INVESTIGATION OF THE ANTIOXIDANT PROPERTIES OF GERMINATED SEEDS

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Abstract: In order to underline the significant antioxidant benefits that can be obtained as the result of germinated seeds consumption we study the protective effect of germinated wheat seeds on irradiated organisms. For this purpose, we follow the evolution of mice offspring born from females, which experience in their pregnancy period a given degree of radiation exposure, correlated with an agreed food regime. Ionizing radiations induct undergrowth to the experience animals, low birth rates and poor viability of offspring. Germinated wheat proves to have a protective effect improving the organism capacity to face such conditions.

Keywords*:* food, germination, radiation, seed.

INTRODUCTION

With today rapidly environmental deterioration, producing global warming associated inevitably with increasing in cosmic radiation levels any means to which organism resistance can be increased is considered of real interest (Monson et al., 2005).

Food is for sure a convenient vector through which can assure a constant flow of bioactive components in the organism, providing a long time solid protection (Kondrusev et al., 2004) (Conney, 2003).

It is well known that germination induces a sensible growth of biological active components in all seeds. This increase is due to vital processes reactivation resulting in a "bio cocktail" which is well known for those miraculous health benefits but far from being adequately elucidated.

In order to reveal the potential uses of germinated seeds we follow the protective effects of germinated wheat on the irradiated animals.

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MATERIALS AND METHODS

Materials

60 pregnant mice females were used, grouped on three study lots: "Blind" lot of 20 females, "I" lot of 20 irradiated females and "IP" lot of 20 protected irradiated females.

Methods

The IP lot was fed only with germinated wheat flakes (aprox. 15g/animal/day) obtained from germinated wheat dried at 30-35°C, to prevent the damaging of thermo sensitive components and flatten into flakes. To feed the "wittiness" and "I" lots we used (aprox. 15g/animal/day) normal fodder consisting of: barley 46, 3%; wheat bran 10%; soya 10%; sunflower 10%; 1310 wheat flour 20%; calcium 1%; phosphate 0, 5%; salt 0, 2%; protein adjuvant 1%.

I and IP lots were irradiated through telegammatherapy appliances equipped with a cobalt 60 source, the activity of which is about 200 terabecquerels (TBq). Each animal was irradiated with a quantity equivalent with 1 Sv. This quantity of radiation induces only minor effects (undergrowth), not a lethal one (death). The animals were irradiated between day 6 and 12 of gestation period, when the embryos have the highest sensitivity (Bild and Miron, 2002) (Bild and Miron, 2003).

The period of feeding IP lot mice with the protection diet consists of 21 days, 7 before the irradiation takes place and 14 afterwards.

The experiment took place in a controlled environment: temperatures of 25°C, humidity of 60%, 12 hours alternating light/dark cycles, filtrated and ventilation airflow.

As criteria of comparison, the number of mice offspring, ponderal gain for offspring and their viability at 2 weeks from their births were used.

RESULTS AND DISCUSSION

Ionizing radiations affect animal organism producing significant defects on all animals exposed. All followed index (the number of mice offspring, ponderal gain for offspring at 2 weeks from their birth and their viability) are significantly reduced to I and IP lots in comparison with blind (figure 1).

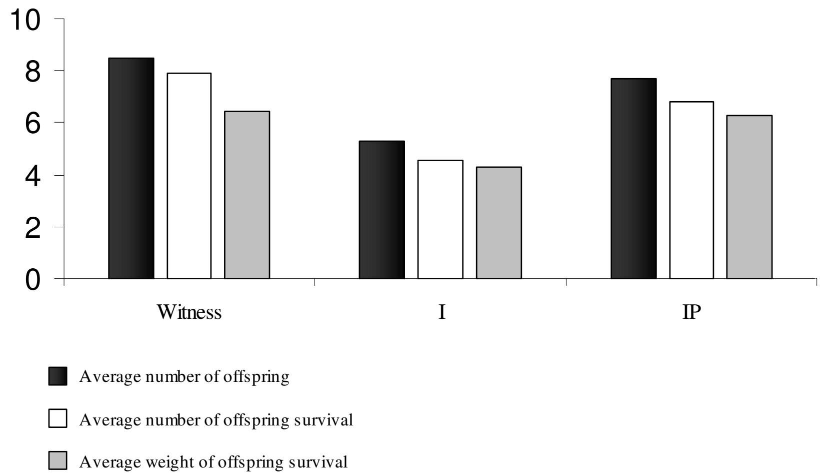

Figure1. Graphical representation of the main criteria of comparisons used to investigate the protective effects of germinated wheat on irradiated organisms

The experimental results are well improved in the case of IP lot towards I lot. This proves that germinated wheat has a protective effect on the irradiated organisms. The results are presented in tables 1, 2 and 3.

In table 3 taking into consideration the number of the offspring survival, only the limit values (min/max) of the weight are presented, the average value being the result of arithmetic mean for all the studied animals.

Table 1. Influences of germinated wheat diet upon the number of mice offspring (statistical interpretation of data).

Lot	Blind				I		IP		
Number of offspring	7	8	9	10	5	6	6	7	8
Frequency	2	9	6	3	14	6	1	4	15
Arithmetic mean	8,5				5,3		7,7		
Ideal value	8,5 ± 0,415				5,3 ± 0,219		7,7 ± 0,267		

Table 2. Influences of germinated wheat diet upon the survival rate of the offspring (statistical interpretation of data).

Lot	Blind			I		IP		
Number of offspring survival	7	8	9	4	5	6	7	8
Frequency	6	10	4	9	11	6	12	2
Arithmetic mean	7,90			4,55		6,80		
Ideal value	7.90 ± 0,21			4,55 ± 0,25		6,80 ± 0,28		

Table 3. Influences of germinated wheat diet upon the ponderal gain for offspring at 2 weeks from their birth (statistical interpretation of data).

Lot	Blind	I	IP
Weight limits min/max (g)	5,78/7,51	4,09/5,12	5,37/6,80
Number of offspring survival	158	91	136
Average weight	6,45	4,31	6,27
Ideal value	6,45 ± 0,11	4,31 ± 0,11	6,27 ± 0,10

CONCLUSIONS

Ionizing radiations are harmful to animal organisms inducing undergrowth and a smaller birth rate and viability of offspring in the cases of tested animals.

Germinated wheat proves to have remarkable protective properties on the irradiated organisms and although it did not offer 100% protection, it greatly improves the capacity of organism to fight back the negative effects of ionizing radiation. Although germinated wheat ratio/animal contains ≈ 13% toward normal fodder ratio, which contains ≈ 17% crude protein all followed parameters were substantially improved in the case of IP lot inclusive ponderal gain. This indicates that in the germinated wheat a complex of factors accumulated as the result of the germination processes that counter attack the effects of radiation activity.

These effects are explained through the richly content of antioxidant principle that actuates at the cellular membrane level having an antiradical after-affect.

Through food, a constant protection can be assured. A diet structured on radioprotective principles, rich in antioxidant substances, can represent an answer to protection against continuous increasing cosmic radiation.

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