

**Purpose:** During a routine quality assurance check, it was found that the total accuracy was drifted out, or deteriorated to 3.5mm and greatly exceeds the manufacturer's specification of less than 1mm. In this report, observations and the preliminary results of investigation on the issue will be presented. Lessons learnt from the incident, suggestions and precaution measures to prevent from its happening will also be discussed.

**Method and Materials:** Previous records of the routine QA and system logs were carefully reviewed. All evidence and all likely cause for the drift, such as the imaging system out of calibration, physical contacts, earthquakes, hospital vibration and room settling were thoroughly examined. Personnel who have access to the CyberKnife Systems were interviewed.

**Results:** The imaging system required no adjustment or recalibration. The system log files seem not corrupted. The robot appeared to be off from its original position. Two spots, one dent and one scratch, on the linac cover occurred over two years ago and were excluded from the likely cause list. The accuracy was re-confirmed within the specification by end-to-end tests after several adjustments, including the robot re-mastering and the secondary calibration of the treatment paths. The likely causes suggested by the manufacturer were not very convincing.

**Conclusion:** By nature, any mechanical system can fail at any time. Failure to identify the true cause of the problem could result in its happening again at any time no matter how often QA is performed and could potentially expose patients to great risks. Rigorous QA such as the end-to-end should be performed monthly; the iso-post test should be performed daily and the laser spot at the perch position should be performed prior to each patient treatment. Some kind of interlock systems should be developed to self-check or detect any deviation for each subsystem.