

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Current Usage of Device-aid Therapy: Asian Perspective

JED NOEL A. ONG, MD

Makati Medical Center
Makati City, Philippines

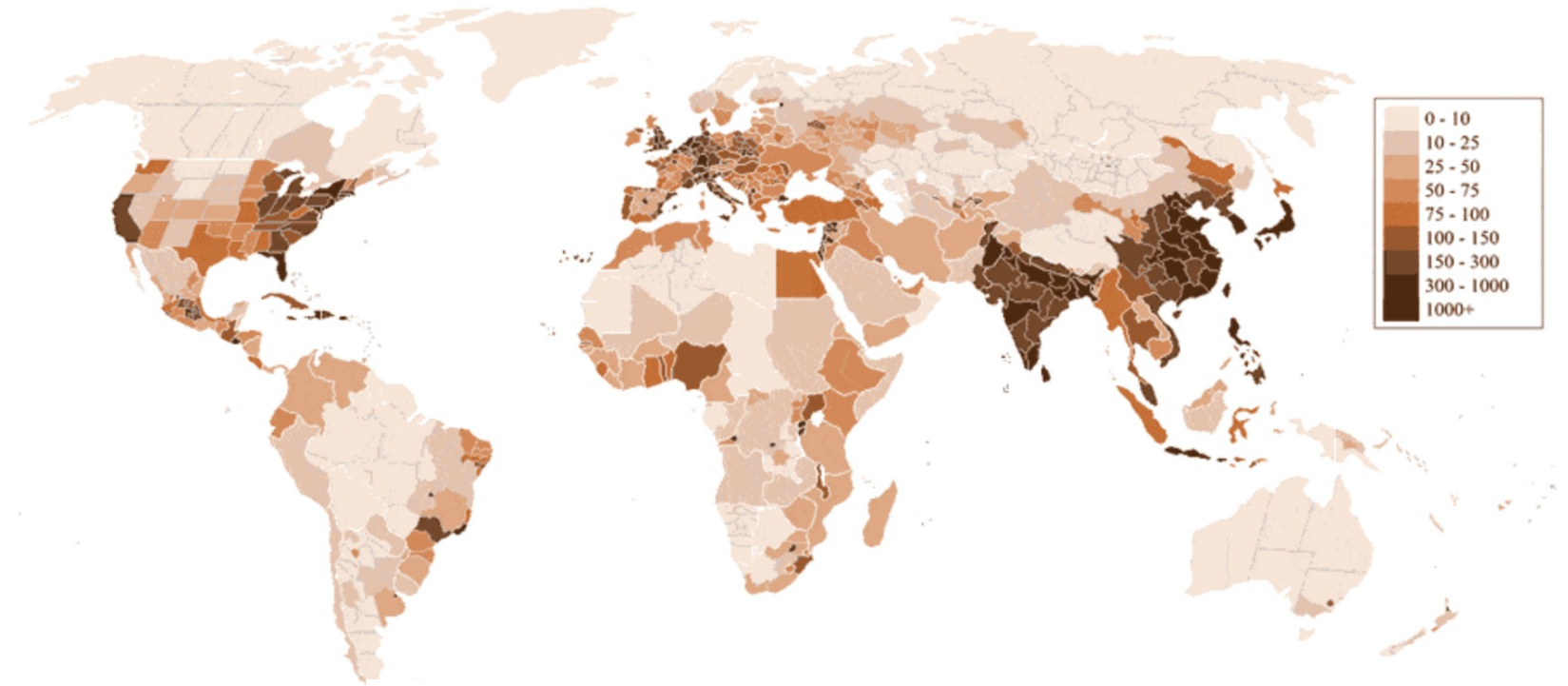
School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

- Current World Population: 8.2 Billion
 - Asia: 4.8 Billion
- Many regions in Asia fall under Low to Middle Income Categories (WHO)
- Parkinson's Disease (PD) is second most common neurodegenerative disease globally
- Global Burden of Parkinson's Disease Study
 - Increase in the age-standardized prevalence of PD in Asia from 1990-2016
 - Highest increase in China (245.73 per 100,000)



<https://www.worldometers.info/world-population/>

Lili M, Ye X, Huang Z et al. Global Burden of Parkinson's Disease from 1990 to 2021. BMJ Open. 2025
Ibrahim N, Phuenpathom W, Jagota P et al. Movement Disorders Clinical Practice. 2025

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and Movement Disorder Society
Asian & Oceanian Section

Systematic Review of the Prevalence and Incidence of Parkinson's Disease in Asia

Weerasak Muangpaisan¹, Hiroyuki Hori², and Carol Brayne³

- 21 original studies
- The prevalence of PD in Asian countries was slightly lower than in Western countries

RESEARCH ARTICLES | NOVEMBER 14 2024

Disease Burden of Parkinson's Disease in Asia and Its 34 Countries and Territories from 1990 to 2021: Findings from the Global Burden of Disease Study 2021

- Data from the Global Burden of Diseases (GBD) Study 2021
- The age-standardized PD incidence and prevalence in Asia were higher than the global average, particularly in East Asia (24.16 and 243.46/100,000 respectively)
- The incidence of PD in Asia rose by 198.01% and prevalence by 284.35%
- PD burden increased with age (>65 years old)
- Increase burden in low income vs. high income areas

Parkinson's disease in the Western Pacific Region

Shen-Yang Lim*, Ai Huey Tan, Azlina Ahmad-Annuar, Christine Klein*, Louis C S Tan, Raymond L Rosales, Roongroj Bhidayasiri, Yih-Ru Wu, Hui-Fang Shang, Andrew H Evans, Pramod K Pal, Nobutaka Hattori, Chong Tin Tan, Beomseok Jeon*, Eng-King Tan*, Anthony E Lang*

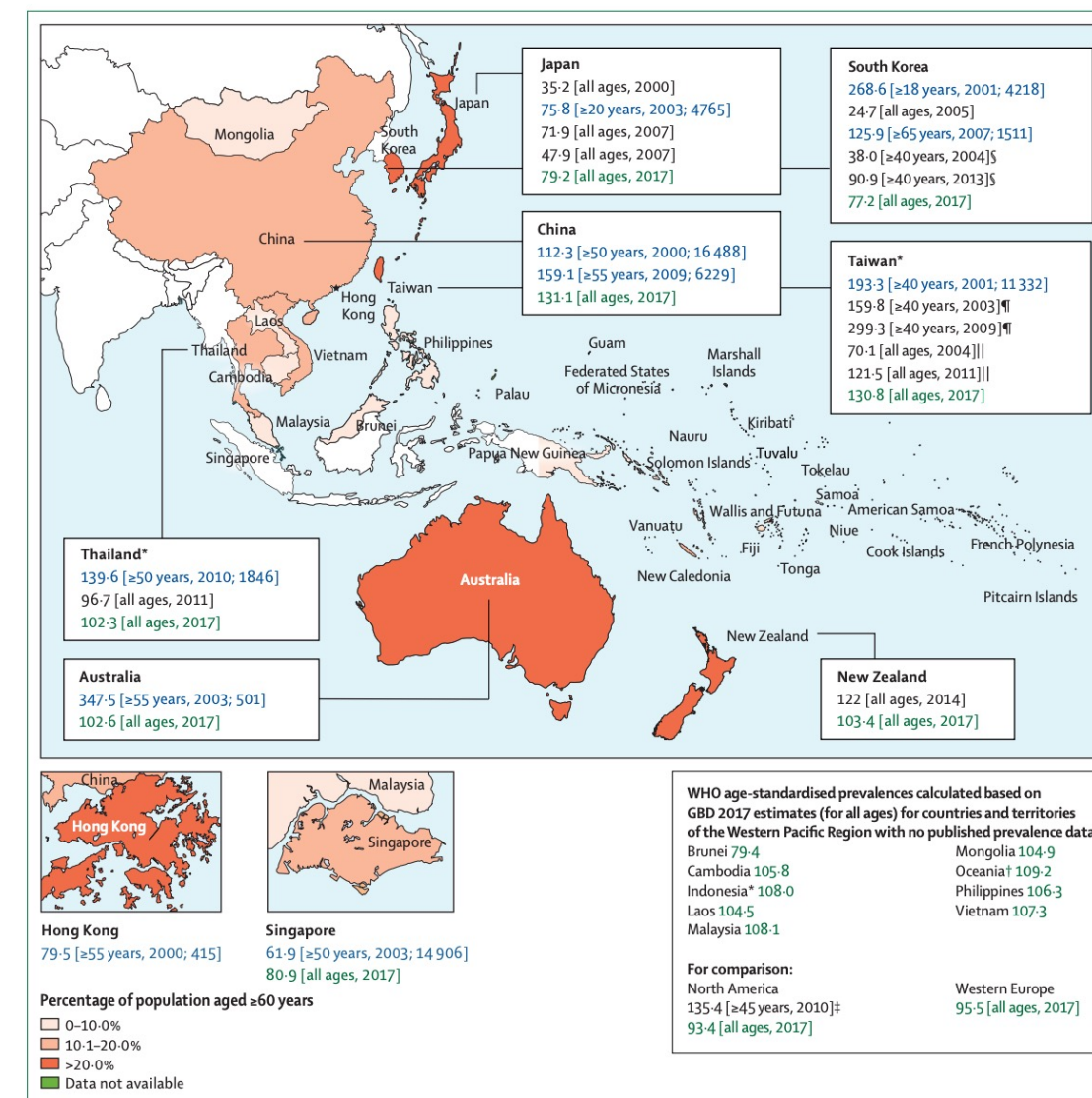


Figure 1: Prevalence of Parkinson's disease in the Western Pacific Region

W Muangpaisan et al. Systematic Review of the Prevalence and Incidence of Parkinson's Disease in Asia. J Epidemiol. 2009.
Q Yang, X Chang et al. Disease Burden of Parkinson's Disease in Asia and its 34 countries and Territories. Neuroepidemiology 2021.
SY Lim et al. Parkinson's Disease in the Western Pacific Region. The Lancet Neurology. 2019

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and Movement Disorder Society
Asian & Oceanian Section

Parkinson's Disease

- *Parkinsonism (Bradykinesia + Tremor and/or Rigidity)
- Absence of absolute exclusion criteria (cerebellar signs, supranuclear gaze palsy, bvFTD, normal functional neuroimaging etc.)
- No red flags (Rapid progression of gait impairment, severe autonomic features, early bulbar dysfunction etc.)
- Presence of supportive criteria (Dramatic response with levodopa, dyskinesia, olfactory loss etc.)

