

## LIPID PEROXIDATION ANALYSIS IN SALMON (*Salmo salar* L.) PROCESSED BY E-BEAM

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### ABSTRACT

In Brazil the consumption of fish is relatively small when compared with other source of meat protein. However the diets rich in fish have association with a wide range of positive health effects, due your great deal the fat acids omega 3, EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). Salmon (*Salmo salar* L.) specifically have those fat acids in main quantity. The omega 3 fat acids are related to the prevention of several not transmissible illness; with emphasis to cardiovascular, hypertriglyceridemia, cancer, osteoporosis and inflammatory and anti immune diseases. Foodborne illnesses have been a growing concern to the governments, producers and consumers, mainly regarding the damages they cause to human health. In this context, irradiation is used as a method to preserve food. The present work aim to evaluate the lipid peroxidation *in natura* salmon filet irradiated on the basis of thiobarbituric acid reactive substances (TBARS). Samples were irradiated in an e-beam accelerator (Radiation Dinamics Co. model JOB, New York, USA), 1,5 MeV-25mA at doses of 0, 1.0 and 2.0kGy, analyzed 7, 15, 21, 30 e 45 days after irradiation. Irradiated samples analyzed during a 45 day period, showed a higher lipid peroxidation than the control samples at the same period, increasing with dose and storage time. However, it did not pass the permitted value. Irradiation demonstrated effective without compromising the quality of the food.

## 1. INTRODUCTION

In Brazil the consumption of fish is still relatively small when compared with other sources of meat<sup>1</sup>. However, the fish is consumed by the humanity since the beginning of its existence. In some societies contemporaries - as for example the Japanese. Fish meat presents excellent nutritional value, mainly as protein source of raised nutritional quality in amino acid terms and digestion<sup>2</sup>.

Diets rich in fish have been associated with a wide range of positive health effects. Conveying low incidences of heart diseases and mortality from atherosclerosis, reduced inflammation associated with rheumatoid arthritis and psoriasis, and low blood pressure<sup>4</sup>.

The good quality of the raw material, of the standardization of the process and the maintenance of the temperatures of foods, has been cited as parameters important to prevent the alimentary toxinfecção, occurred. The fish are highly perishable; propitiate fast microbial multiplication, having to be dealt by diverse forms for elimination to the same ones and with the preservation of the food<sup>5</sup>.

The food treatment for ionizing radiation has been used with great success to the long one of the years in different branches of the industry. The first idea, if using the ionizing radiation in the food preservation appeared almost that immediately to the discovery of the radioactivity in 1895<sup>6</sup>. Since this date, irradiation is used as a method to preserves food in natura and processed food<sup>7</sup>.

However, the radiation has a significant interference in the components of foods, modifying its sensorial characteristics, and in lipids resulted of the oxidation, being that unsaturated fatty acid are more easily oxidized than the saturated ones<sup>2</sup>. In this context the present work aim to evaluate the lipid peroxidation *in natura* salmon filet irradiated on the basis of thiobarbituric acid reactive substances (TBARS).

## 2. MATERIAL AND METHODS

### 2.1. Samples and irradiation

The samples of salmon (*Salmo salar* L.) in files were obtained congealed the – 22 °C in the market of the city of São Paulo , deriving of Chile.

Triplicate samples were irradiated at each of two doses (1kGy and 2kGy), using an irradiator type electron beam of the Radiation Dynamics Incorporation the USA, 1.5 MeV-25mA with the energy of 1.5 MeV. CTA dosimeters for e-beam were used for the measurement of radiation dose.

### 2.2 Lipid peroxidation analysis

The lipid peroxidation will be measured by the TBARS index if it bases on the reaction of the thiobarbituric acid (TBARS) with malonaldehyde (MDA), product of the phase of termination of the oxidative rancidity<sup>8</sup>.

The thiobarbituric acid reactive substances (TBARS) were analyzed from control and irradiated samples to determine the extent of lipid oxidation<sup>9</sup>.

The peroxide Indices is determined by its capacity to liberate iodine of the potassium iodide, in ascetic acid solution of glacial. The set free iodine is titleholder for the tiossilfato. This form the peroxides can be dosed. This determination is used to follow the development

of the rancidity in a food, even so in the final phase, as the peroxide index is very low, is necessary to use one another index. Most used it is the index of the TBARS (thiobarbituric acid) <sup>10</sup>.

### 2.3 Statistical Analyses

Were used a GraphPad InStat, 4.02 version, GraphPad Software. Differences between mean numbers were determined by analyses of variance, followed by the Tukey test (p<0.05).

## 3. RESULTS AND DISCUSSION

Oxidative changes in fish are quantified by the measurement of TBARS, in nonirradiated and irradiated samples. The results are shown in table 1. The results of the Tukey test applied to individual lipid peroxidation at different irradiation doses not demonstrated significant differences.

**Table 1.** Values of lipid peroxidation for storage time, in files of Salmon (*Salmo salar* L.), after irradiation by e-beam<sup>a</sup>.

Treatment	0 <sup>d</sup>	7 <sup>d</sup>	15 <sup>d</sup>	21 <sup>d</sup>	30 <sup>d</sup>	45 <sup>d</sup>
0kGy <sup>b</sup>	0.07 <sup>a,c</sup>	0.07 <sup>a,c</sup>	0.06 <sup>a,c</sup>	0.14 <sup>a,c</sup>	0.09 <sup>a,c</sup>	0.13 <sup>a,c</sup>
1.0kGy <sup>b</sup>	0.15 <sup>a,c</sup>	0.15 <sup>a,c</sup>	0.17 <sup>a,c</sup>	0.23 <sup>a,c</sup>	0.26 <sup>a,c</sup>	0.45 <sup>a,c</sup>
2.0kGy <sup>b</sup>	0.18 <sup>a,c</sup>	0.18 <sup>a,c</sup>	0.22 <sup>a,c</sup>	0.28 <sup>a,c</sup>	0.35 <sup>a,c</sup>	0.39 <sup>a,c</sup>

<sup>a</sup> mgMDA/Kg.

<sup>b</sup> Means of the analysis of variance don't shows significant differences. Tukey test p<0.05.

<sup>c</sup> Deviation Mean (n 3).

<sup>d</sup> Days.

Hampson, Fox, Lakritz and Thayer, 1996 showed a dose dependence of malonaldehyde production due you irradiation in pork, lamb, beef and turkey muscle. However, in significant statistical difference was found in the creaks 0 to 10 kGy<sup>9</sup>. In a general way the losses of nutrients for the irradiation are not bigger of the one than the ones that occur when of the preservation of foods for more conventional methods<sup>2</sup>.

## 3. CONCLUSIONS

In conclusion, the irradiation did not modify significantly the nutritional value of the food and contributes positively for the preservation.

Next step we will improve some studies in the field of sensorial analysis.

#### 4. ACKNOWLEDGMENTS

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