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POS07-05. A Space Radiation Testing Rig at a Proton Therapy Cyclotron. Bhaskar Mukherjee, J. Lambert, C. Fuentes, J. Farr, Westdeutsches Protonentherapiezentrum Essen GmbH, Germany

During extravehicular activities (EVA) astronauts are exposed to intense, life-threatening radiation from solar flares made of protons of a wide energy distribution. Consequently, the design of the space suits and their radiation shielding ability are vital to safety of the astronauts and ultimate success of the mission concerned. We have simulated the solar flares by reprogramming the treatment planning system (TPS) of the 230 MeV proton therapy cyclotron operated by WPE and developed novel method for the testing of space suits. We have parameterised the historical solar flare data (proton energy versus proton flux) collected from previous Mir and Space shuttle mission logs and altered the conventional proton treatment planning system to replicate the solar flare spectra. The proton energy and corresponding flux of solar flare were emulated by proton range and exposure time of the TPS respectively. At present, using the uniform scanning (US) modality on the proton therapy gantry we have produced an exposure field size of about 30 × 30 cm² and have set up a simple irradiation rig to test space suit helmets and other materials used for radiation shielding in a space environment. In this report we highlight the operation principle of the above irradiation set up and shielding calculation results for the helmets used by US astronauts as well as Russian cosmonauts. Furthermore, from the derived LET distribution of the transmitted protons, shown in our presentation in this conference, we will present the results of retrospectively calculated radiation doses in the eyes of the Astro/Cosmonauts received in the previous space missions.

POS8 Radiation chemistry of bioactive compounds

POS08-01. Influence of gamma radiation in chestnut (*Castanea sativa* Mill.) vitamin E content. Isabel C.F.R. Ferreira¹, Ângela Fernandes¹, Lillian Barros¹, João C.M. Barreira^{1,4}, Albino Bento¹, M. Luisa Botelho², 1: Centro de Investigação de Montanha, Escola Superior Agrária, Campus de Santa Apolónia, apartado 1172, 5301-854 Bragança, 2: GTRPP/Unidade de Física e Aceleradores, Instituto Tecnológico e Nuclear, Estrada Nacional 10, 2686-953 Sacavém, 3: Departamento de Física Fundamental, Universidade de Salamanca, Plaza de la Merced, 37008 Salamanca. 4: REQUIMTE/Departamento de Ciências Químicas, Faculdade de Farmácia da Universidade do Porto, Rua Aníbal Cunha, 164, 4099-030 Porto

Chestnut has to be postharvest treated to increase its shelf-life and to meet the phytosanitary regulations during exportation. The most common preservation method for chestnuts was the chemical fumigation with methyl bromide, a toxic agent that is under strictly use according to Montreal Protocol due to the adverse effects on human health and environment. Furthermore, its use has been prohibited by the European Union since March 2010 [1]. Food irradiation is a possible feasible alternative to substitute the traditional quarantine chemical fumigation treatment. The present study evaluates the influence of gamma irradiation in vitamin E content of chestnut.

Vitamin E is a term frequently used to designate a family of related compounds, namely tocopherols and tocotrienols, which are important lipophilic antioxidants with essential effects in living systems against aging, strengthening the immune system and

reduction of cancer risk, reducing viral load in HIV-infected or in the treatment of Parkinson-syndrome [2-5]. g-tocopherol and its physiological metabolite, 2,7,8-trimethyl-2- (β-carboxyethyl) -6-hydroxychroman proved to have anti-inflammatory activity, being promising alternatives to drugs used as cyclooxygenase inhibitors, a key enzyme in the inflammatory process. g-Tocopherol represents 95% of the vitamin E in chestnuts, which could give to this fruit a functional food classification [6].

The irradiations were performed in a experimental equipment with four ⁶⁰Co sources, with a total activity of 305 TBq (8.233 kCi) in November 2009, after calibration with a standard Fricke dosimeter as described in a previous study [7], with a dose rate of 0.6 kGy h⁻¹. After irradiation geometry dose rate estimation the samples were divided in five groups to be exposed to different radiation doses: 0 (control), 0.25, 0.50, 1.00 and 3.00 kGy. Tocopherols contents were analysed by High Performance Liquid Chromatography (HPLC) coupled to fluorescence detection.

The results showed a protective effect in g-tocopherol levels along storage, for the different doses of irradiation, compared to the non-irradiated samples, where this component decreased. Concerning chemical parameters, the gamma-irradiation treatment of this food product could be a promising process to increase its shelf life, not affecting nutraceutical compounds, as is it was observed for g-tocopherol, an isoform of the most natural powerful antioxidant: vitamin E.

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POS08-02. Ascorbyl radical in micellar media - pulse radiolysis studies. Małgorzata Szymańska-Owczarek¹, B. Pacholczyk¹, S. Jankowski² and Jerzy L. Gębicki¹, 1: Institute of Applied Radiation Chemistry, Technical University of Łódź, Wróblewskiego 15 Street, 93-590 Łódź, Poland, 2: Institute of Organic Chemistry, Technical University of Łódź, Żeromskiego 116, 90-924 Łódź, Poland

Ascorbic acid (AsA) readily undergoes two consecutive, yet reversible, one-electron oxidation processes to form the ascorbate radical as an intermediate. Ascorbate radical has its unpaired