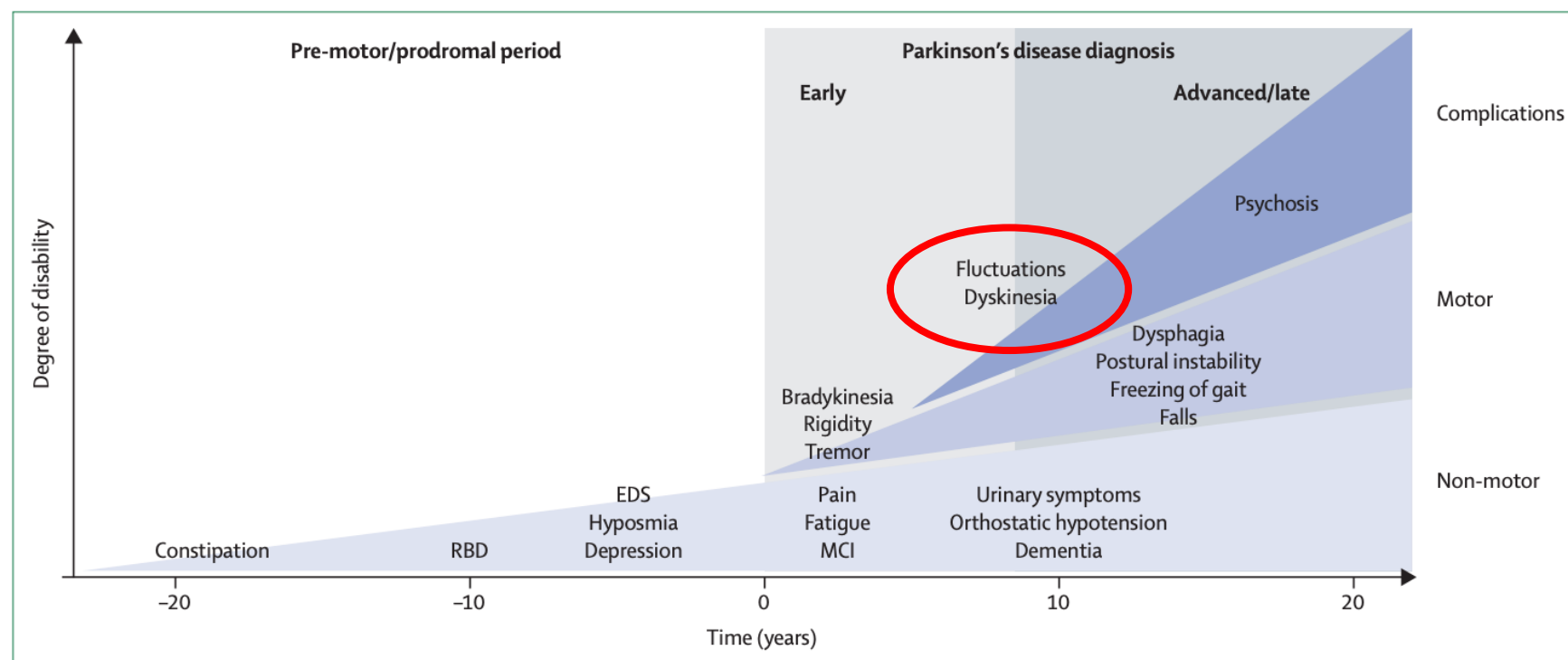


Figure 1: Clinical symptoms and time course of Parkinson's disease progression

TABLE 5a. Treatments for motor fluctuations

Class	Intervention	Efficacy conclusions	Safety ^a	Implications for clinical practice
Dopamine agonists Nonergot	Pramipexole IR	Efficacious		Clinically useful
	Pramipexole ER	Efficacious		Clinically useful
	Ropinirole	Efficacious		Clinically useful
	Ropinirole PR	Efficacious		Clinically useful
	Rotigotine	Efficacious		Clinically useful
	Apomorphine	Efficacious		Clinically useful
	Apomorphine intermittent s.c.			
	Apomorphine infusion	Likely efficacious	Acceptable risk with specialized monitoring	Possibly Useful
	Piribedil	Insufficient evidence		Investigational
Ergot	Pergolide	Efficacious	Acceptable risk with specialized monitoring	Clinically useful
	Bromocriptine	Likely efficacious		Possibly useful
	Cabergoline	Likely efficacious		Possibly useful
	DHEC	Insufficient evidence		Investigational
Levodopa/peripheral decarboxylase inhibitor	Standard formulation	Efficacious		Clinically useful
	Controlled release	Insufficient evidence		Investigational
	Rapid onset	Insufficient evidence		Investigational
	Extended release	Efficacious		Clinically useful
	Intestinal infusion	Efficacious	Acceptable risk with specialized monitoring	Clinically useful
COMT inhibitors	Entacapone	Efficacious		Clinically useful
	Tolcapone	Efficacious	Acceptable risk with specialized monitoring	Possibly useful
MAO-B inhibitors	Opicapone	Efficacious		Clinically useful
	Rasagiline	Efficacious		Clinically useful
	Selegiline	Insufficient evidence		Investigational
	Oral disintegrating selegiline	Insufficient evidence		Investigational
MAO-B inhibitor plus Channel blockers	Zonisamide	Efficacious		Clinically useful
	Safinamide	Efficacious		Clinically useful
Others	Istradefylline	Likely efficacious		Possibly useful
	Amantadine	Insufficient evidence		Investigational
Surgery	Bilateral STN DBS	Efficacious	Acceptable risk with specialized monitoring	Clinically useful
	Bilateral GPI DBS	Efficacious		Clinically useful
	Unilateral pallidotomy	Efficacious		Clinically useful
	Unilateral thalamotomy	Insufficient evidence		Investigational
	Thalamic stimulation (uni or bilateral)	Insufficient evidence		Investigational
	Subthalamotomy	Insufficient evidence		Investigational
	Human fetal transplantation	Nonefficacious	Unacceptable risk	Investigational

TABLE 5b. Treatments for dyskinesia

Class	Intervention	Efficacy conclusions	Safety ^a	Implications for clinical practice
Dopamine agonists	Pramipexole	Insufficient evidence		Investigational
	Levodopa/peripheral decarboxylase inhibitor	Likely efficacious	Acceptable risk with specialized monitoring	Clinically useful
Others	Amantadine	Efficacious	Acceptable risk with specialized monitoring	Clinically useful
	Clozapine	Efficacious		Clinically useful
Surgery	Zonisamide	Insufficient evidence		Investigational
	Levetiracetam	Insufficient evidence		Investigational
	Bilateral STN DBS	Efficacious	Acceptable risk with specialized monitoring	Clinically useful
	Bilateral GPI DBS	Efficacious		Clinically useful
	Unilateral pallidotomy	Efficacious		Clinically useful
	Unilateral thalamotomy	Insufficient evidence		Investigational
	Thalamic stimulation (uni or bilateral)	Insufficient evidence		Investigational
	Subthalamotomy	Insufficient evidence		Investigational
Nonpharmacological	Human fetal transplantation	Nonefficacious	Unacceptable risk	Investigational
	Physical therapy	Insufficient evidence		Investigational

RB Postuma et al. MDS Clinical Diagnostic Criteria for Parkinson's Disease. Movement Disorders. 2015

LV Kalia and A Lang. Parkinson's Disease. The Lancet Neurology. 2015

SH Fox et al. Update on Treatments for the Motor Symptoms of Parkinson's Disease. Movement Disorders. 2018



Device-Aided Therapies (DAT): Levodopa-carbidopa Intestinal Gel (LCIG)

Journal of Neurology (2023) 270:2765–2775
<https://doi.org/10.1007/s00415-023-11615-3>

ORIGINAL COMMUNICATION



Levodopa–carbidopa intestinal gel in advanced Parkinson's disease: long-term results from COSMOS

Alfonso Fasano^{1,2} · Rocío García-Ramos³ · Tanya Gurevich⁴ · Robert Jech⁵ · Lars Bergmann⁶ · Olga Sanchez-Soliño⁶ · Juan Carlos Parra⁶ · Mihaela Simu⁷

Parkinsonism and Related Disorders 45 (2017) 13–20

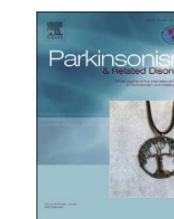


ELSEVIER

Contents lists available at ScienceDirect

Parkinsonism and Related Disorders

journal homepage: www.elsevier.com/locate/parkreldis



Levodopa-carbidopa intestinal gel in advanced Parkinson's: Final results of the GLORIA registry



Angelo Antonini^{a,*,1}, Werner Poewe^{b,**,1}, K. Ray Chaudhuri^c, Robert Jech^d, Barbara Pickut^{e,f}, Zvezdan Pirtošek^g, Jozsef Szasz^h, Francesc Valldeoriolaⁱ, Christian Winkler^j, Lars Bergmann^k, Ashley Yegin^k, Koray Onuk^k, David Barch^k, Per Odin^l on behalf of the GLORIA study co-investigators

- FDA approved since 2015 for advanced Parkinson's Disease (motor fluctuations)
- LCIG treatment led to sustained improvements in motor fluctuations, non-motor symptoms (sleep/ fatigue, mood/ cognition) in advanced PD
- Sustained, long-term symptom control, while potentially avoiding increases in add-on medication dosages

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Device-Aided Therapies (DAT): Apomorphine Infusion

Movement Disorders
Vol. 23, No. 8, 2008, pp. 1130-1136
© 2008 Movement Disorder Society

Efficacy of Long-Term Continuous Subcutaneous Apomorphine Infusion in Advanced Parkinson's Disease with Motor Fluctuations: A Multicenter Study

Pedro J. García Ruiz, MD,^{1*} Ángel Sesar Ignacio, MD,² Begoña Ares Pensado, MD,² Alfonso Castro García, MD,² Fernando Alonso Frech, MD,³ Mercedes Álvarez López, MD,⁴ José Arbelo González, MD,⁵ Joan Baiges Octavio, MD,⁶ Juan Andrés Burguera Hernández, MD,⁷ Matilde Calopa Garriga, MD,⁸ Dulce Campos Blanco, MD,⁹ Belén Castaño García, MD,¹⁰ Manuel Carballo Cordero, MD,¹¹ José Chacón Peña, MD,⁴ Anna Espino Ibáñez, MD,¹² Aránzazu Gorospe Onisalde, MD,¹³ Santiago Giménez-Roldán, MD,¹⁰ Pilar Granés Ibáñez, MD,¹⁴ Jorge Hernández Vara, MD,¹⁵ Ramón Ibáñez Alonso, MD,¹⁶ Félix Javier Jiménez Jiménez, MD,¹⁷ Jerzy Krupinski, MD,⁸ Jaime Kulisevsky Bojarsky, MD,¹⁸ Inés Legarda Ramírez, MD,¹³ Elena Lezcano García, MD,¹⁹ Juan Carlos Martínez-Castrillo, MD,²⁰ Dolores Mateo González, MD,¹⁰ Francesc Miquel Rodríguez, MD,¹⁵ Pablo Mir Rivera, MD,¹¹ Elena Muñoz Fargas, MD,⁶ José Obeso Inchausti, MD,²¹ Jesús Olivares Romero, MD,²² José Olivé Plana, MD,²³ Pilar Otermin Vallejo, MD,²⁴ Berta Pascual Sedano, MD,¹⁸ Víctor Pérez de Colosía Rama, MD,²⁵ Isabel Pérez López-Fraile, MD,²⁶ Albert Planas Comes, MD,²⁷ Víctor Puente Periz, MD,²⁸ María Cruz Rodríguez Oroz, MD,²¹ Dolores Sevillano García, MD,²⁹ Pilar Solís Pérez, MD,³⁰ José Suárez Muñoz, MD,³¹ Julia Vaamonde Gamo, MD,¹⁶ Caridad Valero Merino, MD,³² Francesc Valldeoriola Serra, MD,³³ José Miguel Velázquez Pérez, MD,³⁴ Rosa Yáñez Baña, MD,³⁵ and Ivana Zamarbide Capdepon, MD¹

- Continuous Subcutaneous Apomorphine Infusion (CSAI) is an effective option for patients with PD with severe fluctuations poorly controlled by oral medications
 - Reduction in OFF time, total and motor score in UPDRS, dyskinesia severity andLEDD
 - Improvement of Quality of Life (PDQ 39)
- CSAI also showed beneficial effects in both motor and non-motor symptoms (sleeping problems)

Parkinsonism and Related Disorders 23 (2016) 17–22



Contents lists available at ScienceDirect

Parkinsonism and Related Disorders

journal homepage: www.elsevier.com/locate/parkreldis



Motor and non-motor outcomes of continuous apomorphine infusion in 125 Parkinson's disease patients



Robbert W.K. Borgemeester, Martje Drent, Teus van Laar*

Department of Neurology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

J Neurol
DOI 10.1007/s00415-016-8106-3



ORIGINAL COMMUNICATION

Quality of life in Parkinson's disease improved by apomorphine pump: the OPTIPUMP cohort study

Sophie Drapier^{1,14} · Alexandre Eusebio² · Bertrand Degos³ · Marc Vérin¹ · Franck Durif⁴ · Jean Philippe Azulay² · François Viallet⁵ · Tiphaine Rouaud⁶ · Caroline Moreau⁷ · Luc Defebvre⁷ · Valerie Fraix⁸ · Christine Tranchant⁹ · Karine Andre¹⁰ · Christine Brefel Courbon¹¹ · Emmanuel Roze¹² · David Devos¹³

PJ Garcia Ruiz et al. *Movement Disorders*. 2008
RWK Borgemeester, M Drent and T van Laar. *Parkinsonism and Related Disorders*. 2016
S Drapler et al. *Journal of Neurology* 2016.

