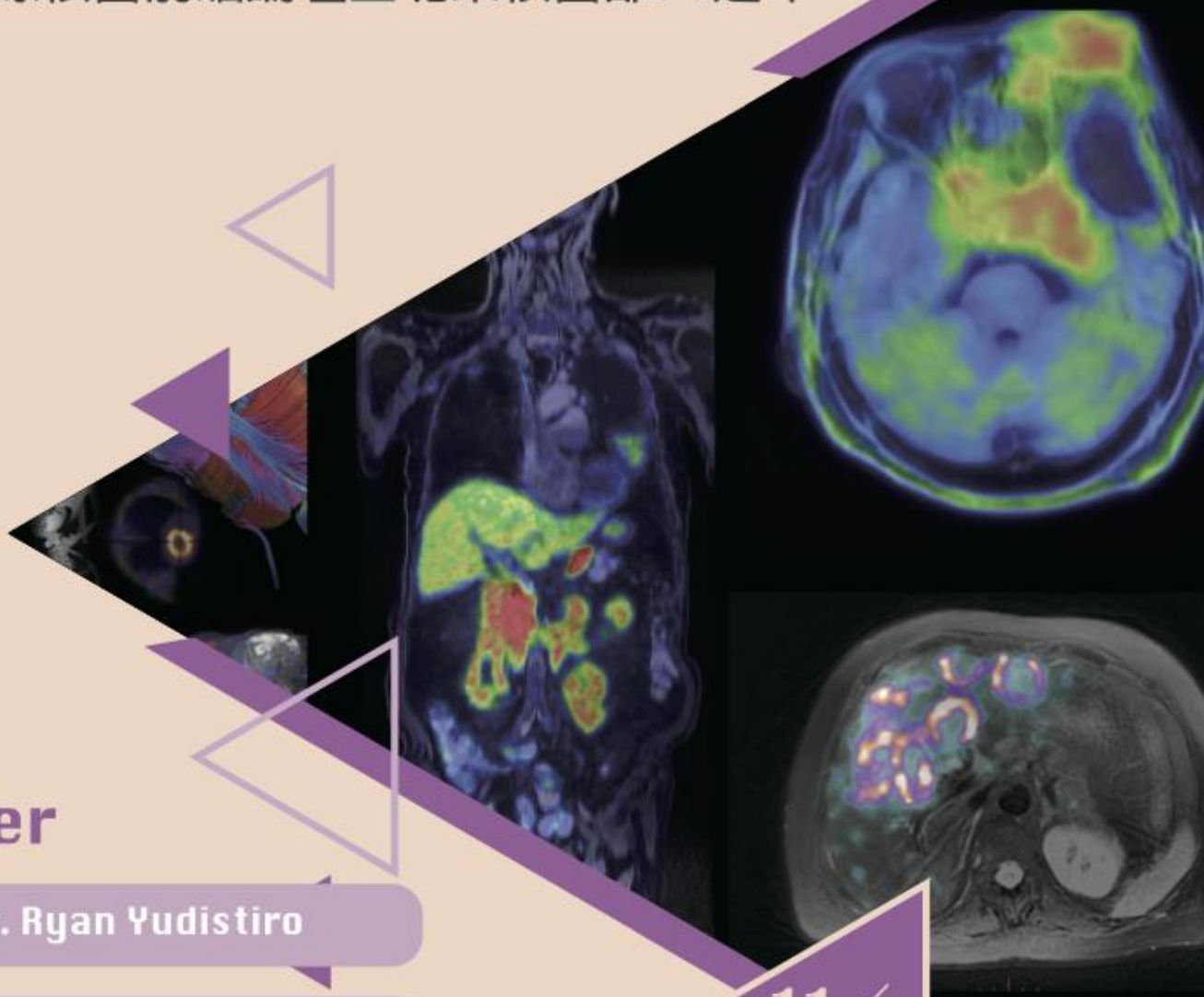


2020 International Forum of Advanced Nuclear Medicine

50th Anniversary of Nuclear Medicine, TVGH

2020國際核醫前瞻論壇暨北榮核醫部50週年



Speaker



Dr. Ryan Yudistiro



Hong-Jae Lee M.S.



Dr. Chanisa Chotipanich



Dr. Ming-Chi Shih



Dr. Peter Lin



Mai Lin Ph.D.

11
FRI.
20
13:00~17:00

Venue:

Hall 4,

Chih-Teh Building,

Taipei Veterans General Hospital

北榮核醫·五十週年



臺北榮民總醫院



中華民國核醫學學會



行政院原子能委員會核能研究所



臺北榮民總醫院
Taipei Veterans General Hospital



**INTEGRATED PET/MR
IMAGING CENTER, TVGH**
全方位正子磁振影像中心

PET/MR臨床應用範圍

正子磁振造影 (TOF PET/MR) 在 診療腫瘤方面的應用

1. 區分腫瘤的良性或惡性
2. 進行癌症分期、協助治療計劃
3. 評估癌症治療效果
4. 偵測癌症復發
5. 搜尋隱形癌症

診療腦神經疾病方面的應用

1. 評估中風位置、範圍與預後
2. 偵測癲癇病灶
3. 腦瘤療效評估、追蹤
4. 評估失智症病程變化
5. 評估神經受體功能狀態

診療心血管疾病方面的應用

1. 心肌血流定量檢查
2. 心肌存活度檢查
3. 心血管炎症評估及追蹤檢查

儀器特色

本儀器最大特色是可以同一時間，單一排程，同一台儀器，同步化獲取生理功能及解剖結構的高解析度磁振影像 (MRI) 以及細胞變化與代謝之功能性正子影像 (PET)，幫助臨床找出早期微小原發或轉移的惡性腫瘤細胞。具備非侵入性、高病灶偵篩檢率以及可在短時間內偵測病變的特性。

