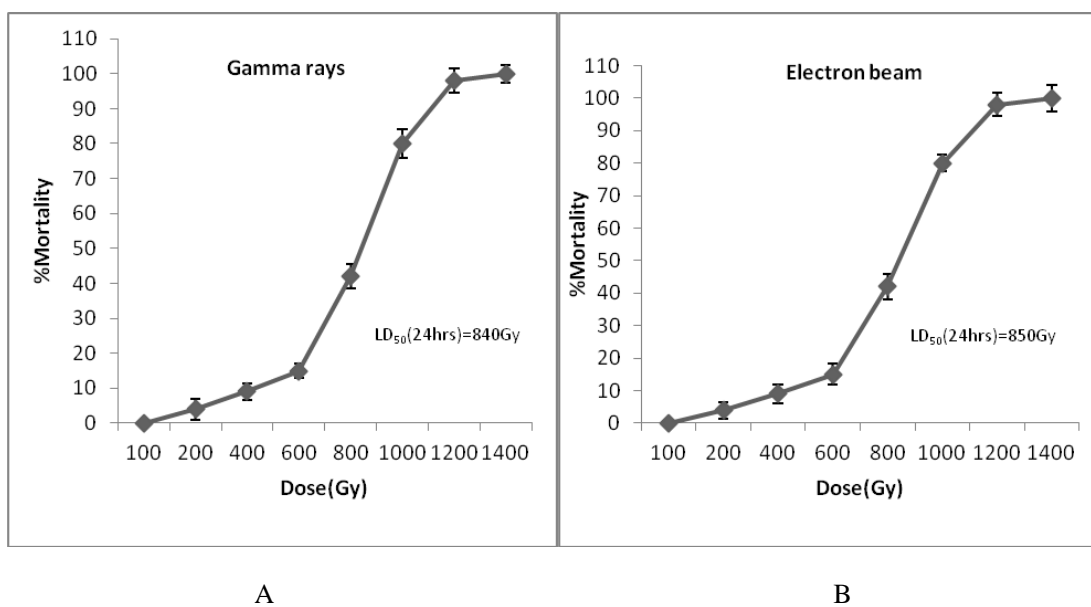


Figure 1. Radiation induced mortality in *D. melanogaster* (A) gamma rays (B) electron beam. LD_{50} (24 hrs) is the dose at which half of the population dies at 24 hrs after exposure determined statistically by probit analysis. Values are given as mean \pm S.D of mean (Each set contained 25 flies \times 6 replicates).

From Figure 1 it is evident that both gamma radiation and electron beam did not cause any mortality at 100 Gy and 200 Gy. At higher doses of 600 Gy to 1000 Gy there was dose dependent mortality in flies exposed to gamma radiation. The pattern of lethality was also similar in flies

exposed to electron beam. LD₅₀ (24 hrs) were 840 Gy and 850 Gy for gamma rays and electron beam, respectively. Dose from 100 Gy to 400 Gy was considered as sublethal in both the radiations. From the results, it is clear that *Drosophila* is tolerant to radiation up to 850 Gy. Although there are several studies on gamma radiation induced toxicity in *D. melanogaster*, our study is the first to report the toxicity of electron beam radiation on *D. melanogaster*.

The results of LD₅₀ dosage and sublethal dosage of gamma rays and electron beam will be useful in evaluating the natural radioprotective agents in *D. melanogaster*. These studies are currently in progress in our laboratory.

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Drosophilid collection in the Font Gropa site, Barcelona (Spain).

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During October 23rd and 24th and November 2012 we collected a sample of drosophilids at Font Gropa (Barcelona). This site is located on the foothills of the Tibidabo mountain, which is located on the northwest edge of Barcelona and at approximately 400 m above sea level. The vegetation is typical for the area, and it is mainly composed of a sparse pine forest (*Pinus pinea*) with some oaks (*Quercus ilex*) and Mediterranean brushwood. Flies were netted over 12 baits containing

Table 1. Number of adult flies collected in Font Gropa (Barcelona, Spain) in autumn 2012.

Species	23 rd Oct.	24 th Oct.	6 th Nov.	Total	Percentage
<i>D. subobscura</i> (♂)	3	14	1	18	3.52
<i>D. subobscura</i> (♀)	6	11	0	17	3.33
<i>D. melanogaster</i> (♂)	2	5	0	7	1.37
<i>D. simulans</i> (♂)	75	95	1	171	33.46
<i>D. menalo/simulans</i> (♀)	71	161	4	236	46.18
<i>D. suzukii</i> (♂)	4	7	0	11	2.15
<i>D. suzukii</i> (♀)	3	31	2	36	7.05
<i>D. immigrans</i> (♀)	6	7	0	13	2.54
<i>D. phalerata</i> (♀)	1	0	0	1	0.20
<i>Scaptomyza</i> sp.	1	0	0	1	0.20
Total	172	331	8	511	100

fermenting bananas. Font Gropa is a common place for sampling drosophilids (Araúz *et al.*, 2009; Calabria *et al.*, 2012). The distribution of trapped flies, according to species and sex, is presented in Table 1.

A large proportion of *D. simulans* males was found. The invasive species *D. suzukii* (Calabria *et al.*, 2010; Cini *et al.*, 2012) was detected in a non-negligible quantity. Taking into account the number of males and females, the estimated N_e for *D. suzukii* in the Font