



PTCS

Proton Therapy Center Switzerland AG

1 What are protons or proton beams? Are they dangerous?

A proton is the nucleus of a hydrogen atom. Hydrogen is the most common chemical element in the universe. It is a component of water and most organic compounds and is found in all living organisms. Correspondingly, only a bottle of hydrogen gas is required as the source for proton therapy. In the ion source, the electron is stripped off the hydrogen atom and the remaining proton is accelerated together with many other protons to high speed (approximately 70% of the speed of light, i.e. about 200'000 km per second), so that the accelerated proton beam can be directed to the patient.

Proton radiation – just like X-rays, which are used for diagnosis and conventional therapy – destroys cells of living tissues. This fact is used in radiation therapy, as cancer cells must be destroyed. The aim of radiation therapy is to always apply a maximum dose that is as homogenous as possible to the tumour and to protect the surrounding healthy tissue as much as possible. Because of its physical properties, proton radiation fulfils this criterion to a greater extent than conventional radiation therapy.

As the protons are accelerated in a closed system, it is not possible for the radiation to be released outside the center. There is no danger to the environment, or to the immediate neighbourhood of the center. The regulatory agency, the Department of Radiation Protection at the Federal Office for Health, carries out an inspection and safety check to ensure that accidents can be ruled out.

As healthy cells also react to the radiation, it is of utmost importance for the treatment that only the tumour cells are hit by the radiation. In order to rule out inadvertent irradiation of a patient or unwanted release of the proton radiation, several safety elements are built in. The regulatory agency, the Department of Radiation Protection at the Federal Office for Health, also carries out regular safety checks before and after the equipment is put into operation, to ensure the highest possible level of safety.