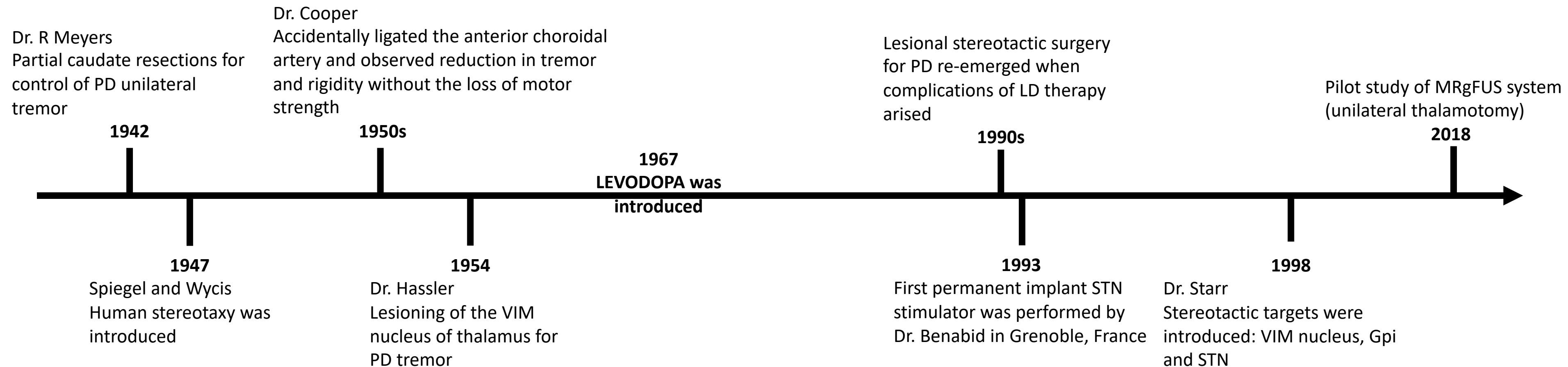
School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Brief History of Neurosurgery in Parkinson's Disease



Device-Aided Therapies (DAT): Lesioning/ Ablative Therapy

Ablative Surgery and Deep Brain Stimulation for Parkinson's Disease

Philip A. Starr, M.D., Ph.D.,
Jerrold L. Vitek, M.D., Ph.D., Roy A.E. Bakay, M.D.
Departments of Neurosurgery (PAS, RAEB) and Neurology (JLV), Emory University,
Atlanta, Georgia

TABLE 1. Overview of Current Neurosurgical Procedures for Human Parkinsonism^a

Procedure	Current status
Vim thalamotomy	Proven benefit for tremor ^b
Vim stimulation	Proven benefit for tremor, FDA approved in 1997 ^c
GPI pallidotomy	Proven benefit up to 1–4 yr ^d
GPI stimulation	Experimental, efficacy trials in progress ^e
STN ablation	Experimental, few cases reported ^f
STN stimulation	Experimental, efficacy trials in progress ^g
Fetal SNc allograft	Experimental, efficacy trials in progress ^h
Fetal SNc xenograft	Experimental, efficacy trials in progress ⁱ
Intraventricular GDNF	Experimental, safety trials in progress ^j

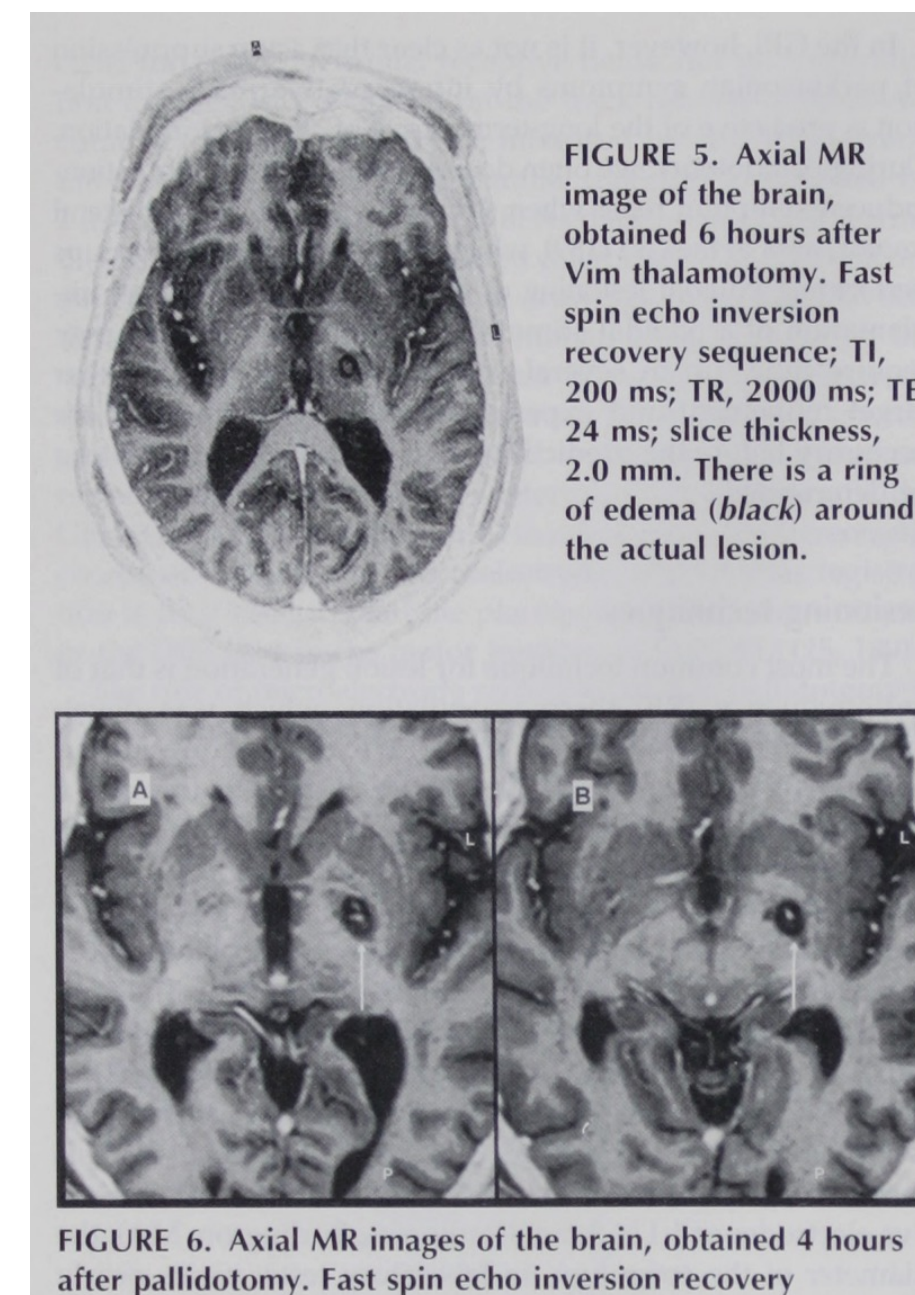
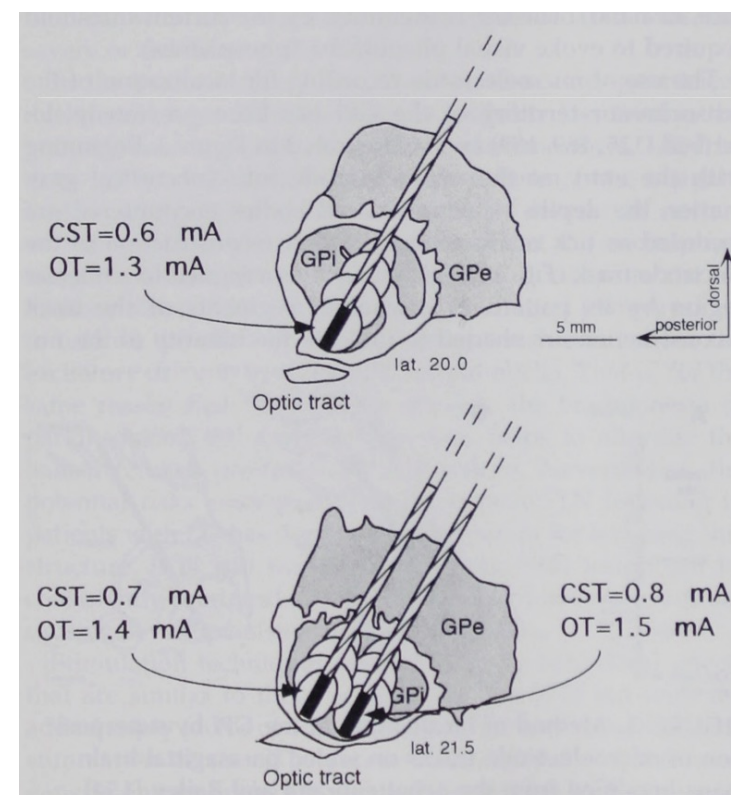


FIGURE 5. Axial MR image of the brain, obtained 6 hours after Vim thalamotomy. Fast spin echo inversion recovery sequence; TI, 200 ms; TR, 2000 ms; TE, 24 ms; slice thickness, 2.0 mm. There is a ring of edema (*black*) around the actual lesion.

