



Particle Therapy Statistics in 2014

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More than 137 000 patients were treated with particle therapy worldwide from 1954 to 2014, including 15 000 in 2014, 86% of which were treated with protons and 14% with carbon ions and with other particles (**Table 1**). In 2014, about 10% of patients were pediatric and another 10% were treated for ocular melanomas. Forty-eight particle therapy facilities were in clinical operation at the end of 2014 (**Figure 1**). Two facilities in Asia (one in Lanzhou and the other in Wanjie) were temporarily shut down for technical upgrades and extensions in 2014. One facility in the United States (Indiana University Health Particle Therapy Center, Bloomington, IN) was closed down at the end of 2014 after 10 years of clinical operation. Five new particle therapy centers started patient treatments in 2014. These include two facilities in Asia (Shanghai Proton and Heavy Ion Center in Shanghai, China, and Aizawa Hospital Proton Therapy Center in Nagano, Japan) and three facilities in the United States (the Provision Center for Proton Therapy in Knoxville, TN, the Scripps Proton Therapy Center in San Diego, CA, and the Willis Knighton Proton Therapy Center in Shreveport, LA). **Figure 2**, **Figure 3**, and **Figure 4** depict the number of patients treated with proton and carbon ions and their location.

At the beginning of 2015, more than 30 particle therapy centers, with a total of about 80 treatment rooms, were under construction worldwide. Half of these centers are in the United States and one-third in Asia. About 15 centers expect to start technical and/or clinical commissioning in 2015 and about half of them should be ready for patient treatment before the end of 2015.

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Editorial

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Table 1. Particle therapy patient statistics (per end of 2014).

Location			Particle	First (last) patient, y	Patient total, no.	Date of total, y
Country	City	Institution				
Belgium	Louvain-la-Neuve	-	p	1991 (1993)	21	1993
Canada	Vancouver	TRIUMF, Canada's national laboratory for particle and nuclear physics	π^-	1979 (1994)	367	1994
Canada	Vancouver	TRIUMF, Canada's national laboratory for particle and nuclear physics	p	1995	182	Dec 2014
Czech Republic	Prague	Proton Therapy Centre	p	2012	357	Dec 2014
China	Zibo	Wanjie Proton Therapy Center	p	2004	1078	Dec 2014
China	Lanzhou	Institute of Modern Physics, Chinese Academy of Sciences	C ion	2006	213	Dec 2014
China	Shanghai	Shanghai Proton and Heavy Ion Center	C ion	2014	22	Dec 2014
China	Shanghai	Shanghai Proton and Heavy Ion Center	p	2014	13	Dec 2014
England	Clatterbridge	-	p	1989	2626	Dec 2014
France	Nice	Centre Antoine-Lacassagne	p	1991	5205	Dec 2014
France	Orsay	Center of Pr \acute{o} tontherapy of Orsay	p	1991	7004	Dec 2014
Germany	Darmstadt	GSI Helmholtz Centre for Heavy Ion Research	C ion	1997 (2009)	440	2009
Germany	Berlin	Hahn Meitner Institut	p	1998	2525	Dec 2014
Germany	Munich	Rinecker Proton Therapy Center	p	2009	2307	Dec 2014
Germany	Heidelberg	Heidelberg Ion-Beam Therapy Center	C ion	2009	1723	Dec 2014
Germany	Heidelberg	Heidelberg Ion-Beam Therapy Center	p	2009	824	Dec 2014
Germany	Essen	West German Proton Therapy Centre Essen	p	2013	139	Dec 2014
Italy	Catania	Istituto Nazionale di Fisica Nucleare (Laboratori Nazionali del Sud)	p	2002	350	Dec 2014
Italy	Pavia	National Centre of Oncological Hadrontherapy	p	2011	111	Dec 2014
Italy	Pavia	National Centre of Oncological Hadrontherapy	C ion	2012	318	Dec 2014
Japan	Chiba	Heavy Ion Medical Accelerator in Chiba	p	1979 (2002)	145	2002
Japan	Tsukuba	Proton Medical Research Center, 1	p	1983 (2000)	700	2000
Japan	Chiba	Heavy Ion Medical Accelerator in Chiba	C ion	1994	8841	Dec 2014
Japan	Kashiwa	National Cancer Center	p	1998	1560	Dec 2014
Japan	Hyogo	Hyogo Ion Beam Medical Center	p	2001	4652	Dec 2014
Japan	Hyogo	Hyogo Ion Beam Medical Center	C ion	2002	2146	Dec 2014
Japan	Tsuruga	Wakasa Wan Energy Research Center	p	2002 (2009)	62	2009
Japan	Tsukuba	Proton Medical Research Center, 2	p	2001	3416	Dec 2014
Japan	Shizuoka	Shizuoka Cancer Center	p	2003	1757	Dec 2014
Japan	Koriyama City	Southern TOHOKU Proton Therapy Center	p	2008	2797	Dec 2014
Japan	Gunma	Gunma University Heavy Ion Medical Center	C ion	2010	1486	Dec 2014
Japan	Ibusuki	Medipolis Proton Therapy and Research Center	p	2011	1317	Dec 2014
Japan	Fukui City	Fukui Prefectural Hospital Proton Therapy Center	p	2011	428	Dec 2013
Japan	Nagoya	Nagoya Proton Therapy Center	p	2013	627	Dec 2014
Japan	Tosu	SAGA HIMAT – Heavy Ion Cancer Treatment Center	C ion	2013	547	Dec 2014
Japan	Nagano	Aizawa Hospital Proton Therapy Center	p	2014	1	Oct 2014
Poland	Krakow	Institute of Nuclear Physics PAN	p	2011	85	Dec 14
Russia	Dubna	Joint Institute for Nuclear Research, 1	p	1967 (1996)	124	1996
Russia	Moscow	Institute for Theoretical and Experimental Physics	p	1969	4368	Dec 2014
Russia	St. Petersburg	Petersburg Nuclear Physics Institute	p	1975	1386	Dec 2012
Russia	Dubna	Joint Institute for Nuclear Research, 2	p	1999	1069	Dec 2014
South Africa	Cape Town	iThemba LABS	p	1993	524	Dec 2014
South Korea	Seoul	National Centers of Competence in Research	p	2007	1496	Dec 2014
Sweden	Uppsala	Swedberg Lab, 1	p	1957 (1976)	73	1976
Sweden	Uppsala	Swedberg Lab, 2	p	1989	1431	Dec 2014
Switzerland	Villigen	Swiss Institute for Nuclear Research/Paul Scherrer Institute, Piotron	π^-	1980 (1993)	503	1993

