Particle Therapy Statistics in 2013

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From 1954 through December 2013, more than 120 000 patients across the world have been treated with particle therapy, including more than 13 000 (10.8%) with carbon ions and more than 105 000 (87.5%) with protons (Table). More than 30% of those patients have been treated for ocular melanomas. Global acceptance of particle therapy is growing, with the most rapid increase in facilities occurring in Japan and the United States. Five particle facilities were opened in 2013 in Seattle, Washington; St. Louis, Missouri; Essen, Germany; and Nagoya and Tosu, Japan. The Figure, a and b, shows the rapid rise in patients treated, particularly with proton therapy and particularly in Japan and the United States.

Today, about 10 new facilities are in the phase of technical commissioning, clinical commissioning, or both, and 5 or 6 of them should be ready to treat patients before the end of 2014.

Table. Particle therapy patient statistics (per end of 2013)*

Location			First (last)	Patient	
Country	Site/city	Particle	patient, y	total, no.	Date of total, y
Belgium	Louvain-la-Neuve	P	1991 (1993)	21	1993
Canada	Vancouver, BC (TRIUMF)	Pion	1979 (1994)	367	1994
Canada	Vancouver, PC (TRIUMF)	P	1995	175	December 2013
Czech Republic	Prague (PTCCZ)	P	2012	140	December 2013
China	Wanjie (WPTC), Zi-Bo City	P	2004	1078	December 2013
China	Lanzhou, Gansu Province	C ion	2006	213	December 2013
England	Clatterbridge, Bebington, Merseyside	P	1989	2446	December 2013
France	Nice (CAL)	P	1991	4936	December 2013
France	Orsay (CPO), Essonne, Île-de-France	P	1991	6432	December 2013
Germany	Darmstadt (GSI), Bundesland, Hesse	C ion	1997 (2009)	440	2009
Germany	Berlin (HMI)	P	1998	2312	December 2013
Germany	Munich (RPTC)	P	2009	1811	December 2013
Germany	Heidelberg (HIT)	C ion	2009	1368	December 2013
Germany	Heidelberg (HIT)	P	2009	503	December 2013
Germany	Essen (WPE)	P	2013	32	December 2013
Italy	Catania (INFN-LNS)	P	2002	293	November 2012
Italy	Pavia (CNAO)	P	2011	76	December 2013
Italy	Pavia (CNAO)	C ion	2012	105	December 2013
Japan	Chiba	P	1979 (2002)	145	2002
Japan	Tsukuba (PMRC, 1)	P	1983 (2000)	700	2000
Japan	Chiba (HIMAC)	C ion	1994	8073	December 2013
Japan	Kashiwa (NCC)	P	1998	1226	March 2013
Japan	Hyogo (HIBMC)	P	2001	4223	December 2013
Japan	Hyogo (HIBMC)	C ion	2002	1935	December 2013

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Table. Continued.

