

# Pediatric Proton Therapy in the United States: Patterns of Care 2013



pediatric proton foundation



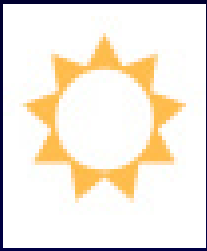
The **National Association** for **Proton Therapy**

Danny Indelicato, MD  
Andrew Chang, MD

No Conflict of Interest



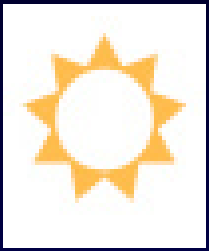
# Survey Methodology



- All 11 operating US proton facilities in 2013 were surveyed
  - Anonymous patient age, tumor site, and histology collected  $\leq 18$  y/o patients treated from January 1, 2013 through December 31, 2013
- All facilities responded for a **100%** response rate



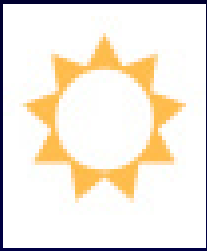
# Results



- **722** children and adolescents treated with proton therapy in 2013
  - 694 patients in 2012
  - 613 patients in 2011
  - 465 patients in 2010
- All facilities treated  $\geq 14$  pediatric patients (range, 14-157)
- 65% were treated at 4 academic medical centers associated with large pediatric hospitals
- 22% of patients originated outside the US



# Results



- 75/722 patients had treatment with a component of photons (range, 0-54 patients per center)
- Hypofractionation/SRS was rare
- All but 8 cases were considered curative intent
- Use of anesthesia, patient age range, and distribution of tumor types was consistent with prior years

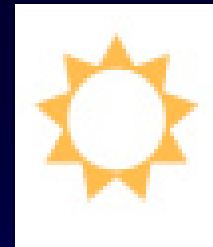


## **Pediatric Proton Therapy: Patterns of Care across the United States**

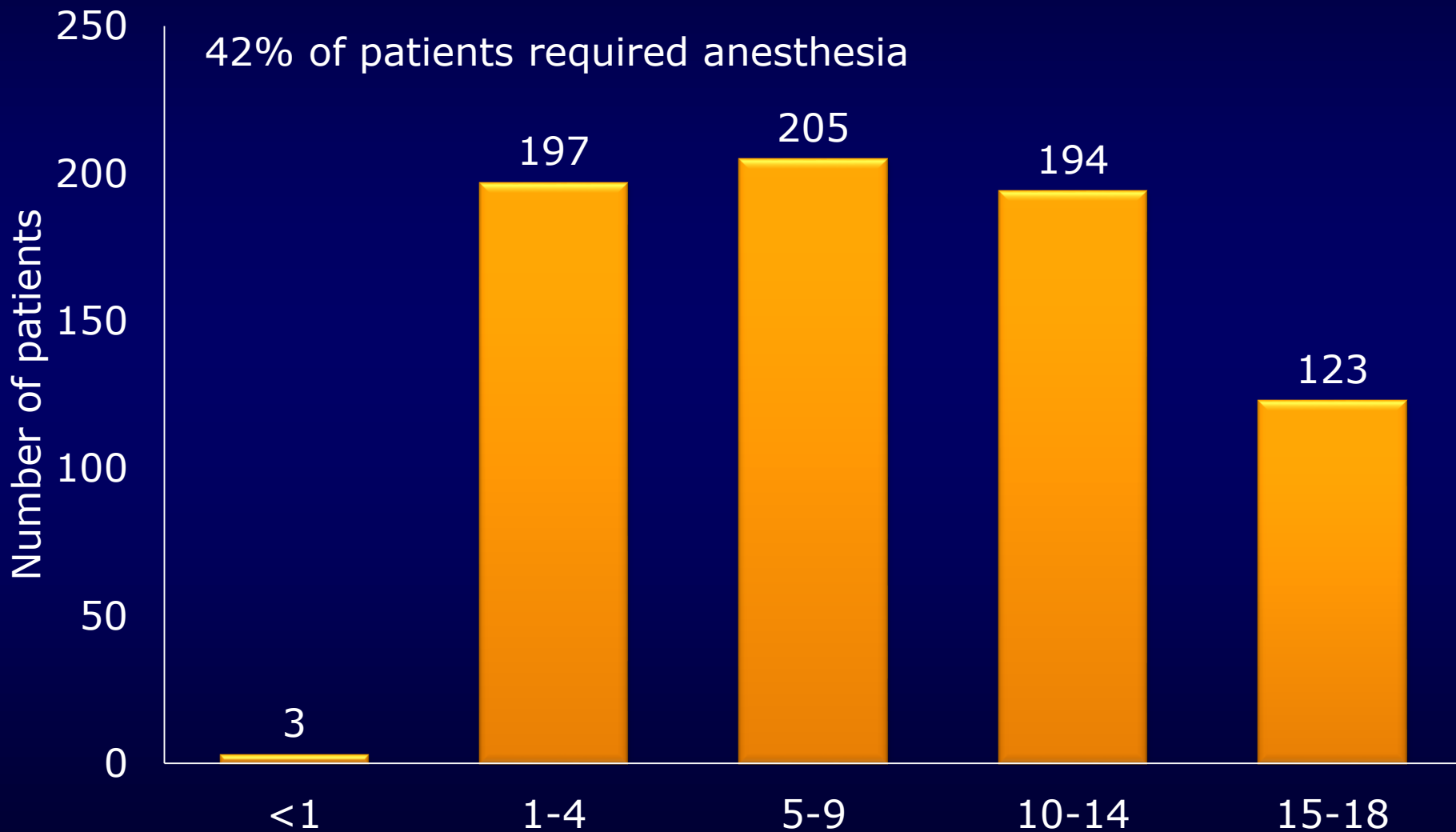
Andrew L. Chang, MD<sup>1</sup>; Toruun I. Yock, MD<sup>2</sup>; Anita Mahajan, MD<sup>3</sup>; Christine Hill-Kaiser, MD<sup>4</sup>; Sameer Keole, MD<sup>5</sup>; Lilia Loredó, MD<sup>6</sup>; Oren Cahlon, MD<sup>7</sup>; Kevin P. McMullen, MD<sup>8</sup>; William Hartsell, MD<sup>9</sup>; and Daniel J. Indelicato, MD<sup>10</sup>