FIGURE 6. Axial MR images of the brain, obtained 4 hours after pallidotomy. Fast spin echo inversion recovery

- Resurgence of pallidotomy occurred in the 1990s
- Effective for parkinsonian symptoms
- Most common technique is Radiofrequency (RF) thermocoagulation
- Temperature greater than 45°C produces permanent tissue destruction

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Device-Aided Therapies (DAT): DBS Surgery

G. Deuschl
W. Fogel
M. Hahne
A. Kupsch
D. Müller
M. Oechsner
U. Sommer
G. Ulm
T. Vogt
J. Volkmann

Deep-brain stimulation for Parkinson's disease

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Deep-Brain Stimulation for Parkinson's Disease

Günther Deuschl, M.D., Ph.D., Carmen Schade-Brittinger, Paul Krack, M.D., Ph.D., Jens Volkmann, M.D., Ph.D., Helmut Schäfer, Ph.D., Kai Bötzel, M.D., Ph.D., Christine Daniels, M.D., Angela Deutschländer, M.D., Ulrich Dillmann, M.D., Ph.D., Wilhelm Eisner, M.D., Ph.D., Doreen Gruber, M.D., Wolfgang Hamel, M.D., Jan Herzog, M.D., Rüdiger Hilker, M.D., Ph.D., Stephan Klebe, M.D., Manja Kloß, M.D., Jan Koy, M.D., Martin Krause, M.D., Andreas Kupsch, M.D., Ph.D., Delia Lorenz, M.D., Stefan Lorenzl, M.D., Ph.D., H. Maximilian Mehdorn, M.D., Ph.D., Jean Richard Moringlane, M.D., Ph.D., Wolfgang Oertel, M.D., Ph.D., Marcus O. Pinsker, M.D., Heinz Reichmann, M.D., Ph.D., Alexander Reuß, M.S., Gerd-Helge Schneider, M.D., Alfons Schnitzler, M.D., Ph.D., Ulrich Steude, M.D., Ph.D., Volker Sturm, M.D., Ph.D., Lars Timmermann, M.D., Volker Tronnier, M.D., Ph.D., Thomas Trottenberg, M.D., Lars Wojtecki, M.D., Elisabeth Wolf, M.D., Werner Poewe, M.D., Ph.D., and Jürgen Voges, M.D., Ph.D., for the German Parkinson Study Group, Neurostimulation Section

LITERATURE REVIEW


BILATERAL SUBTHALAMIC NUCLEUS STIMULATION FOR PARKINSON'S DISEASE: A SYSTEMATIC REVIEW OF THE CLINICAL LITERATURE

Deep brain stimulation of globus pallidus interna, subthalamic nucleus, and pedunculopontine nucleus for Parkinson's disease: Which target?

Kenneth A. Follett^{a,*}, Diego Torres-Russotto^b

^a Division of Neurosurgery and ^b Department of Neurological Sciences, University of Nebraska Medical Center, Omaha, NE 68198, USA

Globus Pallidus Internus (GPI) Deep Brain Stimulation for Parkinson's Disease: Expert Review and Commentary

Ka Loong Kelvin Au  · Joshua K. Wong · Takashi Tsuboi · Robert S. Eisinger · Kathryn Moore · Janine Lemos Melo Lobo Jofili Lopes · Marshall T. Holland · Vanessa M. Holanda · Zhongxing Peng-Chen · Addie Patterson · Kelly D. Foote · Adolfo Ramirez-Zamora · Michael S. Okun · Leonardo Almeida

Long-term follow up of bilateral deep brain stimulation of the subthalamic nucleus in patients with advanced Parkinson disease

GALIT KLEINER-FISMAN, M.D., DAVID N. FISMAN, M.D., M.P.H., ELSPETH SIME, R.N., JEAN A. SAINT-CYR, PH.D., ANDRES M. LOZANO, M.D., PH.D., AND ANTHONY E. LANG, M.D.

GPI vs STN deep brain stimulation for Parkinson disease

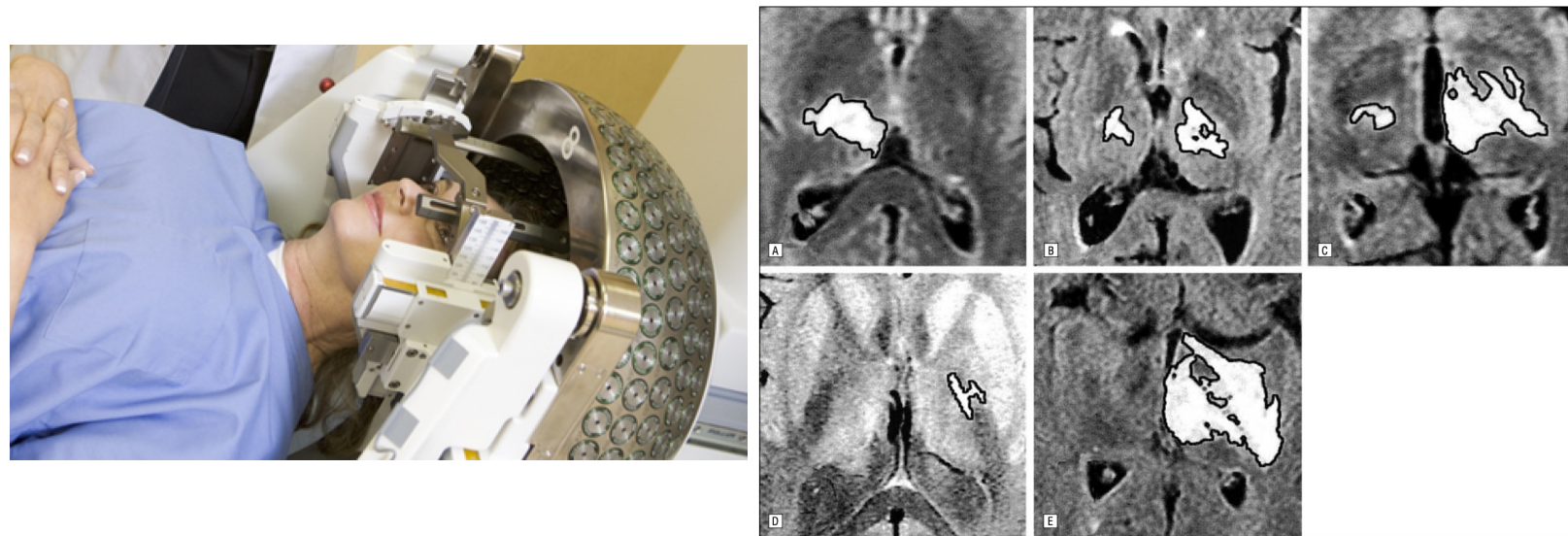
Three-year follow-up

Vincent J.J. Odekerken, MD, Judith A. Boel, MSc, Ben A. Schmand, PhD, Rob J. de Haan, PhD, M. Figee, MD, PhD, Pepijn van den Munckhof, MD, PhD, P. Richard Schuurman, MD, PhD, and Rob M.A. de Bie, MD, PhD For the NSTAPS study group | [AUTHORS INFO & AFFILIATIONS](#)

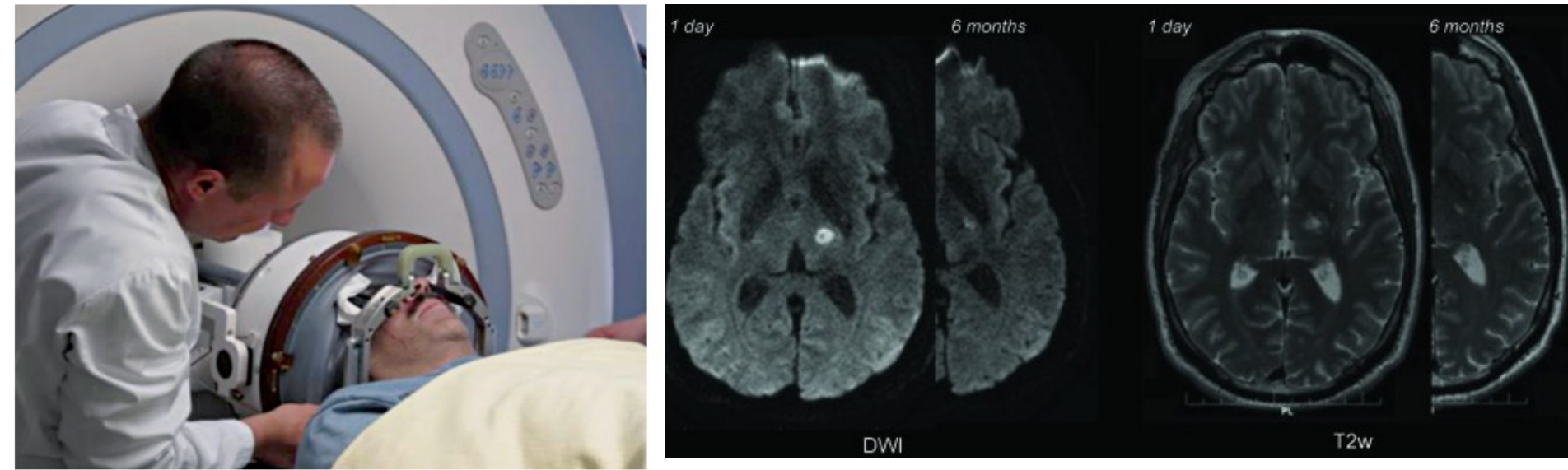
- FDA approved since 2002 for advanced Parkinson's Disease
- Deep Brain Stimulation (DBS) of the Globus Pallidus Interna (GPI) and Subthalamic Nucleus (STN) demonstrated improvement of appendicular motor symptoms (tremors, rigidity and bradykinesia) and showed no difference in motor outcomes between the two targets

Device-Aided Therapies (DAT): Gamma Knife Surgery and HIFU

GKS



HIFU



- Stereotactic Radiosurgery with Gamma Knife (GK): Non-invasive lesioning technique using radiation
- GK Thalamotomy (Tremors) and Pallidotomy (Bradykinesia and Rigidity) – mixed success rates (0-87%)
- Complications of GKS: Lesion accuracy and size, development of delayed neurological complications
- MRgFUS/ HIFU: High intensity focused ultrasound which heats and non-invasively destroys the targeted tissue while the MRI is used for visualization of the anatomical structures
- FDA Approval: Essential Tremor (2016), Tremor Dominant Parkinson's Disease – Unilateral (2016) and Bilateral (2025)

M Okun, N Stover et al. Complications of Gamma Knife Surgery for Parkinson's Disease. Arch Neurol. 2001

Elaimy AL, Arthurs BJ, Lamoreaux WT, Demakas JJ, Mackay AR, Fairbanks RK, Greeley DR, Cooke BS, Lee CM. World J Surg Oncol. 2010 Jul 21;8:61

Thomas B, Bellini G et al. High Intensity Focused Ultrasound – Longitudinal Data on Efficacy and Safety. Tremor and Other Hyperkinetic Movements. 2025

PP Dobrakowski et al. Interventional Neuroradiology 20: 275-282. 2014.