磁振造影 (MR) 特點

1. 高精準分辨能力
2. 多角度切面影像
3. 多參數影像分析

正子造影 (PET) 特點

1. 一半的檢查劑量
2. 功能性分子定量影像
3. TOF 技術提高影像品質



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(臺北榮總全方位正子磁振影像中心)

No.201, Sec. 2, Shipai Rd., Beitou District, Taipei City,
Taiwan 11217(TVGH, IPMC)

General Information

Meeting Date

November 20 (Friday), 2020; 13:00 - 17:00

Meeting Venue

Hall 4, Chih-The Building, Taipei Veterans General Hospital
201, Sec. 2, Shipai Rd., Beitou District, Taipei City, Taiwan 11217, R.O.C.
Tel: +886-2-2875-7301 (See the city map and transportation information behind)
Fax: +886-2-2871-5849

Meeting Notices

Upon arrival at the meeting venue, all validated registered delegates will receive a meeting QR cord. Containing the meeting proceedings and precautions for preventing coronavirus spreading in this pandemic situation. The invited speakers will give the topic via video conference. The moderators will show up at the meeting room at least 5 minutes before the session start and please go to the registration desk to get meeting bags and complete administrative affairs.

Credits of Attendance

You will find different official signature sheets on the table in front of the meeting room gate, if you need the related credits, please sign the related information on sheets. Please bring your ID card with you for CME applications and epidemic prevention measures.

Photograph

The meeting photograph will be taken immediately after the opening speech of the meeting president (around 13: 20). Please just stay in your seat.

Registration Desk and Congress Secretariat

Friday, November 20, 2020; 13:00 - 17:00, in front of the meeting room (Hall 4).

Remarks

1. Food or drink are forbidden in the meeting room
2. Please turn down your mobile phone or shift to vibration
3. To sustain the meeting proceed smoothly, may we suggest all guest speakers and moderators control the session time as scheduled. A ringing will give 5 mins before time-up and light-on at the end of each session.
4. Please be advised to set the lecture materials (files) in an OK status 30 mins before the show-time.
With any problem, please feel free to contact the meeting personnel: Mr. Wen-Bin, Hsieh E-Mail: wbhsieh@vghtpe.gov.tw
5. The meeting personnel will wear bright yellow badges all the time throughout the entire meeting and during social events. Please reach them for any assistance.
6. The meeting will provide attendees a dedicate gift and a tea-break meal box at the end of the meeting.
7. Again, we welcome your jointing and may you have a good day!

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2020 International Forum of Advanced Nuclear Medicine & 50th Anniversary of Nuclear Medicine, TVGH Opening Address

敬致 各位嘉賓及醫界先進

2020 國際核醫前瞻論壇暨北榮核醫部 50 週年於 109 年 11 月 20 日在臺北榮民總醫院致德樓舉行，謹代表臺北榮民總醫院誠摯歡迎各位嘉賓蒞臨及指導。臺北榮民總醫院自 1959 年建院迄今已逾一甲子，核醫部今年亦歡慶成立 50 週年。



核醫部在葉鑫華主任的精心籌劃及苦心經營下，引進最新儀器設備及放射製藥，早已成為國內核醫學人才搖籃。全方位正子磁振影像中心，於 2018 年 10 月正式使用；亞洲唯一 7T 小動物正子暨核磁共振影像儀，也於 2019 年 7 月使用。正子提供非侵入性高解析度的尖端影像檢查。惟核醫及正子影像的進展除了硬體設備外，藥物的應用更是不可或缺。目前核醫分子診療(Nuclear molecular theranostics)正處在蓬勃發展的階段，更要積極汲取新知，應用在臨床造福病患。

值此核醫部 50 週年之際，舉辦 2020 國際核醫前瞻論壇，邀請國內外專家學者(美澳韓泰及印尼)，針對核子醫學在診療藥物的發展、提供及核子醫學未來發展等題目進行專業討論及經驗分享，更顯不凡意義。

再次誠摯歡迎您們來進行跨國界，跨領域的整合性交流與討論，希望能夠藉此激發出更多學術研究及臨床應用實質效益，嘉惠病患。最後 祝論壇圓滿順利！各位嘉賓滿載而歸！

臺北榮民總醫院 院長

李發耀

2020 International Forum of Advanced Nuclear Medicine & 50th Anniversary of Nuclear Medicine, TVGH Congratulatory Speech

各位嘉賓、核醫界的前輩與新進們，大家午安！

非常榮幸應邀參加 2020 年國際核醫前瞻論壇暨北榮核醫部 50 週年紀念大會。由於曾是核醫學界的一員，因此有機會見證了國內核醫界的成長與發展。我早年便是在臺北榮總接受恩師葉鑫華教授的教誨，完成了核醫專科的訓練。歲月如梭，轉眼已經過了 50 個年頭。



臺北榮民總醫院於 1970 年由葉鑫華教授創立了核子醫學中心（即今天的核醫部），爾後於 1992 年成立了國家多目標正子迴旋加速器中心及 2002 年成立了分子轉譯影像中心。

回顧草創之初，筚路藍縷，由無到有，由有到好，經由歷屆主任如：劉仁賢教授、廖澍昆醫師、王世禎教授、至目前的黃文盛教授等的接棒努力以及北榮長官們的支持，終於成就了今天的規模與成果。