Table 1. Continued.

Country	Location		Particle	First (last) patient, y	Patient total, no.	Date of total, y
	City	Institution				
Switzerland	Villigen	Swiss Institute for Nuclear Research/Paul Scherrer Institute, OPTIS1 gantry	p	1984 (2010)	5458	2010
Switzerland	Villigen	Paul Scherrer Institute, Center for Proton Therapy, including the OPTIS2 gantry	p	1996	1906	Dec 2014
USA	Berkeley, CA	Lawrence Berkeley National Laboratory (184 inch cyclotron)	p	1954 (1957)	30	1957
USA	Berkeley, CA		He	1957 (1992)	2054	1992
USA	Los Alamos, NM	Los Alamos Meson Physics Facility	π^-	1974 (1982)	230	1982
USA	Berkeley, CA		ions	1975 (1992)	433	1992
USA	Boston, MA	Harvard Cyclotron Laboratory	p	1961 (2002)	9116	2002
USA	Loma Linda, CA	Loma Linda University Medical Center	p	1990	18362	Dec 2014
USA	Bloomington, IN	Midwest Proton Radiotherapy Institute, 1	p	1993 (1999)	34	1999
USA	San Francisco, CA	University of California, San Francisco - Cracker Nuclear Laboratory	p	1994	1729	Dec 2014
USA	Boston, MA	Massachusetts General Hospital Francis H. Burr Proton Therapy Center	p	2001	8107	Sep 14
USA	Bloomington, IN	Indiana University Health Proton Therapy Center	p	2004 (2014)	2200	2014
USA	Houston, TX	MD Anderson Cancer Center	p	2006	5838	Dec 2014
USA	Jacksonville, FL	University of Florida Health Proton Therapy Center	p	2006	5376	Dec 2014
USA	Oklahoma City, OK	ProCure Proton Therapy Center	p	2009	1690	Dec 2014
USA	Philadelphia, PA	Penn Medicine's Roberts Proton Therapy Center	p	2010	2522	Dec 2014
USA	Warrenville, IL	Chicago Proton Center	p	2010	1782	Dec 2014
USA	Hampton, VA	Hampton University Proton Therapy Institute	p	2010	1200	Dec 2014
USA	New Jersey/ Metro New York	ProCure Proton Therapy Center	p	2012	1168	Dec 2014
USA	Seattle, WA	Seattle Cancer Care Alliance ProCure Proton Therapy Center	p	2013	420	Dec 2014
USA	St. Louis, MO	S. Lee Kling Proton Therapy Center	p	2013	149	Dec 2014
USA	Knoxville, TN	Provision Center for Proton Therapy	p	2014	100	Aug 2014
USA	San Diego, CA	Scripps Proton Therapy Center	p	2014	220	Dec 2014
USA	Shreveport, LA	Willis-Knighton Cancer Center	p	2014	28	Dec 2014
Total of all facilities (in and out of operation):						
		He	2054	1957-1992		
		Pions	1100	1974-1994		
		C-ions	15736	1994-present		
		Other ions	433	1975-1992		
		Protons	118195	1954-present		
		Grand Total	137179			