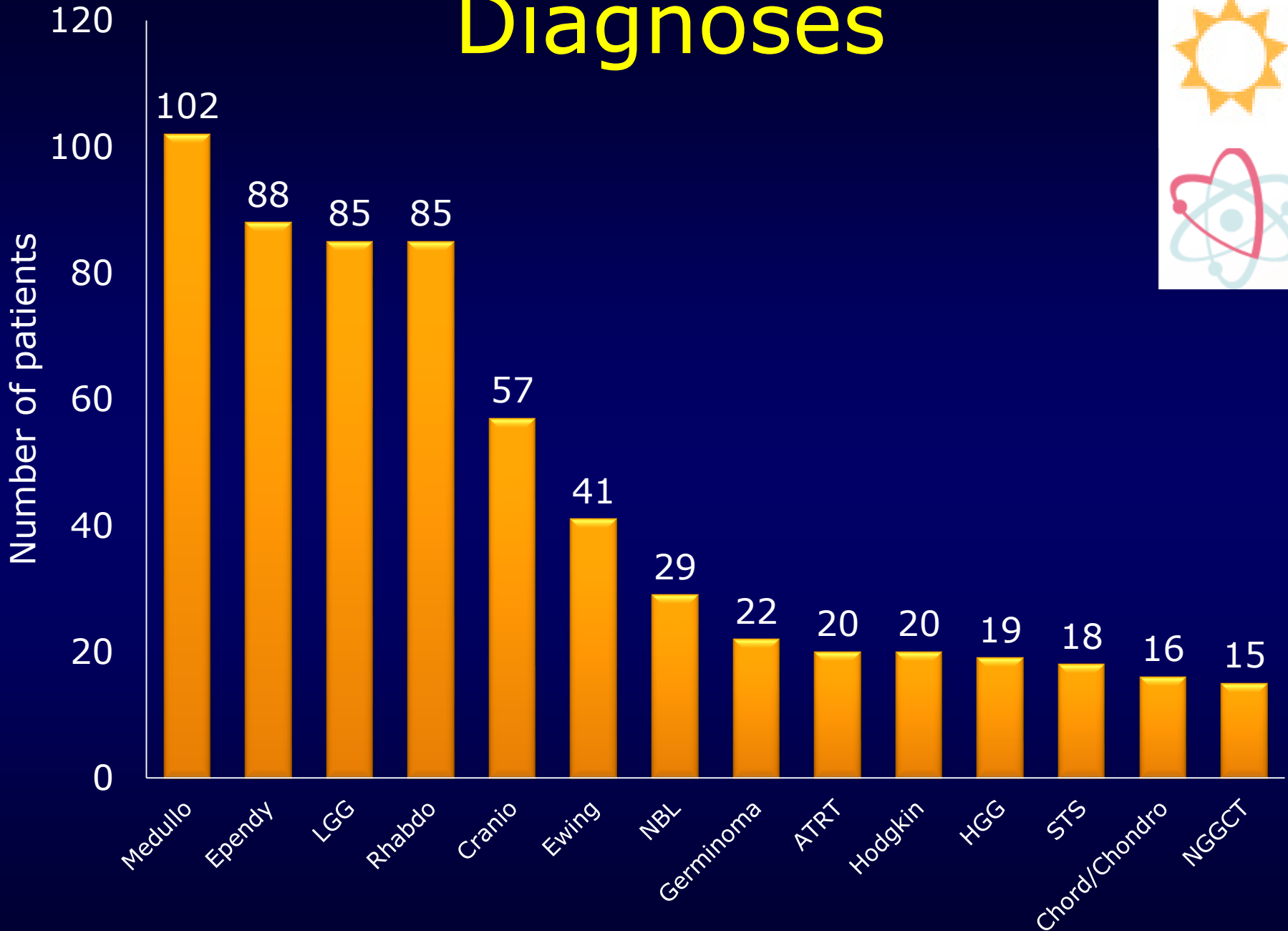
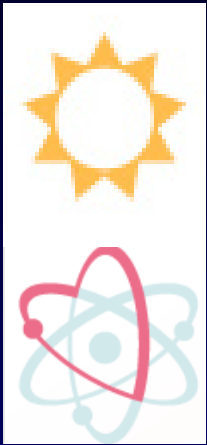
# Patient Age