在過去的 50 年間，北榮核醫部擁有多項醫療特色與成就，包括：於 1970 年首先使用 Tc-99m 孳生器製藥；於 1974 年使用單光子造影儀及 1977 年用醫用電腦服務病患；於 1975 年設置放射免疫試管分析室；於 1977 年成立輻射傷害中心；於 1986 年設立核醫專科學會及協助核醫專科醫師鑑定；於 1988 年舉辦亞太核醫大會及世界核醫大會會後會；於 1992 年設立國家多目標正子迴旋加速器中心及 2002 年成立了分子轉譯影像中心；並於 2010 年，聯合韓、日共同創立了亞洲分子影像協會等。對國內核醫的發展，影響深遠。期待日後能網羅更多的年輕優秀人才加入行列，讓北榮核醫能百尺竿頭、更進一步。

1896 年 Becquerel 發現鈾鹽的放射性之後，人類首次認識了放射性核種。迄今，處在和平時代，放射性核種已廣泛應用在生物醫學的基礎研究和臨床實

踐上，為醫學科學發展和人類健康事業做出了巨大的貢獻。經過一代代科學工作者的努力，核醫學已發生巨大的變化，核醫學在功能測定、體外放射分析、放射性核種造影、放射性核種治療與放射製藥學等方面取得了令人矚目的成就，特別是將分子生物學和放射性核種示蹤技術相結合的分子核醫學之崛起，確定了核醫學在分子影像學中扮演的重要位置。

2020 年的國際南向核醫研討會適逢北榮核醫部成立 50 周年，在北榮會議中心舉行，受邀演講貴賓分別來自美國、韓國、澳洲、泰國、巴西及印尼等各國核醫專家，介紹該國核醫藥物概況以及他們服務單位的使用現況，提供我國核藥輸出的開發與佈局評估參考，應是精彩可期。

再次，感謝主辦單位的邀請。

祝大會圓滿、成功!

台北喜悅健康診所 院長
中華民國核醫學學會 第三屆 (1995-9) 理事長

陳維廉

北榮核醫·五十週年



2020 International Forum of Advanced Nuclear Medicine & 50th Anniversary of Nuclear Medicine, TVGH

2020 國際核醫前瞻論壇暨北榮核醫部 50 週年

Date: Nov. 20 (Friday), 2020

Venue: Hall 4, Chih-Teh Building, Taipei Veterans General Hospital, Taipei

Time	Topic	Speaker	Moderator
13:00~ 13:10	Registration		
13:10~ 13:20	Opening and Expression/ Group Photo	All Attendees	
13:20~ 13:50	Supply/Development of Radiopharmaceutical in Indonesia and MRCCC Siloam Hospitals Semanggi	Dr. Ryan Yudistiro	Dr. Wen-Sheng Huang
13:50~ 14:20	Supply/Development of Radiopharmaceutical in Korea and Seoul National University Hospital	Hong-Jae Lee M.S.	Wen-Yi Chang Ph.D.
14:20~ 14:50	Supply/Development of Radiopharmaceutical in Thailand and Chulabhorn Hospital	Dr. Chanisa Chotipanich	Chi-Wei Chang Ph.D.
14:50~ 15:20	Supply/Development of Radiopharmaceutical in Brazil	Dr. Ming-Chi Shih	Prof. Chyng-Yann Shiue
15:20~ 15:30	Tea Break		
15:30~ 16:00	Supply/Development of Radiopharmaceutical in Australia and Liverpool Hospital	Dr. Peter Lin	Dr. Chih-Yung Chang
16:00~ 16:30	Supply/Development of Radiopharmaceutical in USA and MD Anderson Cancer Center	Mai Lin Ph.D.	Prof. Hsin-El Wang
16:30~ 17:00	Panel Discussion (using virtual media)	All speakers	All moderators

**Organizer: Atomic Energy Council, Executive Yuan, Institute of Nuclear Energy Research
Taipei Veterans General Hospital**

**Co-organizer: The Society of Nuclear Medicine, Taiwan (R.O.C)
Taipei Veterans General Hospital, Depart of Nuclear Medicine**

Secretary: Ms. Chia-Jung Chang, cjchang12@vghtpe.gov.tw,

Tel: 886-2-2875-7301 ext. 597; Fax: 886-2-2871-5849



CV and Abstract

講者簡介及演講摘要

Guest speech 1

Name: Ryan Yudistiro

Affiliation: Medical Staff, Nuclear Medicine Department,
MRCCC Siloam Hospital, Jakarta

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Email: Ryan.yudistiro@siloamhospitals.com



Education:

Ph.D., Gunma University, Japan

Ph.D., Department of Nuclear Medicine and Molecular Imaging, Universitas Padjadjaran

M.D., University of Pelita Harapan, Indonesia

Postgraduate Training:

Tc-99m TRODAT-1 at Taipei Veteran General Hospital, Taipei

IAEA Neuroimaging and brain mapping in dementia and epilepsy at Siriraj Hospital, Thailand

mIBG theranostic at Kanazawa University Hospital, Japan

IAEA RTC on Theragnostic and Dementias at Osaka University, Japan

Workshop on NM Techniques in Neurological Disease: Emphasis on Oncology and

Neurology, Osaka University, Japan

Research and Personal Interests:

Nuclear oncology and neurology

Honors and Awards:

2017 Fellowship of Asian Nuclear Medicine Board at Yokohama, Japan

Supply/Development of Radiopharmaceutical in Indonesia and MRCCC Siloam Hospitals Semanggi

Ryan Yudistiro, M.D., Ph.D.

Department of Nuclear Medicine, MRCCC Siloam Hospital

Indonesia is the largest archipelago country in the world with almost two million square kilometers in wide. Indonesia has more than seven-teen thousand islands divided into 34 provinces. Indonesian population in 2020 reach 273,523,615 people that equivalent to 3.5% of the total world population. Indonesia is a developing/emerging country that labeled as one of the upper-middle income economy country.

