

Replacement of Diagnostic CT Scans with Rapid MR Imaging for Pediatric Neurosurgery Patients.

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Introduction

CT scans have been used uniformly for years to quickly evaluate pediatric patients for ventricular size, postoperative complications, and numerous other indications. We have attempted to reduce unnecessary radiation in this population through the use of rapid MRI scans as the long term effects of radiation have continued to become clear. The goal of the present study was to look at the change in practice of our group and to evaluate the reduction in radiation exposure.

Methods

A retrospective review was conducted analyzing the breakdown of CT scans, full MRIs and rapid MRIs performed at UCSF Benioff Children's Hospital Oakland from 2004 to 2012. We then calculated the reduction in radiation exposure based upon the average radiation for a given head CT.

Typical **Infant**, 2 month old: CTDI 31 mGy, DLP 350 mGy*cm x 0.0067 = **2.3 mSv**

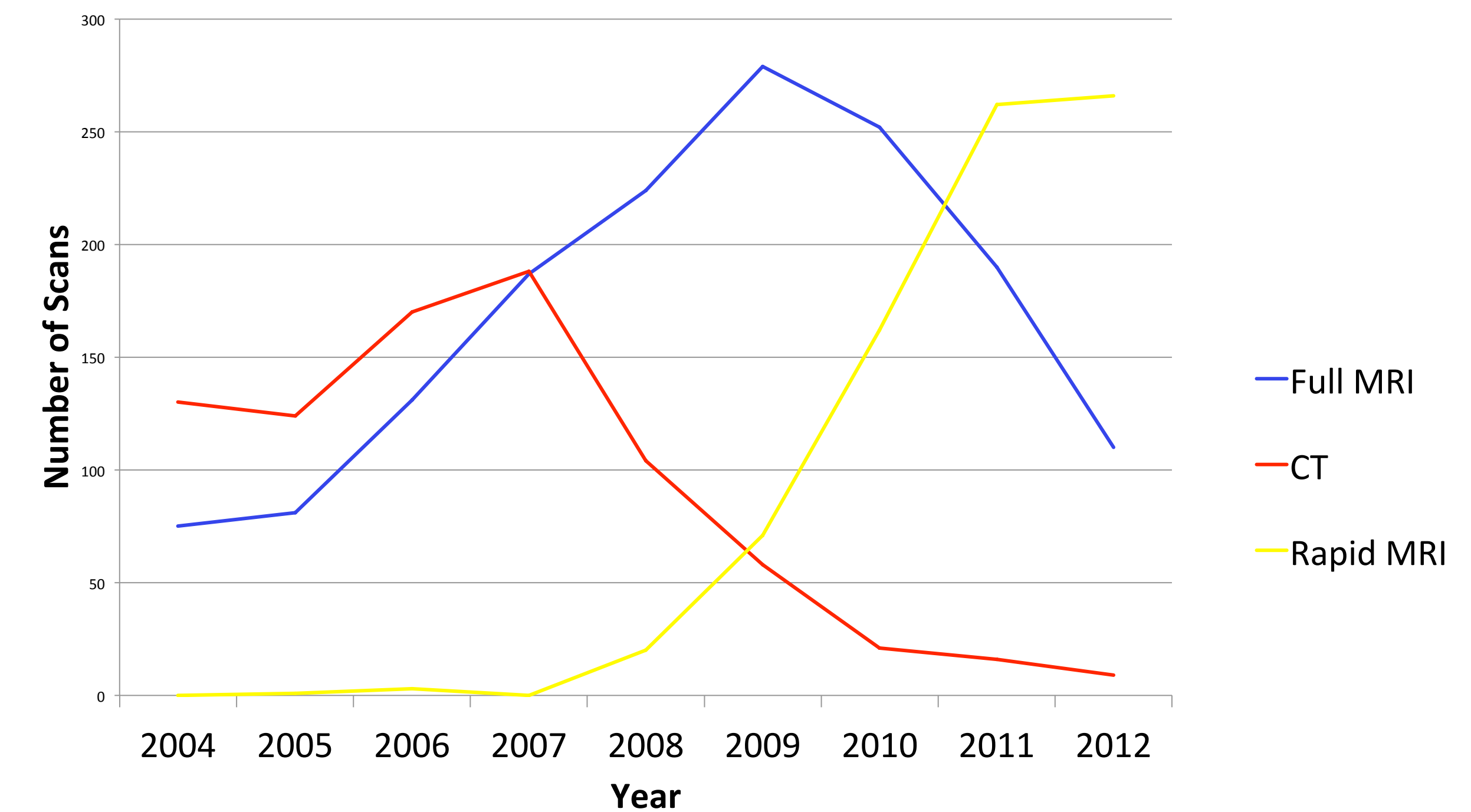
Typical **Child**, 6 year old: CTDI 31 mGy, DLP 480 mGy*cm x 0.0067 = **3.2 mSv**