42% of patients required anesthesia

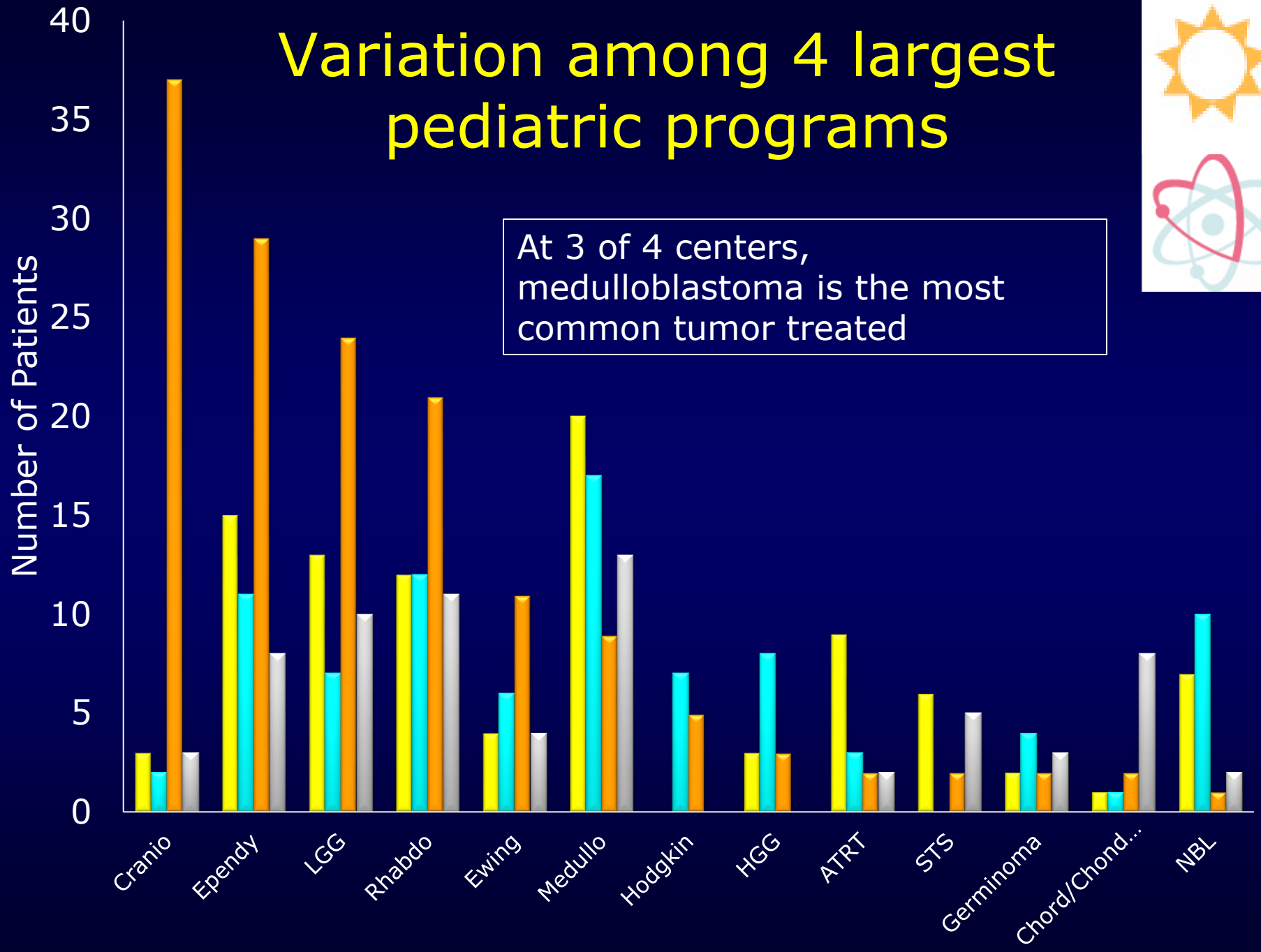
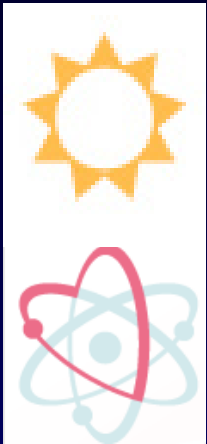