Abbreviations: P, protons, C ion, carbon ions; π^- , pion.

^aData collected by the Particle Therapy Cooperative Group.

Figure 1. Facilities in clinical operation and the number of patients treated from 1955 to 2014.

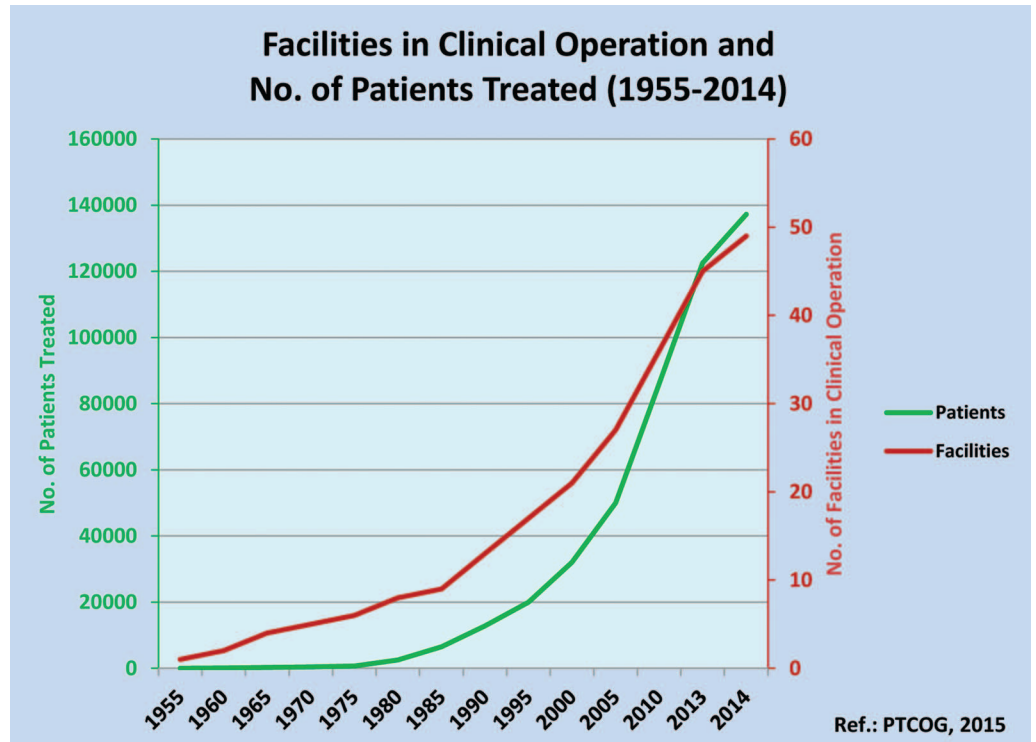


Figure 2. Patients treated with protons and carbon ions in North America, Asia, and Europe.