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and Movement Disorder Society
Asian & Oceanian Section

Parkinson's Disease in the Western Pacific Region

	Population (millions)	Number of neurologists*	Number of individuals in population per neurologist†	Number of specialist neurologists; and number of specialist neurosurgeons‡	Universal availability of oral levodopa	Deep brain stimulation		Apomorphine infusion		Levodopa-carbidopa intestinal gel	
						Available	Widely used¶	Available	Widely used¶	Available	Widely used¶
Australia	25	500	50 000	51; 17	Yes	Yes	Yes	Yes	Yes	Yes	
Cambodia	16	11	1455 000	0; 0	No	No	No	No	No	No	
China	1379	20 000–100 000	14 000–69 000	500; 200	Yes	Yes	No	No	No	No	
Hong Kong	7	126	56 000	14; 7	Yes	Yes	Yes	No	No	No	
Indonesia	264	2470	107 000	1; 3	Yes	No	No	No	No	No	
Japan	127	5925	21 435	930; 520	Yes	Yes	No	No	Yes	Yes	
Laos	7	4	1750 000	0; 0	No	No	No	No	No	No	
Malaysia	32	102	314 000	14; 4	Yes	No	Yes	No	No	No	
Mongolia	3	300	10 000	4; 0	Yes	No	No	No	No	No	
New Zealand	5	46	109 000	4; 2	Yes	Yes	Yes	Yes	No	No	
Philippines	103	535	193 000	10; 3	Yes	No	Yes	No	No	No	
Singapore	6	103	58 000	12; 4	Yes	Yes	Yes	No	No	No	
South Korea	51	2185	23 000	50; 40	Yes	Yes	No	No	No	No	
Taiwan	24	1141	21 000	50; 22	Yes	Yes	No	No	No	No	
Thailand	69	800	86 000	20; 10	Yes	No	Yes	No	Yes	No	
Vietnam	93	300–500	186 000–310 000	5; 1	Yes	No	No	No	No	No	

- Most patients in the Western Pacific Region have poor access to Device Aided Therapies (DAT) compared with Europe and North America
- DBS centers are available in China, Japan, South Korea and Australia
- The low use of DBS might reflect poor physician awareness of the benefits of the procedure, late referrals and a general fear among patients










School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

MDS Movement Disorders in Asia Study Group

Norlinah Mohamed Ibrahim, MBBCh, FRCPE,^{1,*}  Warongporn Phuenpathom, MD, PhD,²  Priya Jagota, MD, MSc,² 
Roongroj Bhidayasiri, MD, FRCP, FRCPI,^{2,3}  Pramod Kumar Pal, MD, DM, FRCP,⁴ Chin-Hsien Lin, MD, PhD,^{5,6} 
Prashanth Lingappa Kukkle, DM,^{7,8}  Taku Hatano, MD, PhD,⁹  Shen-Yang Lim, MD, FRACP,^{10,11} Zhanybek Myrzayev, MD,¹²
HuiFang Shang, MD,¹³ Jed Noel Ong, MD,¹⁴ Raymond L. Rosales, MD, PhD,¹⁵ Jinyoung Youn, MD, PhD,^{16,17}  Zakiyah Aldaajani, MD,¹⁸
Shivam Om Mittal, MD,¹⁹  Azmawati Mohammed Nawi, MD, PhD,²⁰ and Yoshikazu Ugawa, MD, PhD²¹

- Assess the current practices, focusing on availability, accessibility and affordability of services, and resources for the management of PD across Asia
- Survey of 55 questions divided into 5 sections
 - Section 1: Epidemiology and Genetics
 - Section 2: Availability and Accessibility to Clinical Expertise and Facilities
 - Section 3: Clinical Management of Parkinson's Disease
 - Section 4: Advanced Therapies for Parkinson's Disease
 - Section 5: Comprehensive Care, Health Policies & Education

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

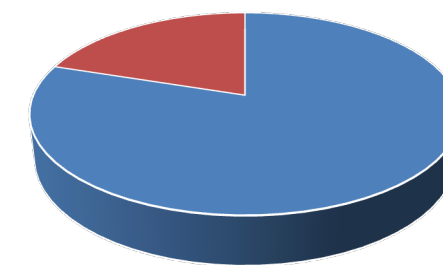
Availability and Accessibility of Advanced Non-Oral Therapies for PD

- Levodopa Intestinal Gel
 - UAE, South Korea, Japan, Bahrain and Saudi Arabia
- Inhaled Levodopa
 - Qatar
- Subcutaneous Apomorphine Injection
 - Malaysia, Hong Kong, Japan, Taiwan, UAE, Oman, Bangladesh, India, Saudi Arabia, Iran*
- Apomorphine Infusion
 - UAE, Oman, India, Saudi Arabia, Malaysia, Thailand, Hong Kong, Iran*

***UAE and Iran – Highly Accessible**

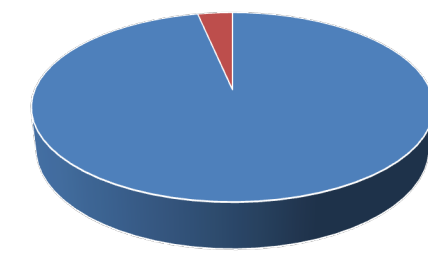
AVAILABILITY

Intestinal Levodopa Gel



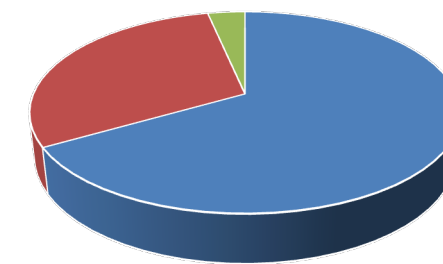
■ Not Available ■ Limited
■ Widely Available

Inhaled Levodopa



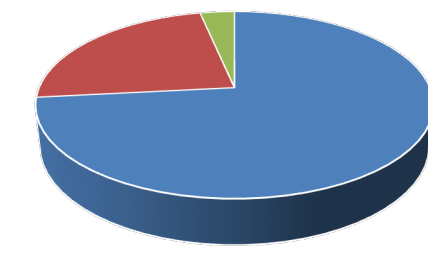
■ Not Available ■ Limited ■ Widely Available

Apomorphine Injection



■ Not Available ■ Limited
■ Widely Available

Apomorphine Infusion



■ Not Available ■ Limited
■ Widely Available

School for Device-Aided Therapies in Parkinson's Disease

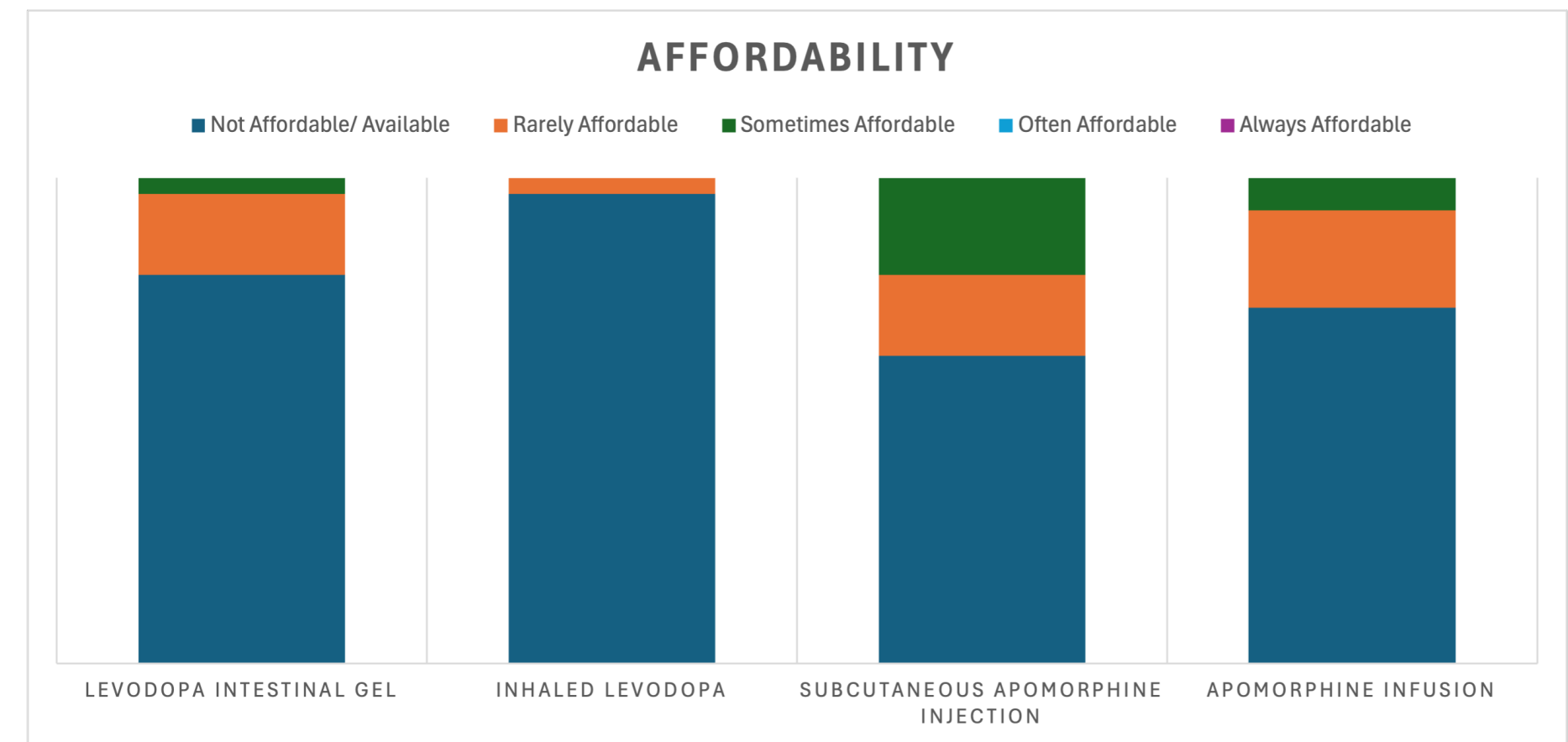
Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Affordability of Advanced Non-Oral Therapies for PD

- Levodopa Intestinal Gel
 - UAE, South Korea, Japan, Bahrain and Saudi Arabia
- Inhaled Levodopa
 - Qatar
- Subcutaneous Apomorphine Injection
 - Malaysia, Hong Kong, Japan, Taiwan, UAE, Oman, Bangladesh, India, Saudi Arabia, Iran*
- Apomorphine Infusion
 - UAE, Oman, India, Saudi Arabia, Malaysia, Thailand, Hong Kong, Iran*



School for Device-Aided Therapies in Parkinson's Disease

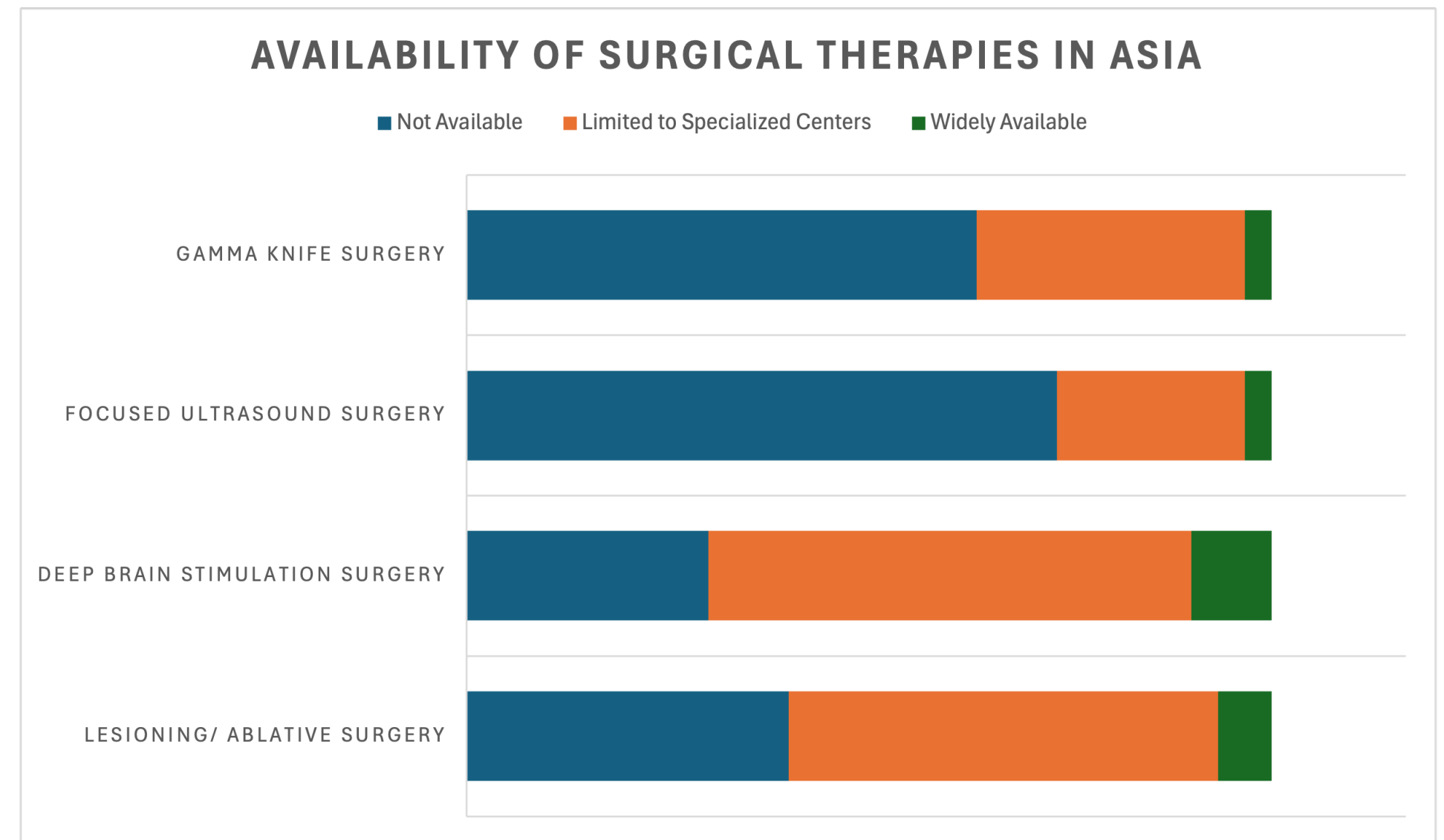
Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Availability of Surgical Therapies for PD