# Diagnoses



(Limited to diagnoses with >15 cases)

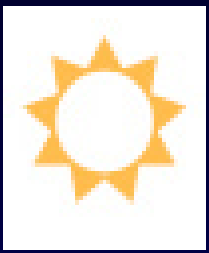
# Variation among 4 largest pediatric programs







# Research Engagement

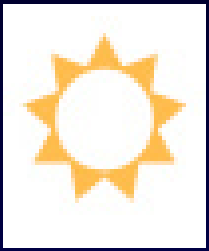


Number of children enrolled on:

- Single institution registry studies: 364 (50%)
- Multi-institution registry studies: 186 (26%)
- Multi-institutional therapeutic trials: 138 (19%)
  - 109/138 were treated at three centers



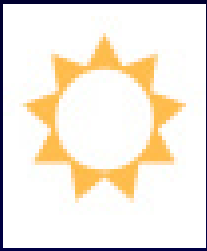
# Conclusions



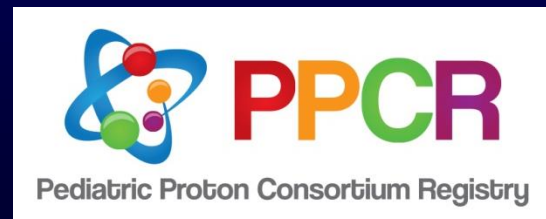
- Number of children treated at US proton centers continues to increase, rising 36% since 2010
  - consistent with the international perception that pediatric patients derive a relative benefit from this technology
- Average patient continues to be a child <10 years old with a curable brain tumor or axial sarcoma

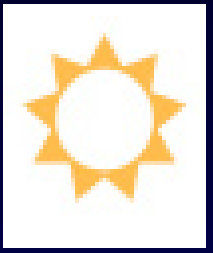


# Conclusions



- Access to a multidisciplinary pediatric team remains critical
  - 1/2 of the top six tumors require concurrent chemotherapy
  - 1/2 of patients require anesthesia support
- As the number of proton centers increases, broader engagement in collaborative research is necessary





Thank you

All 2013 survey respondents

Susan Ralston (PPF)

Len Arzt (NAPT)