In Indonesia, there are 100 state and more than 200 private hospitals, however only 12 hospitals that have Nuclear Medicine centers. Based on 2019 data, doctor number in Indonesia was 81,011 doctors. Nuclear Medicine Doctor in Indonesia until 2020 was only not more than 50 NM doctors.

Nuclear Medicine history in Indonesia was started in 1965 when the first atomic reactor was operated under Indonesian Atomic Energy Agency. This reactor is reactor Triga Mark 2000 with energy capacity is 2 MW and located in Bandung city (around 200 km away from our capital city, Jakarta). The other two reactors were followed to be operated in Yogyakarta (1988) and Jakarta (1989), with the latest is multipurpose atomic reactor that supply our I-131 until now. However, our reactor is still not able to produce Mo-99 generator yet. The other radiopharmaceuticals that our reactor able to produce is I-131 mIBG, Sm-153 EDTMP, and P-32 solution. Indonesian Atomic Energy Agency also can produce several cold-kit reagents that routine clinically used, such as MDP, MIBI, and DTPA.

The first cyclotron in Indonesia was operated in one of the private hospital in Jakarta in 2008 followed by MRCCC Siloam Hospital in 2011 and National Cancer Center in 2012. MRCCC Siloam Hospital's cyclotron is the largest cyclotron in Indonesia with maximum energy capacity is 18 MeV. Until now, FDG is the most routine cyclotron-based radiopharmaceutical production in MRCCC Siloam Hospital. However, we also able to produce another cyclotron-based radiopharmaceuticals, such as NaF, F-18 PSMA, and NH₃. Our daily production capacity is around 1-2 Ci of FDG. For Mo-99 generator, MRCCC is supplied from overseas countries, such as Poland and South Korea. Some cold-kit reagents, we are also supplied from overseas countries, for example TRODAT-1 from Taipei.

Guest speech 2

Name: Hong Jae Lee

Affiliation: a. Chief technologist of Nuclear Medicine,
Seoul National University Hospital, Seoul
city, Korea
b. President of Kentucky Society of Nuclear
Medicine Technologists (KSNMT)



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Education:

Graduate School of public Health Seoul university, Seoul, Korea

Korea national open university, Seoul, Korea

Shin-gu university, Kyung-ki, Korea

Professional Training and Experience:

Nuclear medicine training university of Pennsylvania Hospital, USA

Research and Personal Interests:

Radiological, Environmental Health Science

Honors and Awards:

2020-2022 The president of KSNMT

2016-2019 The president of radiation division

2018 The Award of ministry of science and ict, Korea

2016 The Academic award of KSNMT

2007, 2011, 2016 The exemplary staff, Seoul National University Hospital, Seoul, Korea

Supply/Development of Radiopharmaceutical in Korea and Seoul

National University Hospital

Hong Jae Lee, M.S.

Department of Nuclear Medicine, Seoul National University Hospital

Nuclear medicine in Korea started in 1960 and marked its 60th anniversary this year, bringing great progress. With the efforts of nuclear medicine scientists, it has grown remarkably, and in 1994, PET and cyclotron were installed and developed rapidly. It became PET medical insurance in 2006 and spread across the country. In particular, the development of radiopharmaceuticals became the basis for the growth of nuclear medicine. The installation of medical cyclotron in 1994 became a decisive opportunity for cancer patient diagnosis, starting with F-18 FDG, and was able to diagnose early and determine metastasis. C-11 Methionine, including F-18 FDG, has been used clinically. The installation of PET-CT in the 2000s further promoted the development of the radiopharmaceutical field. The nationwide installation of PET-CT increased the number of companies producing and selling F-18 FDG by producing only cyclotron. The installation of PET/MRI has led to advances in nuclear medicine imaging and diagnostics.

F-18 FPCIT, F-18 florbetaben, F-dopa, N-13 Ammonia, etc. have been used clinically and resulted in an increase in patients. In particular, in the research field, C-11 PIB and 30 kinds of radiopharmaceuticals for research are the basis of nuclear medicine research. Nuclear medicine should be developed with devices and radiopharmaceuticals, and many types of radiopharmaceuticals should be developed and applied to clinical practice.

Nuclear medicine requires cooperation with doctors, PhDs, and technologists. Through this, we look forward to further developments and studies that contribute to the health of patients.

Guest speech 3

Name: Chanisa Chotipanich

Affiliation: a. Associated Professor, HRH princess
Chulabhorn College of Medicine, Chulabhorn
Royal Academy
b. Deputy Director of Chulabhorn Hospital,
National Cyclotron and PET Centre



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Education:

Resident, Nuclear Medicine, Faculty of Medicine, King Chulalongkorn Memorial hospital, Thailand

Intern, Thammasat University Hospital, Thailand

M.D., Faculty of Medicine, Thammasat University, Thailand

Professional Training and Experience:

PET and Lymphoma Tutoria, Denmark

SPECT/PET training, Soule National University of Bandung, South of Korea

FDOPA PET/CT in Neurology, Turku PET Centre, Finland

“PET/CT and SPECT/CT” Rambam Medical Centre, Israel

Research and Personal Interests:

Nuclear Medicine

Supply/Development of Radiopharmaceutical in Thailand and Chulabhorn Hospital

Chanisa Chotipanich, M.D.

National Cyclotron and PET Centre, Chulabhorn Hospital

National Cyclotron and PET Centre

It is graciously founded on the aspirations and vision of Professor. Dr. HRH Princess Chulabhorn, with the set course of actions and supports towards international collaboration networks, such as The International Atomic Energy Agency (IAEA) as a center for diagnosis of cancer, neurological, and heart diseases through modern, advanced technology and the most cost-effectiveness of researches and knowledge transfer for the most quality of life and better health care among Thai people as a whole.