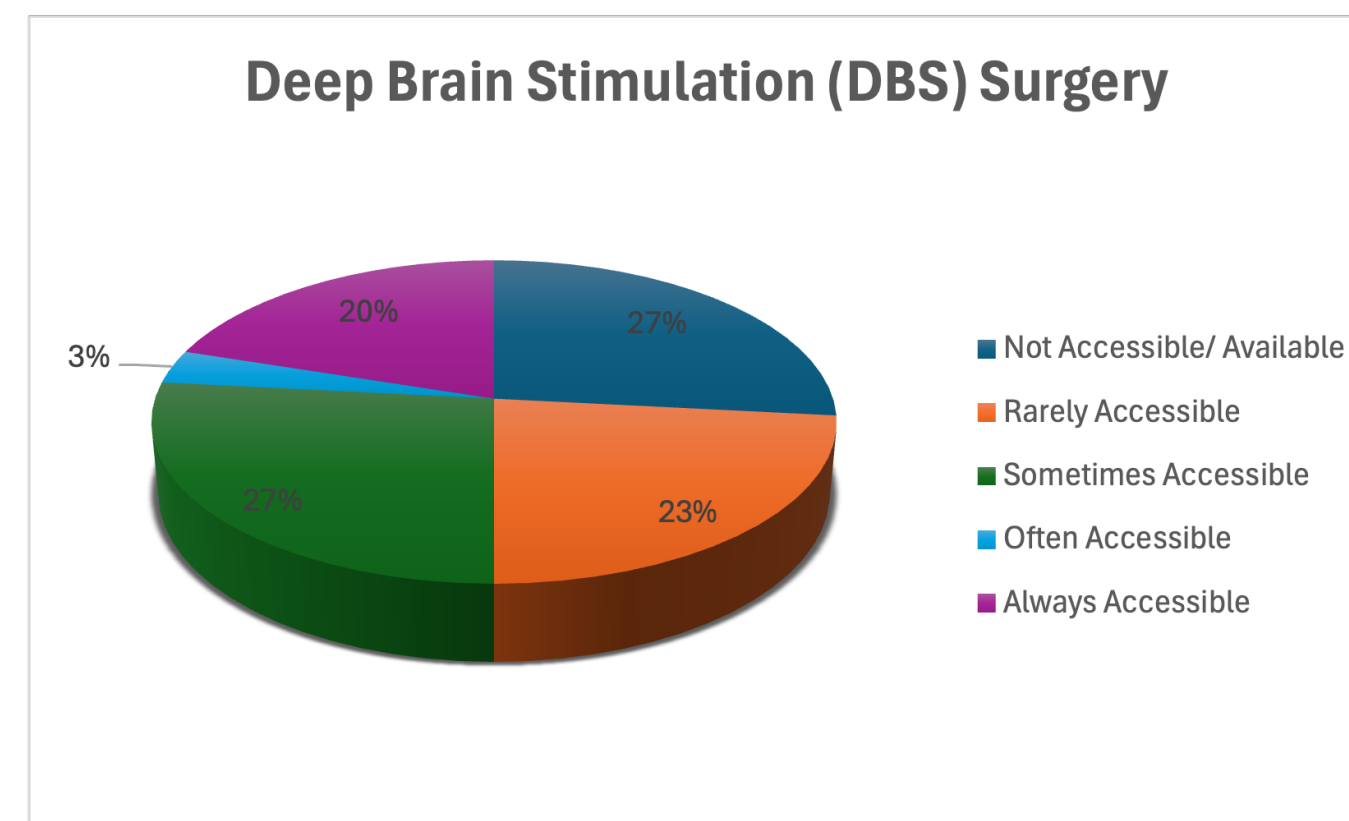
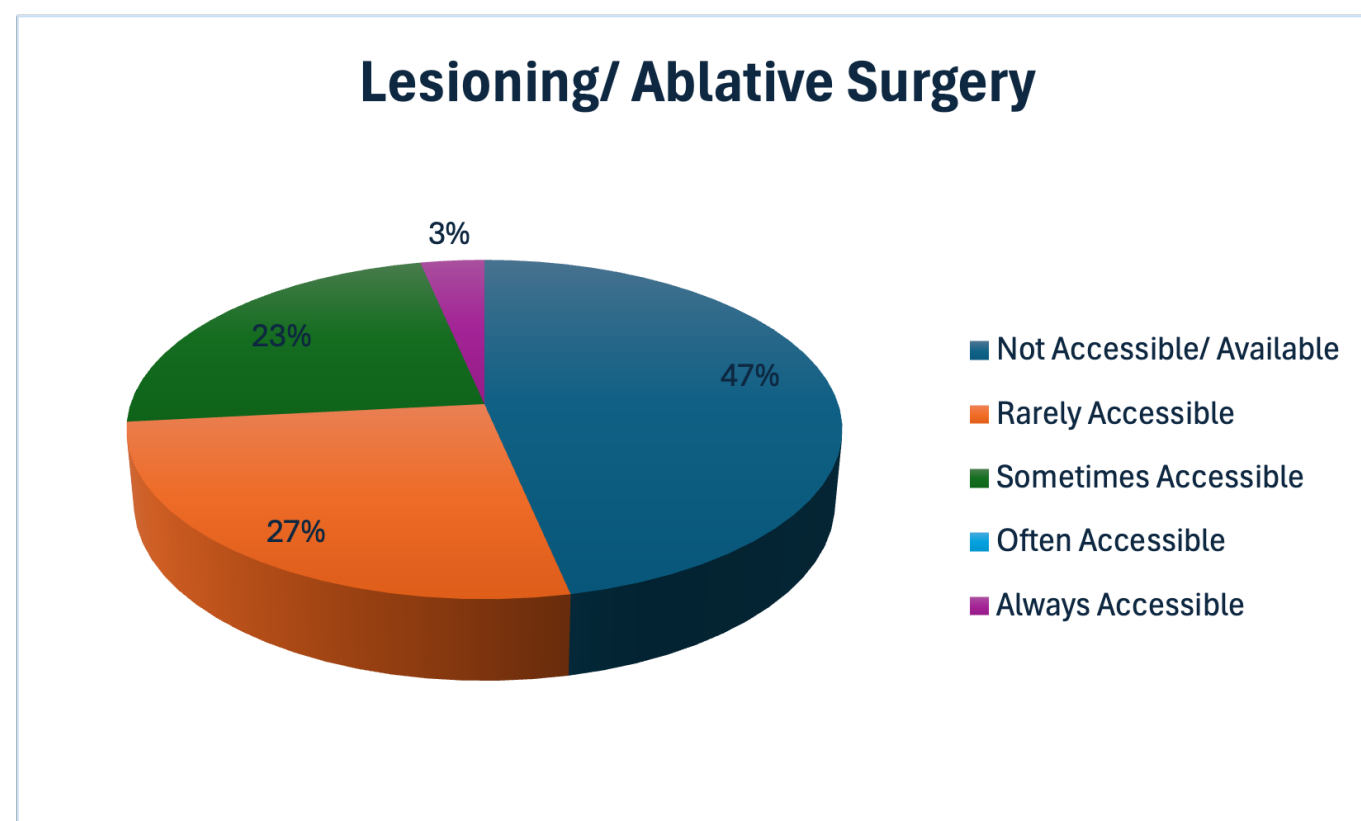
- Gamma Knife Surgery (GKS)
 - Focused Ultrasound Surgery (HIFU)
 - Deep Brain Stimulation Surgery (DBS)
 - Lesioning/ Ablative Surgery
- *China, Taiwan, Macau and Malaysia
- Asian Countries where Surgical Therapies are NOT AVAILABLE:
 - Sri Lanka
 - Laos
 - Bahrain
 - Myanmar
 - Brunei
 - Oman
 - Uzbekistan
 - Kyrgyzstan
 - Cambodia





Accessibility of Surgical Therapies for PD

- Gamma Knife Surgery (GKS) and Lesioning/ Ablative Surgery are widely accessible only in Iran
- Focused Ultrasound Surgery (HIFU) is rarely accessible (<25%)
- Deep Brain Stimulation Surgery (DBS)
 - Always accessible (>75%) for UAE, Bahrain, Iran, China, Taiwan, Singapore and Vietnam