Location		Particle	First (last) patient, y	Patient total, no.	Date of total, y
Country	Site/city				
Japan	WERC	P	2002 (2009)	62	2009
Japan	Tsukuba (PMRC, 2)	P	2001	2967	December 2013
Japan	Shizuoka	P	2003	1590	December 2013
Japan	Koriyama	P	2008	2306	December 2013
Japan	Gunma	C ion	2010	985	December 2013
Japan	Ibusuki (MMRI)	P	2011	919	December 2013
Japan	Fukui City, (Prefectural Hospital)	P	2011	428	December 2013
Japan	Nagoya PTC, Nagoya, Aichi	P	2013	199	December 2013
Japan	Tosu (Saga-HIMAT)	P	2013	62	December 2013
Poland	Krakow	P	2011	39	December 2013
Russia	Dubna (1)	P	1967 (1996)	124	1996
Russia	Moscow (ITEP)	P	1969	4320	December 2013
Russia	St Petersburg	P	1975	1386	December 2012
Russia	Dubna (JINR, 2)	P	1999	995	December 2013
South Africa	iThemba Labs	P	1993	521	December 2013
South Korea	Ilsan, Seoul (NCCR)	P	2007	1266	December 2013
Sweden	Uppsala (1)	P	1957 (1976)	73	1976
Sweden	Uppsala (2)	P	1989	1356	December 2013
Switzerland	Villigen PSI (Piotron)	Pion	1980 (1993)	503	1993
Switzerland	Villigen PSI (OPTIS 1)	P	1984 (2010)	5458	2010
Switzerland	Villigen-PSI (including OPTIS 2)	P	1996	1581	December 2013
United States, California	Berkeley (184-inch sychlotron)	P	1954 (1957)	30	1957
United States, California	Berkeley	He	1957 (1992)	2054	1992
United States, New Mexico	Los Alamos	Pion	1974 (1982)	230	1982
United States, California	Berkeley	ions	1975 (1992)	433	1992
United States, Massachusetts	Harvard (HCL), Boston	P	1961 (2002)	9116	2002
United States, California	Loma Linda (LLUMC)	P	1990	17 829	December 2013
United States, Indiana	Bloomington (MPRI, 1)	P	1993 (1999)	34	1999
United States, California	University of California, San Francisco (CNL)	P	1994	1621	December 2013
United States, Massachusetts	Boston (NPTC)	P	2001	7345	December 2013
United States, Indiana	Bloomington (Indiana University Health PTC)	P	2004	1927	December 2013
United States, Texas	Houston (MD Anderson)	P	2006	4746	December 2013

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Table. Continued.

Location		Particle	First (last) patient, y	Patient total, no.	Date of total, y
Country	Site/city				
United States, Florida	Jacksonville (UFPTI)	P	2006	5085	December 2013
United States, Oklahoma	Oklahoma City (ProCure PTC)	P	2009	1364	December 2013
United States, Pennsylvania	Philadelphia (UPenn)	P	2010	1750	December 2013
United States, Illinois	CDH Warrenville	P	2010	1329	December 2013
United States, Virginia	Hampton (HUPTI)	P	2010	767	December 2013
United States, New York	New Jersey (ProCure PTC)	P	2012	512	December 2013
United States, Washington	Seattle (SCCA ProCure PTC)	P	2013	86	December 2013
United States, Missouri	St Louis (S Lee King PTC)	P	2013	1	December 2013
Total of all facilities (in and out of operation)					
	He		2054		1957–1992
	Pions		1100		1974–1994
	C ions		13 119		1994–
	Other ions		433		1975–1992
	Protons		105 743		1954–
	Grand Total		122 449		

* Data collected by the Particle Therapy Cooperative Group.

Abbreviations: P, protons, TRIUMF, Canada's national laboratory for particle and nuclear physics; PTCCZC, Proton Therapy Centre; WPTC, Wanjie Proton Therapy Center; C ion, carbon ions; CAN, Centre Antoine Lacassagne; CPO, Centre de Protonthérapie de l'Institut Curie (Orsay); GSI, GSI Helmholtz Centre for Heavy Ion Research; HMI, Hahn-Meitner-Institut; RPTC, Rinecker Proton Therapy Center; HIT, Heidelberger Ionenstrahl-Therapiezentrum; WPE, Westdeutsches Protonentherapiezentrum Essen; INFN-LNS, Istituto Nazionale Fisica Nucleare Laboratori Nazionali del Sud; CNAO, Centro Nazionale di Adroterapia Oncologica; PMRC, Proton Medical Research Center; HIMAC, National Institute of Radiological Science; NCC, National Cancer Center; HIBMC, Hyogo Ion Beam Medical Center; MMRI, Medipolis Medical Research Institute; HIMAT, Heavy Ion Medical Accelerator in Tosu; ITEP, Institute for Theoretical and Experimental Physics; JINR, Joint Institute for Nuclear Research; NCCR, National Center for Catalysis Research; PSI, Paul Scherrer Institute; HCL, Harvard Cyclotron Laboratory; LLUMC, Loma Linda University Medical Center; MPRI, Midwest Proton Radiotherapy Institute; CNL, Crocker Nuclear Laboratory; NPTC, Northeast Proton Therapy Center; PTC, Proton Therapy Center; UFPTI, University of Florida Proton Therapy Institute; HUPIT, Hampton University Proton Therapy Institute; CDH, Central DuPage Hospital; SCCA, Seattle Cancer Care Alliance.