There are 2 services available at National Cyclotron and PET Centre:

- Patients' checkup service with PET/CT and PET/MRI scan at Chulabhorn Hospital or those transfer from other hospitals for diagnostics at National Cyclotron and PET Centre
- Radiopharmaceutical products for service to various hospitals with PET/CT.

Cyclotron

It is the accelerator for the radioactive particles in the positron, including carbon (^{11}C), nitrogen (^{13}N), oxygen (^{15}O), and fluorine (^{18}F), which are elements in the natural compounds of body's cells. Each of these radioactive substances is prepared as a radiopharmaceutical by labeling with compounds specific for cellular activity, such as Fluoro-deoxy-glucose or FDG, and required a strict quality control to inject in patients and measure radiation intensity of suspected lesions within the organs by PET.

National Cyclotron and PET Centre, Chulabhorn Hospital is the center for radiopharmaceuticals production from the cyclotron. These radiopharmaceuticals are ordered and purchased by various hospitals with PET/CT. Also, PET/CT service is provided to patients with all types of health coverage and those transferred from other hospitals nationwide. The center commits and strives for continuous research and development in the production of radiopharmaceuticals.

At present, National Cyclotron and PET Centre can produce 20 radiopharmaceuticals as follows: ^{18}F -FDG, ^{18}F -FDOPA, ^{11}C -PiB, ^{18}F -THK 5351, ^{11}C -Erlotinib, ^{11}C -Choline, ^{18}F -FLT, ^{68}Ga -PSMA, ^{68}Ga -DOTATATE, ^{18}F -PSMA-1007, ^{18}F -Florbetaben (NeuraCeq), ^{18}F -PI 2620, ^{177}Lu -DOTATATE, ^{177}Lu -PSMA-617, ^{15}O -H₂O (Radiowater), ^{18}F -NaF, ^{18}F -FMISO, ^{225}Ac -PSMA-617, ^{68}Ga -FAPI and ^{18}F -FES.

Law and Regulation on GMP;

FDA Thailand follow WHO/PICs

Radiation Safety

Office of Atoms for Peace (Thailand); national regulatory body, is responsible for ensuring safety of users and public from radiation and nuclear utilizations by educating the public and regulating the use of nuclear energy.

Memo:

Guest speech 4

Name: Ming Chi Shih

Affiliation: Affiliated Professor, Chief of Molecular Imaging
at LINC Neuroscience Lab, Department of
Psychiatry, Federal University of Sao Paulo, Sao
Paulo, Brazil



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Email: Mingchi.shih@gmail.com

Education:

Ph.D. Department of Psychiatry, Federal University of Sao Paulo (UNIFESP), Sao Paulo, Brazil

M.D. Faculty of Medicine Sao Paulo University of Sao Paulo (FMUSP), Sao Paulo, Brazil

Professional Training and Experience:

Researcher, Sleep Institute and Psychopharmacology Incentive Found Association, SP Brazil

Cardiac Imaging Clinical Fellow, Cardiovascular Image Diagnose Service MRI Section, Heart Institute,
Clinic Hospital, University of Sao Paulo (FMUSP), Brazil

Research and Personal Interests:

Radiology & Nuclear Medicine: New diagnostics & imaging in Neuroscience, Endocrinology, Cardiology
and Oncology areas

Honors and Awards:

2016 EANM Springer Prizes awarded at EANM' 16 Barcelona

2009 Award for Imaging of Pancreatic Beta Cell, 4th Workshop, NIDDK USA

2005 The Best work in Clinic Study XXIII Brazilian Congress of Psychiatry Award, Brazil.

Supply/Development of Radiopharmaceutical in Brazil

Ming Chi Shih, M.D., Ph.D.

Department of Psychiatry, Federal University of Sao Paulo

Nuclear medicine is the medical specialty that employs radiopharmaceuticals, which has presented itself as a tremendously useful ally for medicine assisting in various diagnoses and treatments, especially for cancer. The progress in the use of radiopharmaceuticals has culminated to a sector in common with other types of drugs regulation and surveillance. From 2006 on, production, marketing and use of these drugs were open to the Brazilian market granting much more freedom, which removes the Union monopoly for this kind of manipulation and granted this production to other nuclear medicine. From this date on, the amount of this type of sold product have been greatly increased, and the nucleus of surveillance and regulation in Brazil have also advanced in the legislative processes, creating documents that are now more focused on radiopharmaceuticals in the national territory (Resolutions No. 63 and No. 64). In international overview, there is too much to be done in regulatory terms in Brazil, such as adding mainly issues of drugs surveillance to pharmacovigilance practice in radiopharmaceuticals drugs.

To expose the current situation of the Brazilian Nuclear Medicine in relation to innovation, taking into account the particularities of this field. The number of accumulated patents filings of conventional pharmaceuticals was ten times higher compared to the radiopharmaceuticals in the three regions studied. The number of Brazilian patents filings corresponded to the international patent applications, which is related to the country development conditions, as well as to the difficulties in the economic area in focus long term development, the main production of Radioisotopes for medical uses are still from publics. These radioisotopes, together with other imported ones, are processed at the Radiopharmacy Center under the requisites of the ISO 9002 standards and distributed just in time to hospitals throughout the country caring for more than 2.3 million patients per year. A total of about 640 TBq of ^{18}F , ^{67}Ga , ^{123}I , ^{131}I , ^{99}Mo , ^{153}Sm , ^{35}S , ^{32}P , and ^{51}Cr compounds are processed annually at IPEN.