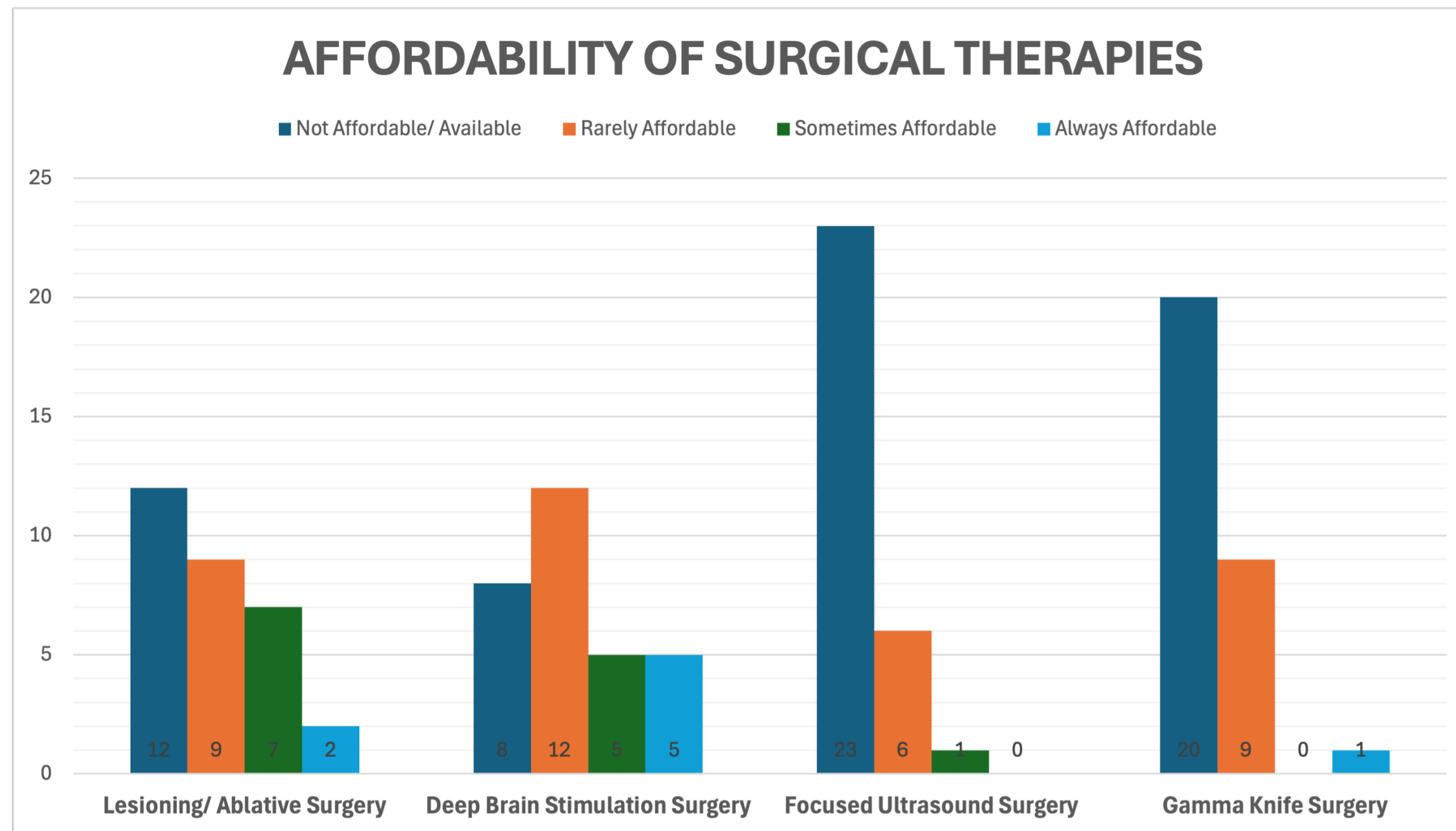
School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Affordability of Surgical Therapies for PD



- **Lesioning/ Ablative Surgery**
 - Always affordable in China and Iran
- **DBS Surgery**
 - Always affordable in Iran, Kazakhstan, Bahrain, Vietnam and Hong Kong
 - Sometimes affordable in China, Singapore, Japan, Taiwan and Saudi Arabia
- **Focused Ultrasound Surgery**
 - Sometimes affordable in Japan
- **Gamma Knife Surgery**
 - Always affordable in Iran

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Deep Brain Stimulation (DBS) Surgery

- The decision to do DBS surgery is primarily made by Movement Disorder Specialists (57%) except for Qatar (Neurosurgeon)
- Programming is primarily done by Movement Disorder Specialists (63%) except for Sri Lanka, Qatar and Bangladesh (Neurosurgeon)

School for Device-Aided Therapies in Parkinson's Disease

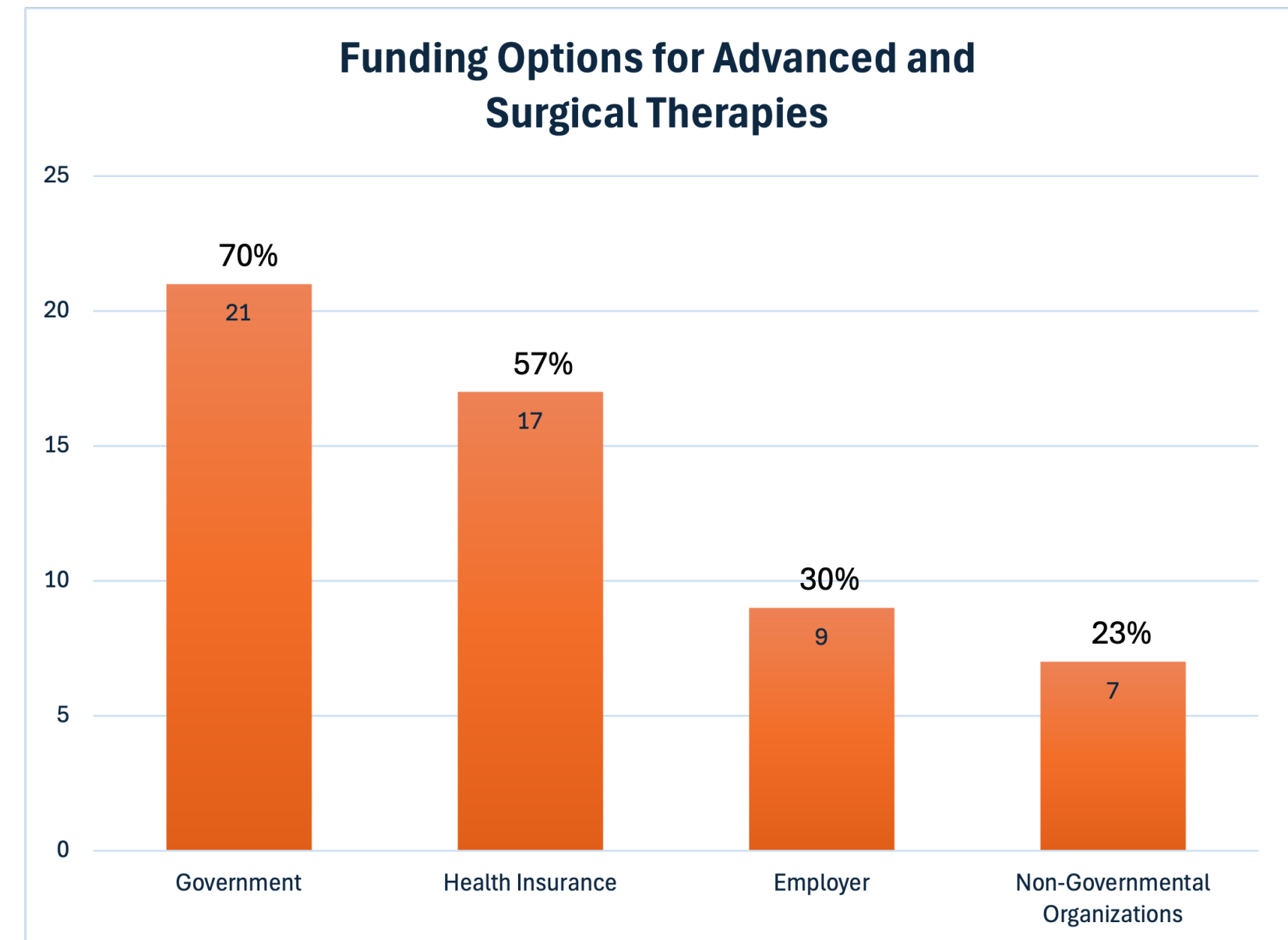
Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Funding Options for Device-Aided Therapies in PD

- Most of the Device Aided Therapies are still SELF-FUNDED
- 70% (21/30) can ask funding from the Government
- 57% are covered by the Health Insurance



