

RaySearch has recently released RayOcular as a module for ocular treatments with following features:

- geometric, hierarchically organized eye model including clips
- a dedicated pencil beam algorithm with grid resolution down to 0.2 mm
- integration of fundus imaging
- overlay of X-ray images and clip projections

WPE has treated first patients completely based on RayOcular in 2021 after commissioning and validation of the system. Validation included testing geometric modelling and fundus projection with the use of 3D printed phantoms. Dosimetric tests were based on gamma-analysis between calculated lateral and depth dose profiles and measurements in water. As a stringent dosimetric test, the impact of wedges in treatment plans was investigated.

RayOcular fulfills requirements for accurate and efficient treatment planning in ocular proton therapy. Predicted clip positions in X-ray imaging is well reproduced by the calculated clip projections for various orientations of the eye. Funduscopy photos, once registered, can be used for delineation. The dose calculation predicts lateral and depth dose profiles within a gamma test pass-rates well above 95% (2%/0.3 mm). The impact of wedges in terms of excess scatter dose and lateral profile broadening is well reproduced, demonstrating the superiority of a PBA against simplistic dose calculation algorithms.