The diffusion of PET in Brazil is recent and still limited, even recently multiply the number of cyclotron installations and the purchase of PET scanners, especially by the private health sector. The resulting increase in demand has placed pressure on the

Brazilian National Health System to incorporate this type of examination into the reimbursement tables, requiring evidence-based updated appraisals to support the decision-making processes.

The all requirements recommended by the Brazilian GMP for Pharmaceuticals and Occupational Safety and Health Regulations required for Health Services. Due the fact that Brazilian regulations are not specific to radiopharmaceutical production, is intended to produce radiopharmaceuticals completely capable of being certified under the most rigorous worldwide standards, as it make a more difficult and also due to not much qualified facilities for research development of these drugs for clinical trial use.

In Brazil, the lack of investment and R&D, make still have a commercial potential opportunity for most international qualify distributors of radiopharmaceuticals, for producing, importing and distributing them to clinics and hospitals over the country.

Memo:

Guest speech 5

Name: Peter Lin

Affiliation: a. Clinical Director, Medical Imaging in South Western Sydney Local Health District
b. Head, Department of Nuclear Medicine and PET at Liverpool Hospital

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Email: plin171@gmail.com



Education:

MBBS, University of Sydney

Professional Training and Experience:

Royal Prince Alfred Hospital

Prince of Wales Hospital

Clinical Director, Medical Imaging in South Western Sydney Local Health District

Head, Department of Nuclear Medicine and PET at SWSLHD Liverpool Hospital

Research and Personal Interests:

Nuclear Medicine

Honors and Awards:

My research works and with my oncology colleagues have received several awards at both national Nuclear Medicine and Radiology College meetings including best young investigator, RadPharm Award, David Wigg Prize for radiobiology research and Elekta Award for technology advances.

Supply/Development of Radiopharmaceutical in Australia and Liverpool Hospital

Peter Lin, M.D.

Department of Nuclear Medicine and PET at Liverpool Hospital

The presentation will provide an overview of the molecular imaging and targeted therapy program in my department located at Liverpool Hospital as part of South Western Sydney Local Health District (“SWSLHD”).

The Molecular Science Cyclotron Facility (MSCF) is part of Nuclear Medicine Department and co-located in Liverpool Hospital, and is a Therapeutic Goods Administration (TGA) licensed cyclotron and research facility used to produce mainly PET radiopharmaceuticals for targeted molecular imaging and therapy purposes.

It houses a 16.4 MeV cyclotron producing radionuclides including Fluorine-18 (^{18}F), Carbon-11 (^{11}C) and Gallium-68 (^{68}Ga) presently with the potential to add on targets to produce Copper-64 (^{64}Cu), Iodine-124 (^{124}I), Yttrium-86 (^{86}Y) and Zirconium-89 (^{89}Zr) through solid targetry, and a planned second cyclotron, and enhanced PET, theranostics and preclinical imaging facilities as part of the local academic health and innovation precinct development in the next few years. I will share our experiences and provide clinical perspectives on the development of our radiopharmaceutical and theranostics services, supported by a favourable regulatory landscape and strong existing Nuclear Medicine clinical community and industry in Australia.

I will discuss some of the key enablers for planning considerations in my Department and Australia to meet emerging needs and future opportunities for radiopharmaceutical supply and development: alternative radioisotopes, integrated biology based imaging instrumentation, developmental radiochemistry and GMP-compliant production, clinical dosimetry, development of clinical treatment capacity and infrastructure, workforce planning, engagement and be part of multidisciplinary care, translational research and patient-centric clinical trials network, regulatory support and funding requirements.

Guest speech 6

Name: Mai Lin

Affiliation: Cyclotron Radiochemistry Facility, UT MD
Anderson Cancer Center

Address: 7900 Cambridge St, 14-2A, Houston, TX 77054,
USA

Citizenship: Taiwan

Tel: +1 713-792-7590

Email: Mlin2@mdanderson.org



Education:

Ph.D., Radiological Sciences, University of Texas Southwestern Medical Center at Dallas

M.S., Radiological Sciences, National Yang-Ming University, Taipei, Taiwan

B.S., Life Sciences, National Yang-Ming University, Taipei, Taiwan

Professional Training and Experience:

Postdoctoral Research Associate, Mallinckrodt Institute of Radiology, Washington University in St. Louis

Research and Personal Interests:

Radiopharmaceutical Chemistry

Honors and Awards:

2010 Siemens Preclinical Image of the Year 2010, World Congress of Molecular Imaging

2009 Travel Award, The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)

2009 Travel Award, Society of Nuclear Medicine

2008 Travel Award, Society of Nuclear Medicine

2008 Honorable Mention, Nominata Award, University of Texas Southwestern Medical Center at Dallas

2006 Travel Award, The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)

2006 Bradley-Alavi Fellowship, Society of Nuclear Medicine

Supply/Development of Radiopharmaceutical in USA and MD

Anderson Cancer Center

Mai Lin, Ph.D.

Cyclotron Radiochemistry Facility, UT MD Anderson Cancer Center

The radioactive nature and the technology needed to perform a PET/SPECT scan have conveyed the use of diagnostic radiopharmaceuticals to hospitals and medical centers. Despite relatively short half-life of most diagnostic radiopharmaceuticals, they have been made available through commercial sources along with several therapeutic counterparts. However, despite a quite diffuse and efficient distribution network of radiopharmaceuticals overall, in-house preparation and compounding is still largely present. In this presentation, I will take my facility at MD Anderson as an example to explain the radiopharmaceutical supply and development process in the United States.