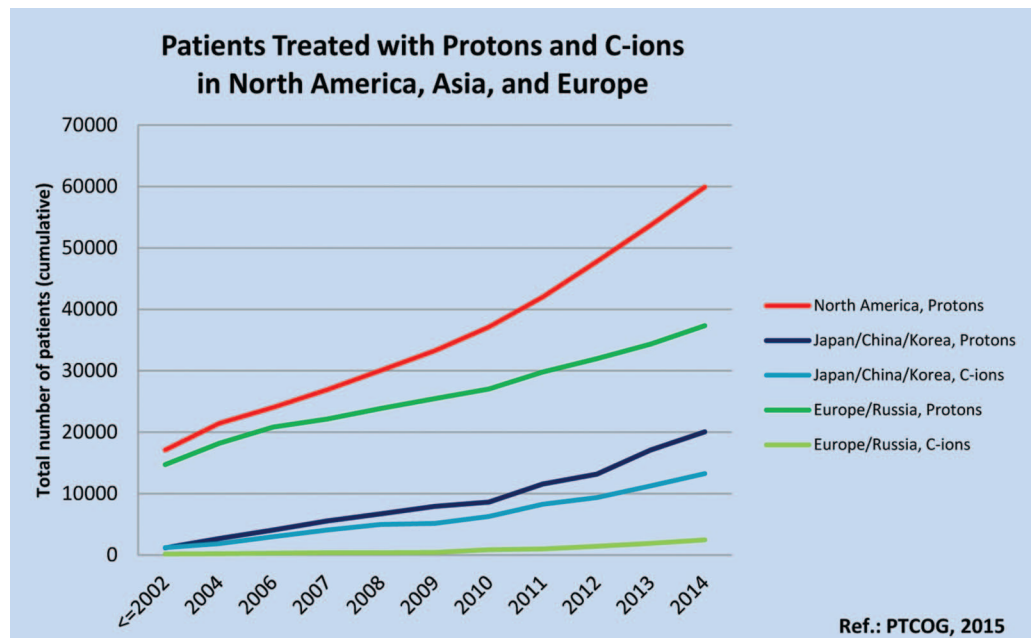


Figure 3. Patients treated with proton and carbon ions worldwide.

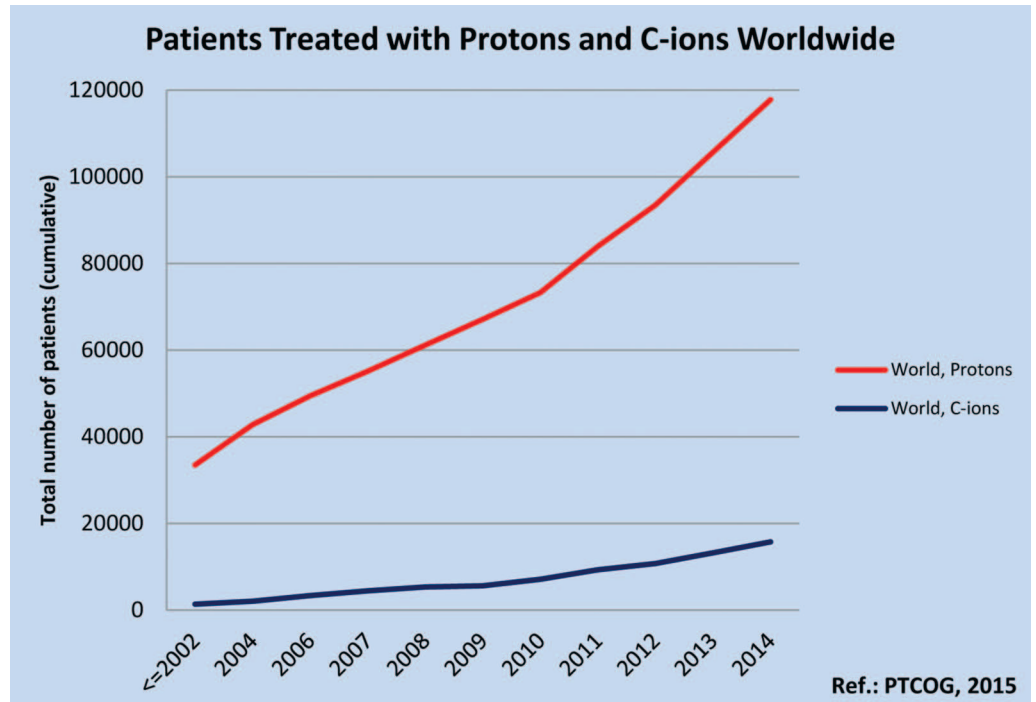


Figure 4. Pie charts depicting (A) patients treated with particle from 1954 to 2014 and (B) patients treated in 2014 with protons and carbon ions (total = 15 000).

