

The aim of this work is the development of a method based on the spatial seed distributions to evaluate the volume variation of the prostate after a permanent transperineal implant.

The spatial seed distributions were obtained from radiographic films within few days following the implantation of I-125 or Pd-103 seeds on 32 patients. Five different approaches were used to extract volume information from the seed spatial coordinates. These methods include the external envelope of the seeds, the 2D average inter seed separation from several projections and the average 3D inter seed separation from the complete reconstruction of the 3D coordinates of each seed.

2D and 3D reconstruction methods were compared for their robustness, precision and ease of calculation. The envelope of the seed cloud was found too sensitive to the displacement of a single seed. Three days after the implantation, the average increase in prostate volume of 30 patients is 35% with a 26% standard deviation relative to the planning volume. For two patients, films were taken at regular intervals, every week at first and more sparsely after one month for up to 200 days. In both cases, the prostate volume shows a rapid increase reaching its maximum after 12 and 21 days respectively followed by a decrease.

In conclusion, the post-implant edema can be investigated from the spatial seed distribution variation. In a cohort of 32 patients, very large volume increases were observed emphasizing the need to choose an appropriate delay on the volume determination used for post-implant dosimetry.