AbstractID:9041Title :Positrone missionba sedte chniqueforlinearfiducialm   arker trackingduringradia tionther apy

Purpose: Todevelopa trackinga lgorithmforlin earpo sitronemis sionm arkerforexternalbeamr   adiationtherapy . **Methodand Materials:** Thedeliveryac curacyof external beamradiation   therapyiscurrentl ylimi tedbythemotionof   tumourdur ingtr eatment. Byim plantingpositronemission   fiducial markersint othe tumo r,andusing pai rsofposition -sensitivedetectorstotracktheresulting annihilationgamma ra ys,th epos itionoft he tumorcanb etrac kedin real-timewithh ighaccur acy.P ositronemissionb asedtec hnique willdeliv er a lower radiationd osetonormalti ssuethanx -rayfluoroscopy,andthesmallersi   zeof theposit ronemiss ionmarkers reducesr isktothep atientduri ngimp lantation.Someprevi ousstu dieshavesho wnthatm ultiplepointm arkersc anbetr ackedusing thist echnique. Inth is study, wefur therext endedth etechniquetot rack al inearmarker.Usingasingle   linearmark erhas many advantages ascompared withmul tiplepoin tmar kers:si ngleimpl antationis teadof threeca nf urtherr educet hepati entriskandtotally eliminatesthepossibil ityofmar kermigrat ion.Analgorith mthati terativelyest imatest heloca tionandorientationof   the linearmarker ispropo sed.The algorithm wasth enevaluatedusing dat aobt ainedfromMont eCarlosimul ation. **Results:**Theacc uracyof the trackinga lgorithmimpr ovesw ith increasednum berofevents used.Thecent eroft he linearmarker w aslocalized tos ub-millimeter accuracywith a total of 1000events.Theend   -pointsof linearm arkerwerelo calizedwit h averageaccuracyofabout2   .5mm,which convertstoabout6degre   eofu ncertaintyon theor ientation. **Conclusion:** Linearfi ducialmarker labeledwithpositro ne mission isotopecan be localizedwiths ub-millimeteracc uracyandcanbe   potentiallyus edf orre al-timetumour trackingdurin gradiation therapy.