MO157 Individual, physiological and molecular stress responses exposed to ionising radiation in Lemna minor a. van hoeck, N. Horemans, Belgean Nuclear Research Centre (SCK-CEN) / Biosphere Impact Studies; R. Blust, University of Antwerp; D. Knapen, University of Antwerp / Zebrafishlab Dept Veterinary Sciences; H. Vandenhove, SCK-CEN / Biosphere Impact Studies. The biological effects and interactions of different radiation types in plants are still far from understood. Additional knowledge on the impact of ionising radiation in plants on individual, biochemical and molecular level will help to unravel the toxic mode of action. Among different radiation types, gamma radiation treatments have been mostly studied both in lab and field studies to derive the biological impact of radiation toxicity in organisms. However, environmental relevant studies on chronic low-dose gamma exposures are scarce. Exposure to gamma radiation can induce ionisation events causing an increase in reactive oxygen species (ROS) and inducing damage to biological material like DNA, lipids and structural proteins. The present study aimed at evaluating individual, physiological and molecular endpoints to understand the mode of action of ionising radiation stress in plants. The floating freshwater plant *Lemna minor* was chosen as model system. In an effort to strengthen duckweed genomic research, we sequenced the genome of *Lemna minor* using Illumina sequencing platform. Plants were being exposed to an external gamma radiation source for seven days. The classic growth related endpoints on plant biomass and frond area and frond number, were measured and compared with biochemical and molecular endpoints. A dose-response curve with 60% growth inhibition was obtained on plant growth. Additionally, *Lemna* plants showed also dose-dependent responses in anti-oxidative defense activities, nucleic acid modifications and a shift in ploidy level. Transcriptomic data of recently performed RNAseq runs are currently analyzed to evaluate protein-coding gene expression levels. The observed physiological changes and ongoing RNA-seq investigations will help to unravel response mechanisms for ionising radiation in plant systems. As multiple levels in biological organisation of the organism were considered, and also different dose rates taken into account, this approach allows a better understanding of the toxic mode of action of radiation stress in higher plants. *This research was supported by the European Commission Contract Fission-2010-3.5.1-269672 to Strategy for Allied Radioecology (www.star-radioecology.org) and a project of the Fund for Scientific Research (FWO-Vlaanderen, G.A040.11N)*