Radiobiological and medical research at the ion microprobe SNAKE

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High energy ion microprobes allows a precise energy dose deposition, which makes them very attractive for irradiation of living, biological samples and open a wide range
of application in radiation biology and neighboring fields, e.g. medicine. Beam size and targeting accuracy in the micron and submicron range allows structured and targeted irradiation on a dimension of the cell nuclei and below. Beyond the laterally very well defined irradiation with single or counted ions the amount of deposited energy is very reproducible. By using ions of different linear energy transfer (LET) the damage per single ion can be varied by several orders of magnitudes.
At the ion mircoprobe SNAKE installed at the Munich tandem accelerator 20 MeV protons are available. In new kinds of experiments these low LET protons (LET in water of 2.65 keV/µm) are focused to imitate and approximate spatial concentrated dose deposition of heavy, high LET ions to gain understanding of RBE effects [1]. In other kinds of experiments the potential of structured irradiation to reduce side effects in radiation therapy is investigated [2]. Structured irradiation with 55 MeV Carbon ions were used to induce well separated ionizing radiation induced foci.
Subsequent measurement of foci distances reveals movement not compatible with normal diffusion, which might enhance rejoining probability of DSB end [3]. We cover these
and other experiments to give an overview of the radiobiological research at the ion microprobe SNAKE.
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