Typical **Teen**, 14 year old: CTDI 37 mGy, DLP 600 mGy*cm x 0.0067 x 0.75 = **3.0 mSv**

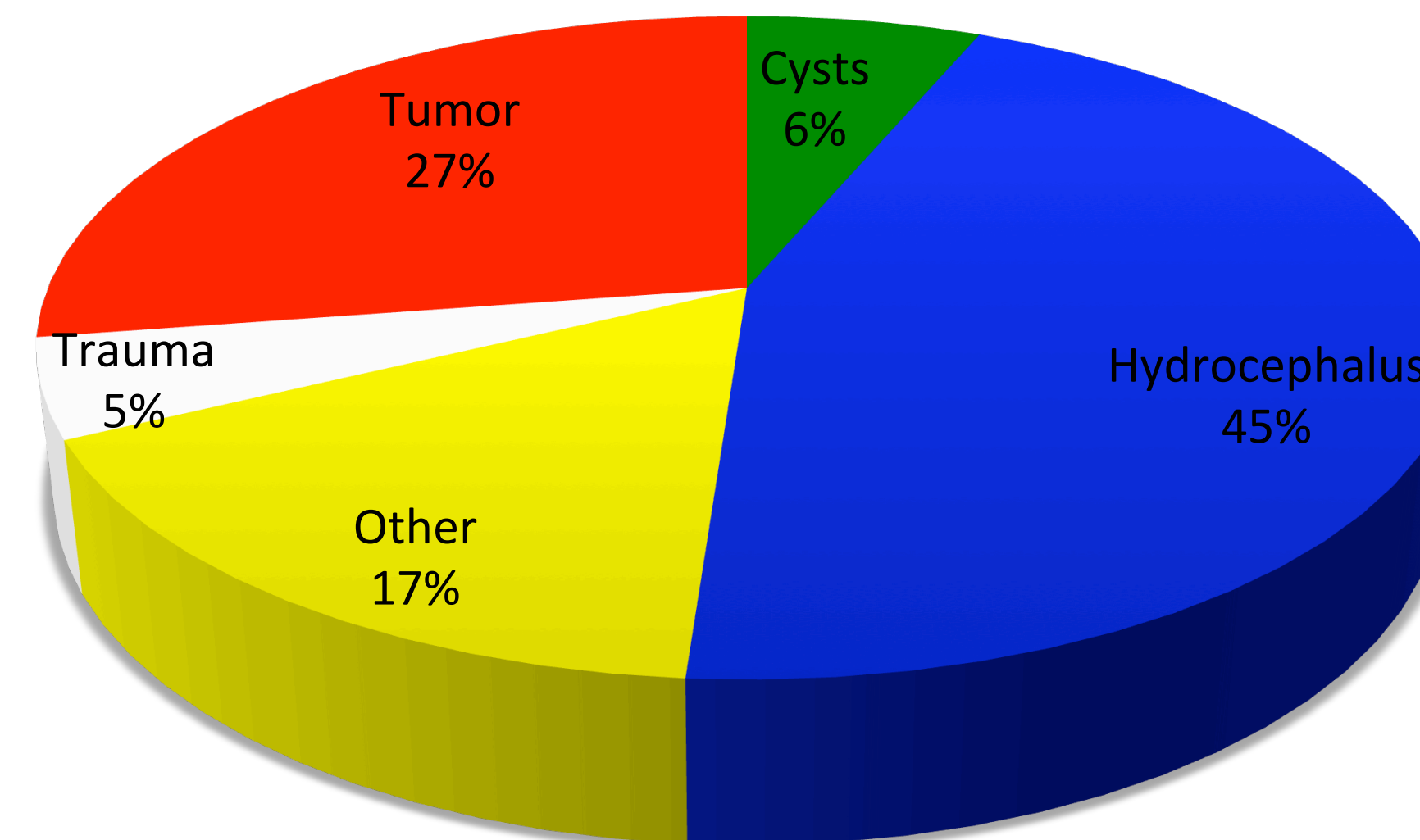
Results

CT scans accounted for 63% of all brain scans done in 2004, while rapid MRI accounted for 0%. Over the course of 8 years, the number of CT scans dropped to just 2.3% and rapid MRIs made up 69.1% of all scans in 2012. The most common diagnosis for all scans was hydrocephalus, followed by brain tumors. Age ranged from 1 month to 26 years, with a median age of 6 years. The average dose length product for a child head CT is 480mGy*cm; therefore saving each child this potential dose of radiation at the time of each necessary scan. The effective dose varies by age group, ranging from 2.3 mSv to 3.2 mSv (see below).

Rapid MRI vs. Full MR vs. CT Imaging by Year



Indication for all scans performed



Conclusions

Rapid brain MRIs have largely replaced the need for head CT scans in the pediatric population, thus avoiding the potential radiation effects. Additionally, rapid MRIs have eliminated the need for sedation in younger patients not requiring full length MRIs.