Body of Abstract: A Task Group of the International Commission on Radiological Protection (ICRP) has finished a report “Biological Effects after Prenatal Irradiation (Embryo and Fetus)” which has been approved by the Main Commission and will be published. Some new important scientific data shall be discussed in this contribution:

- During the preimplantation period lethality of the mammalian embryo is the dominating radiation effect. However, in mouse strains with genetic predispositions it has been shown that also malformations can be caused. This effect is genetically determined and its mechanism is different from the induction of malformations during major organogenesis. Radiation exposures during this prenatal period leads to an increase of genomic instability of cells in the normal appearing fetuses. These radiation effects can be transmitted to the next generation.

- A renewed analysis of individuals with severe mental retardation after exposures during the 8th to 15th week post conception in Hiroshima and Nagasaki gives evidence that a threshold dose exists for this effect around 300 mGy. This is supported by a number of experimental animal data which have been obtained from cellular and molecular investigations during the brain development. The data show the high radiosensitivity of the developing brain but also the various compensatory mechanisms and the enormous plasticity of these processes. The radiosensitivity varies strongly during the prenatal development. The highest sensitivity is found during the early and mid fetal period which is coinciding with weeks 8 – 15 post conception in humans. The lowest doses causing persistent damage are in the range of 100 to 300 mGy. For intelligence quotient scores a linear dose response model provides a satisfactory fit.

- From the experimental data it can be concluded that the fetal stage is most sensitive to the carcinogenic effect in comparison to the other prenatal stages. Such a clear situation cannot be obtained from the epidemiological studies with humans. In general the magnitude of cancer risk from in-utero exposures may be similar to that from radiation exposures in early childhood. This is especially the case when the follow-up is extended to adulthood.

- RBE values for fast neutrons as well as DREF values have been reported for various biological endpoints after exposures at various developmental stages. These will be discussed.