School for Device-Aided Therapies in Parkinson's Disease

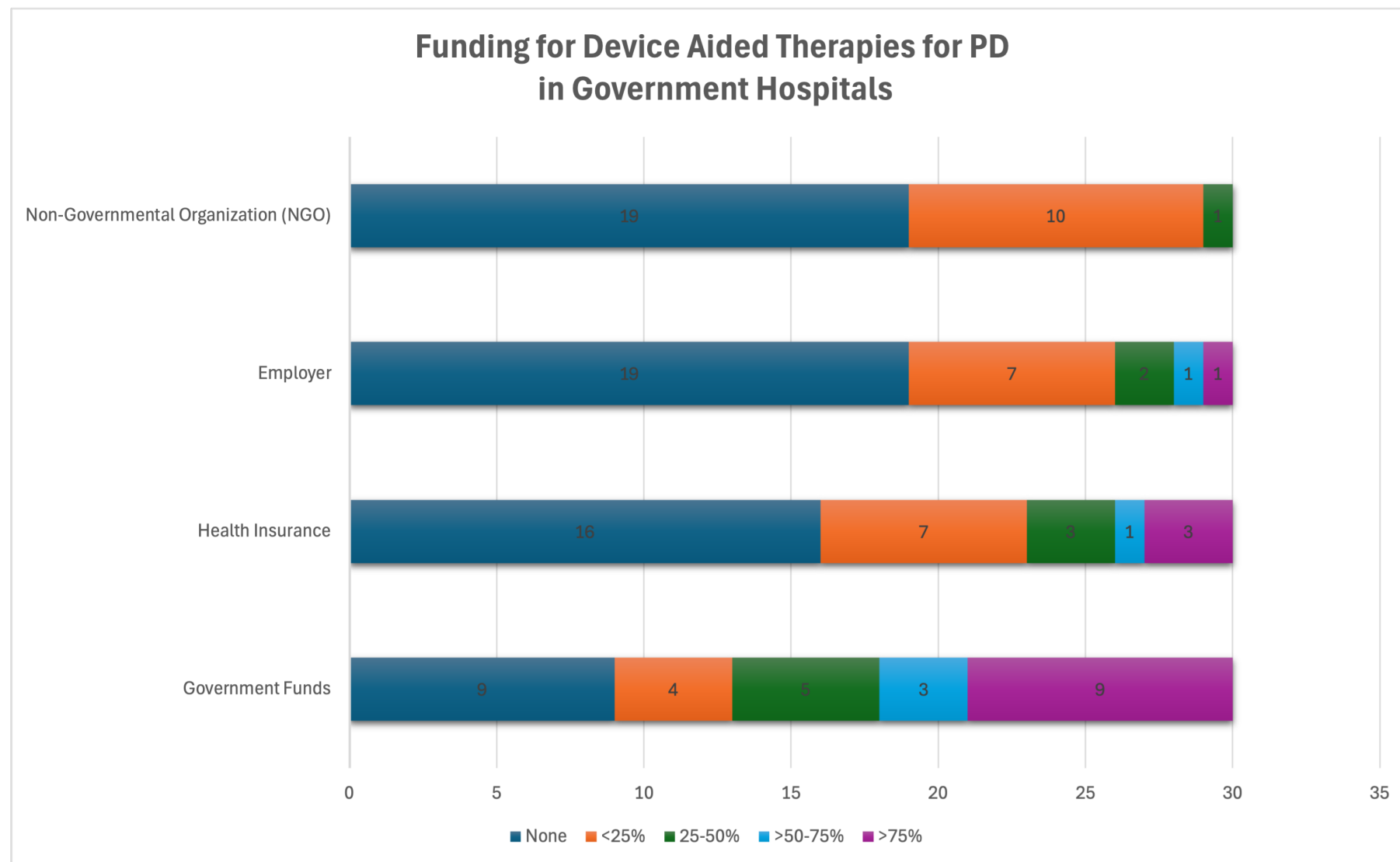
Bangkok, Thailand | May 6-7, 2026



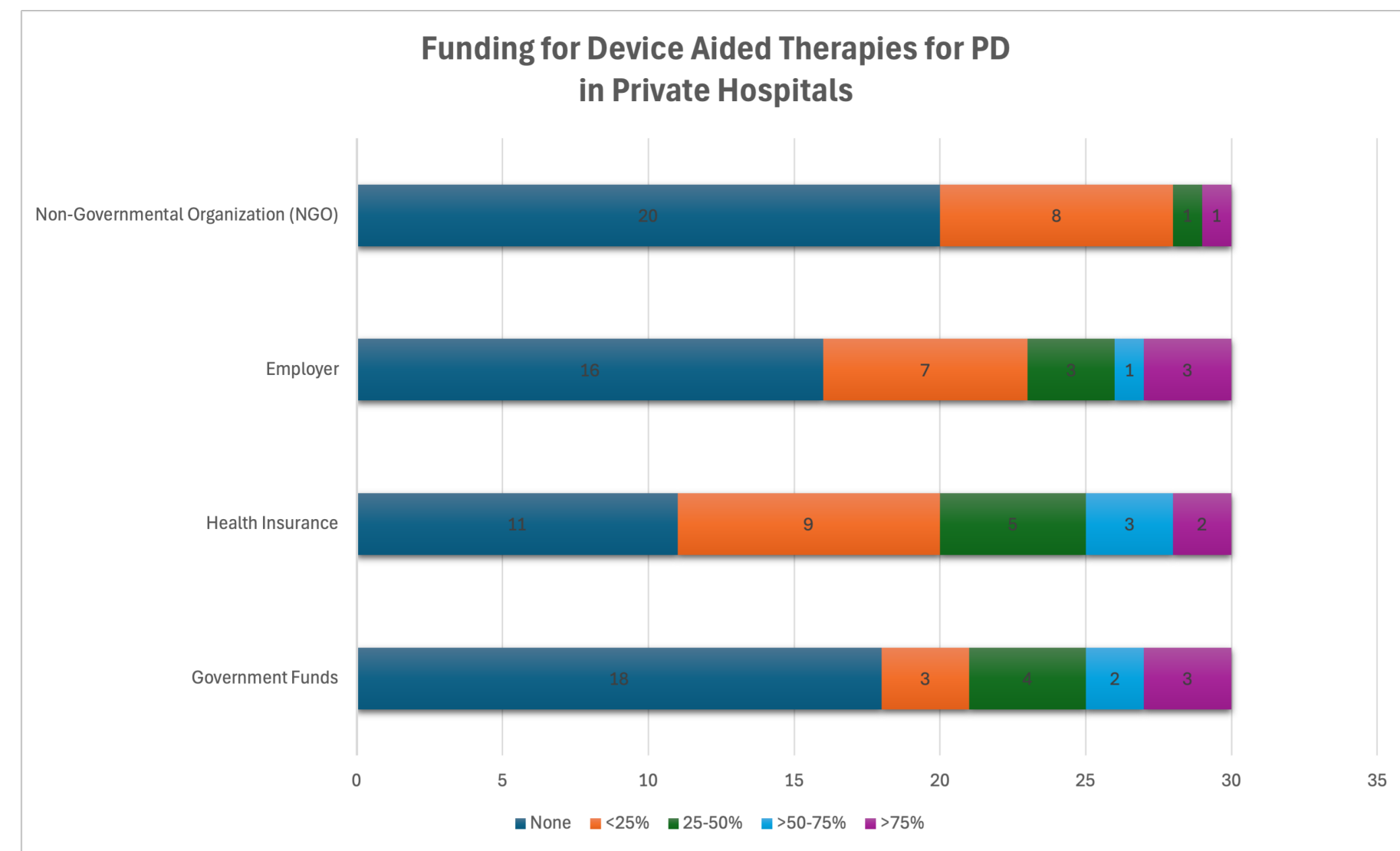
International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Funding Options for Device-Aided Therapies in PD

- Government Hospital



- Private Hospital



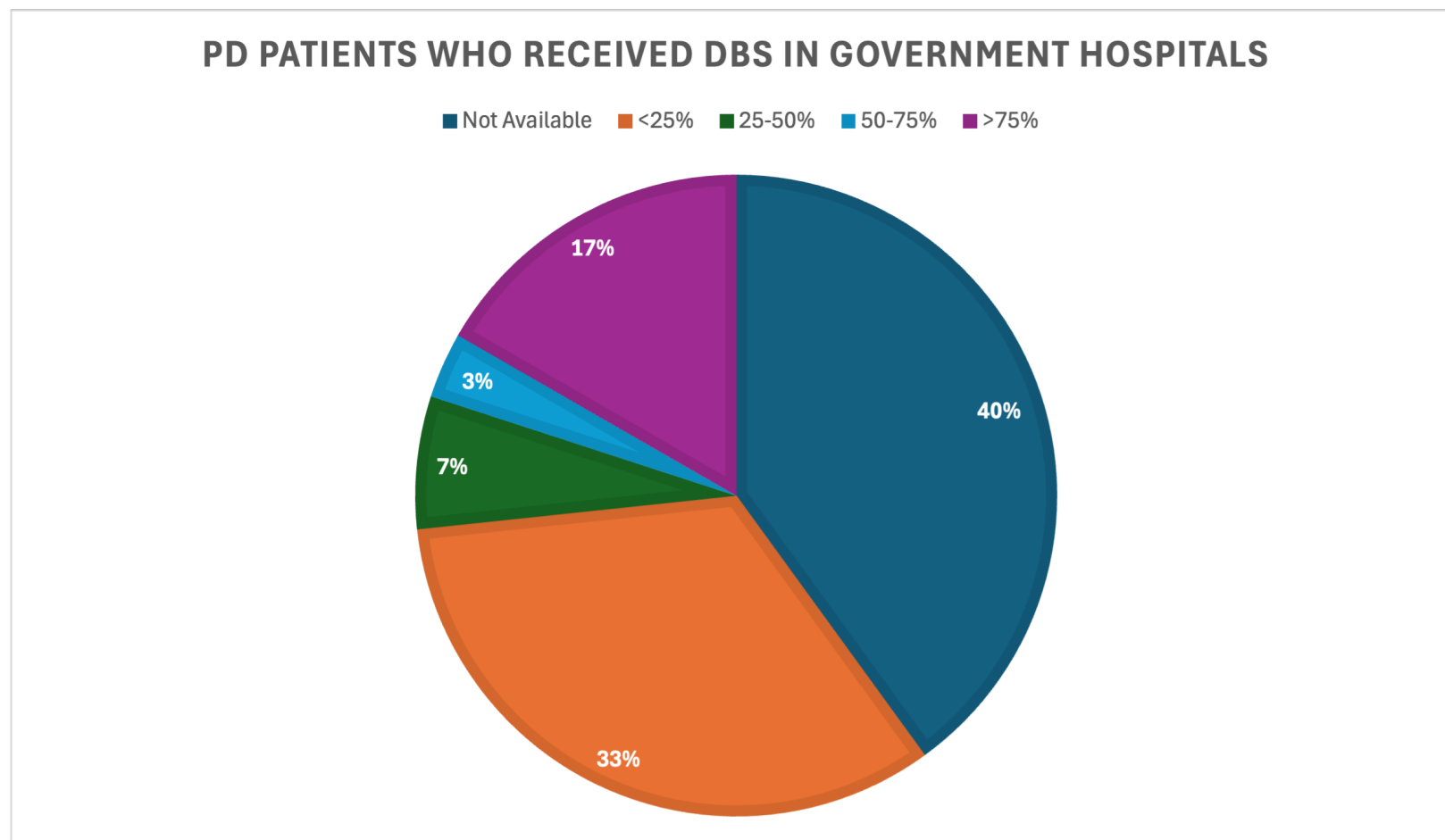
School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026

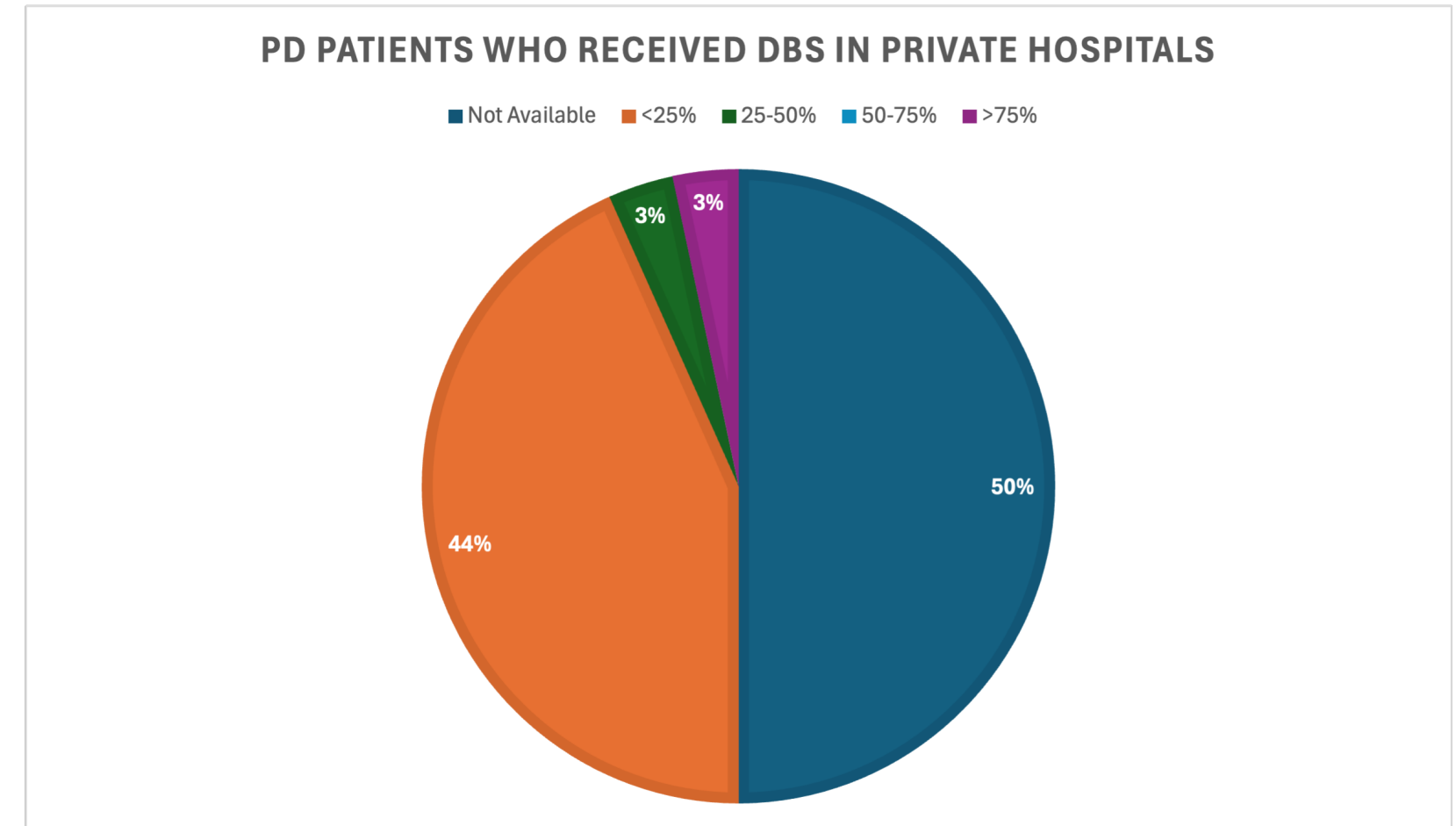


International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

Proportion of PD Patients Receiving DBS



- >75% of PD patients in China, Hong Kong, Iran, Kazakhstan and UAE (Government)



- >75% of PD patients in Nepal received their DBS in Private Hospitals

School for Device-Aided Therapies in Parkinson's Disease

Bangkok, Thailand | May 6-7, 2026



International Parkinson and
Movement Disorder Society
Asian & Oceanian Section

CONCLUSION

- Device-aid therapies are more available and accessible in East Asian countries/territories, compared to other regions