Memo:

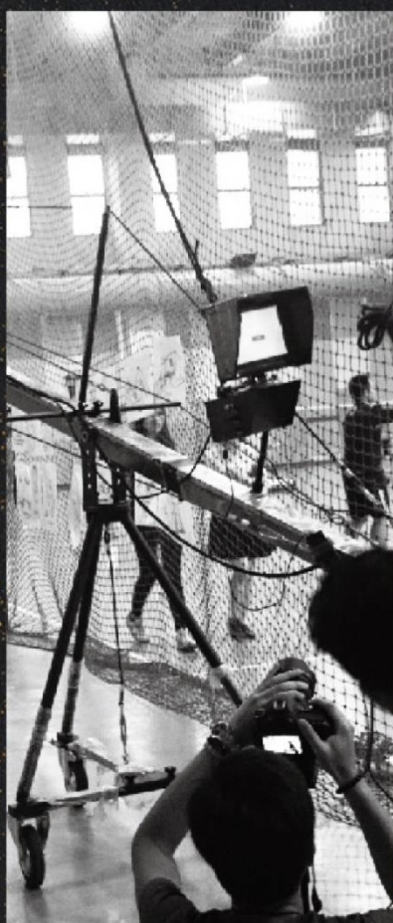
Memo:

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The screenshot displays a complex software interface for managing nuclear medicine patients. It includes a top navigation bar with various menu options. The main area is divided into several sections: a patient list table on the left, a central scheduling and examination details area, and a right-hand panel for patient information and reports. The patient list table contains columns for patient ID, name, gender, age, and examination type. The central area shows detailed scheduling information, including examination dates, times, and the names of the technicians and physicians involved. The right-hand panel provides a summary of the patient's medical history and current examination status.

- ◎ 符合醫學中心核醫部完整之檢查流程需
- ◎ 方便與直覺性的操作介面
- ◎ 完善的檢查排程流程管理機制
- ◎ 一眼掌握病患當前流程狀態
- ◎ 多樣化報告編輯範本與片語使用
- ◎ 支援統計及評鑑要求之各式報表
- ◎ 為PET打藥造影流程提供詳盡記錄
- ◎ 整合醫療影像系統以完善影像確認機制
- ◎ 支援自動報到與叫號系統整合

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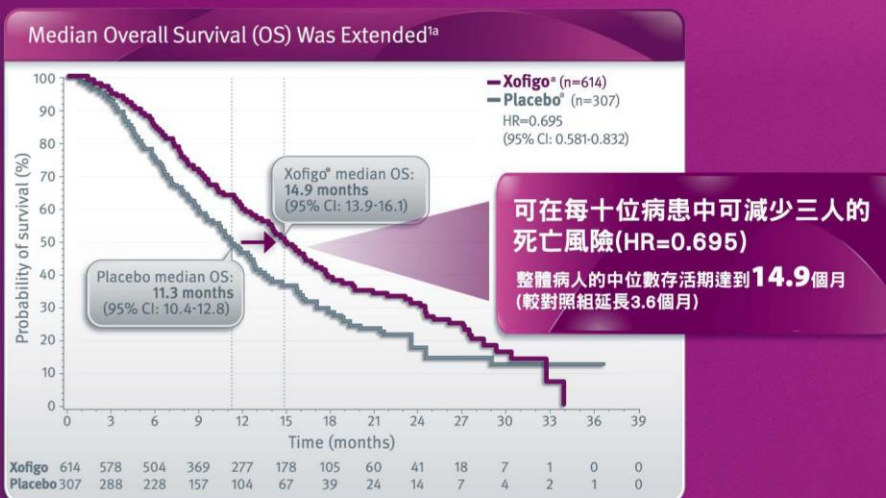
Xofigo® 鐳治骨 用於治療去勢抗性攝護腺癌病患，其合併有症狀的骨轉移且尚未有臟器轉移者



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^aPlus best standard of care.¹

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- 2** 2處以上骨轉移
- 1** 1種常規使用止痛藥物
- 0** 0處器官轉移