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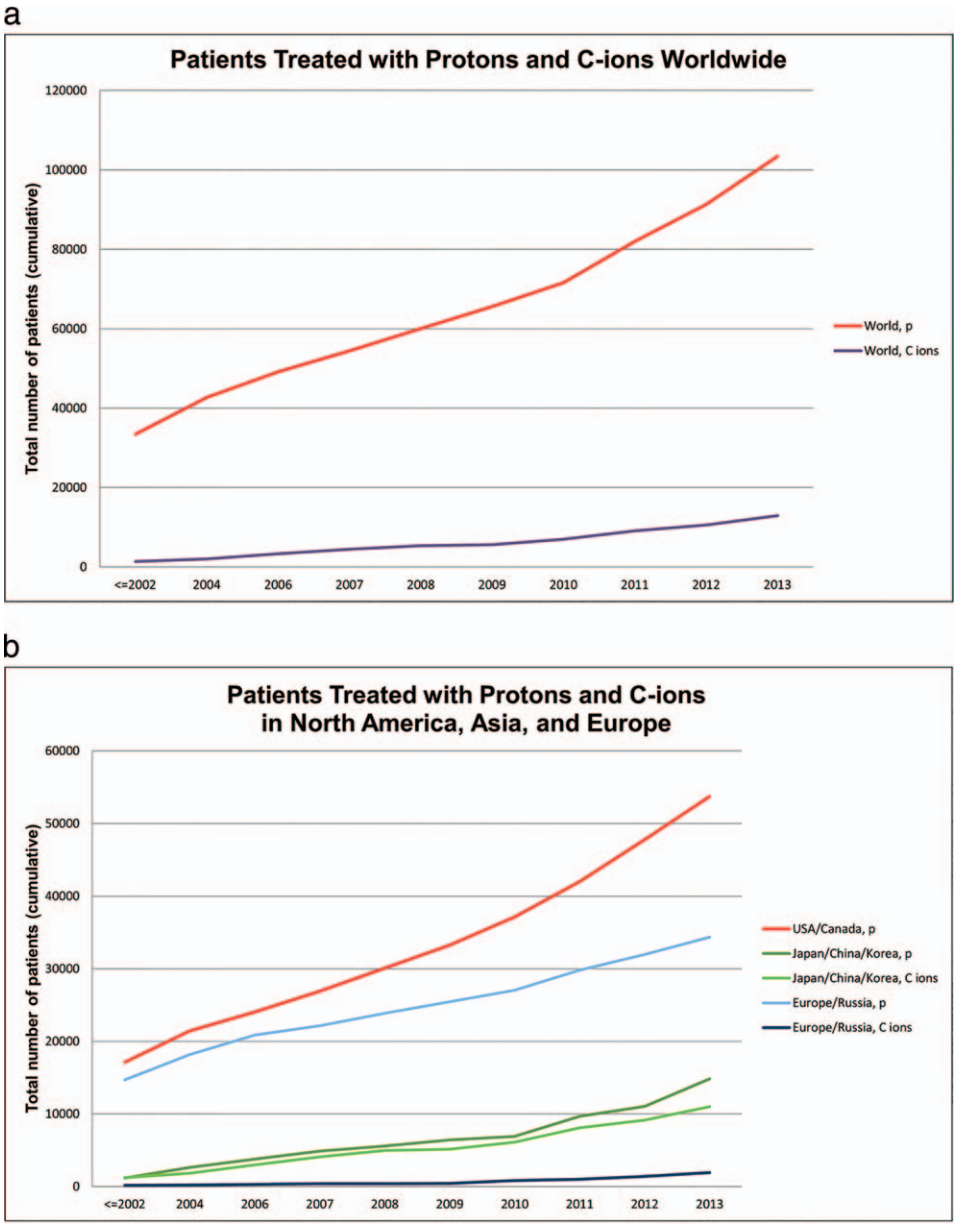

Figure 1. Number of patients treated with protons and carbon ions (C-ions) between 2002 and 2013.

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