鐳治骨®注射液 Xofigo® solution for injection
衛部醫器字第R00091號 本藥限由醫師使用

Xofigo®適應症 用於治療去勢抗性攝護腺癌(castration-resistant prostate cancer)病人，其合併有症狀的骨轉移且尚未有臟器轉移者。劑量與給藥方式 Xofigo®的劑量應為每公斤體重給予56 kBq的放射活性，每兩週給予，共6劑注射。尚未針對注射Xofigo®超過6劑的安全性與療效進行研究。Xofigo®以靜脈注射使用，必須以緩慢注射(通常為1分鐘)的方式給藥。Xofigo®應於合格醫師為病人評估後，由處理放射線藥物之合格人員在指定的臨床場所進行給藥。禁忌症 Xofigo®的使用上並無已知的禁忌症。特殊警告與使用注意事項 併用Abiraterone和Prednisone/Prednisolone增加骨折及死亡。於臨床試驗以外，Xofigo®不建議與abiraterone acetate加上prednisone(或prednisolone)之療程合併使用。骨髓抑制 接受Xofigo®治療的病人中曾有骨髓抑制的通報，特別是血小板減少症、中性白血球減少症、白血球減少症及全血球減少症。克羅氏症與潰瘍性結腸炎 尚未在克羅氏症與潰瘍性結腸炎病人中針對Xofigo®的安全性與療效進行研究。在急性發炎性腸道疾病病人中，只有在仔細評估後才應給予Xofigo®治療。腎臟問題 在未治療而即將發生或已確認為腎臟壓迫的病人中，應於開始或重新開始Xofigo®治療前依臨床所需完成標準治療。骨折 在骨折病人中，應於開始或重新開始Xofigo®治療前完成骨折的骨科固定。骨質增生 在接受雙磷酸鹽藥物與Xofigo®治療的病人中，無法排除有骨質增生(ONJ)風險增加的情況。繼發性惡性腫瘤 Xofigo®會增加病人長期累積的整體放射線暴露量。於臨床試驗中，長達3年的追蹤期間並無Xofigo®誘發癌症的病例通報。畸形劑 依據給藥體積，本藥品每次劑量可能含有高達2.35 mmol (54 mg)的鈉。對控制飲食的病人應考慮這點。注意事項 鐳治骨尚未針對生強力和胎毒性進行試驗。根據動物試驗，Xofigo®產生的放射線可能有造成生強力不良反應的潛在風險。男性病人在治療前應尋求關於精子保存的醫學建議。由於有放射線對精子生成的潛在影響，應告知男性病人於Xofigo®治療期間以及治療後6個月內使用有效的避孕方式。Xofigo®不適用於女性病人。副作用 在接受放射線治療的病人中非常常見(>1/10)的副作用為腹瀉、噁心、嘔吐、血小板減少症。常見(>1/100至<1/10)的副作用為中性白血球減少症、白血球減少症、全血球減少症、注射部位反應，例如：皮膚發紅、疼痛和腫脹。嚴重與其他處理的特殊注意事項 Xofigo®的使用方式應同時符合放射安全及藥物品質規定。應採取適當的無菌預防措施。應只經由合格人員於專門指定的臨床場所收取、使用及給予放射線藥物。其收取、儲存、使用、轉移及棄置均應遵照政府主管機關的規定和/或取得適當許可。放射線藥物製備說明 每個藥瓶僅供單次使用。使用本藥品前應目視檢查。Xofigo®為澄清無色溶液，若變色、出現顆粒物質或包裝損壞即不應使用。Xofigo®為即用型溶液，不應稀釋或與任何溶液混合。

詳細產品資訊請參考衛生福利部核准之產品說明書，版本: Xofigo / CCDS / US P1 / TW04 / Jun 2019
MA-XOF-TW-0022-1 07.2019
PP-XOF-TW-0104-1 Approval Date 03.2020

鐳治骨®
Xofigo®
radium Ra 223 dichloride
INJECTION

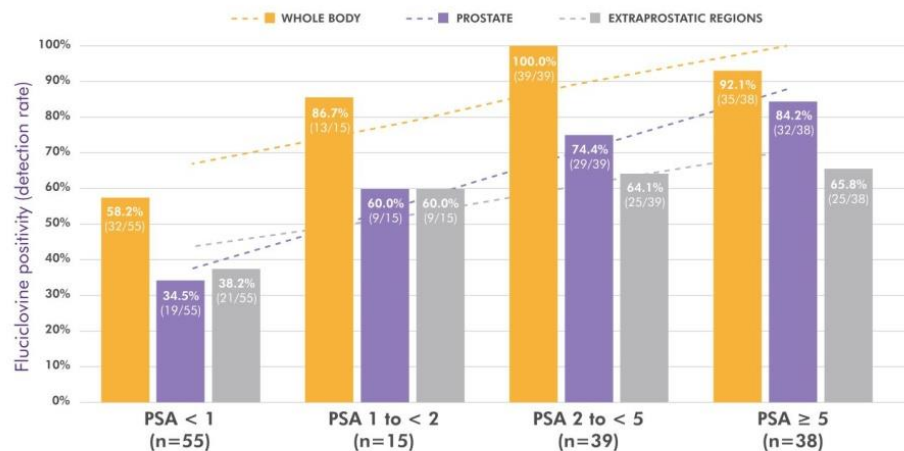
Detect and localize with Axumin

Find prostate cancer across local and distant sites of recurrence

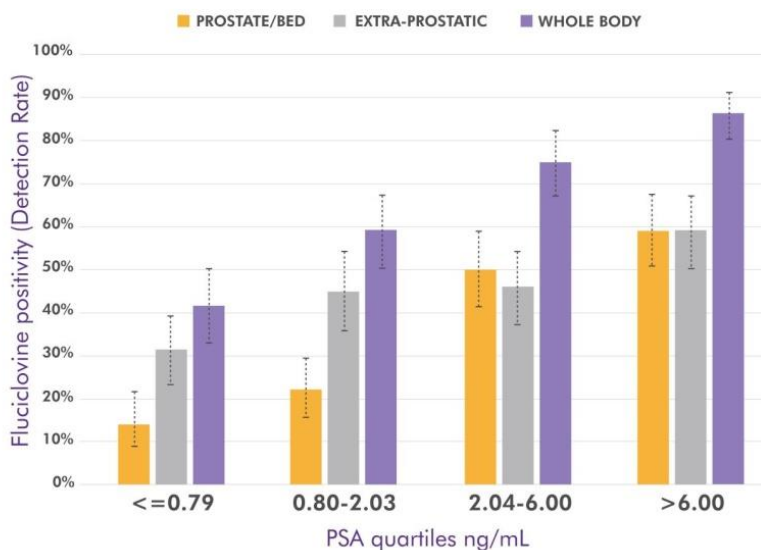
INDICATION

Axumin (fluciclovine F 18) injection is indicated for positron emission tomography (PET) imaging in men with suspected prostate cancer recurrence based on elevated blood prostate specific antigen (PSA) levels following prior treatment.

Detection



- Axumin detection rates correlated with increasing PSA levels¹.
- Axumin demonstrated an overall detection rate of 81%.



- Overall detection rate of ~40% in patients with PSA levels ≤0.79 ng/mL, rising to ~60% at PSA 0.80-2.03².

- ▶ 126/213 (59%) had their clinical management revised after the results of Axumin PET/CT imaging were included in their diagnostic workup³.

78%
n=98

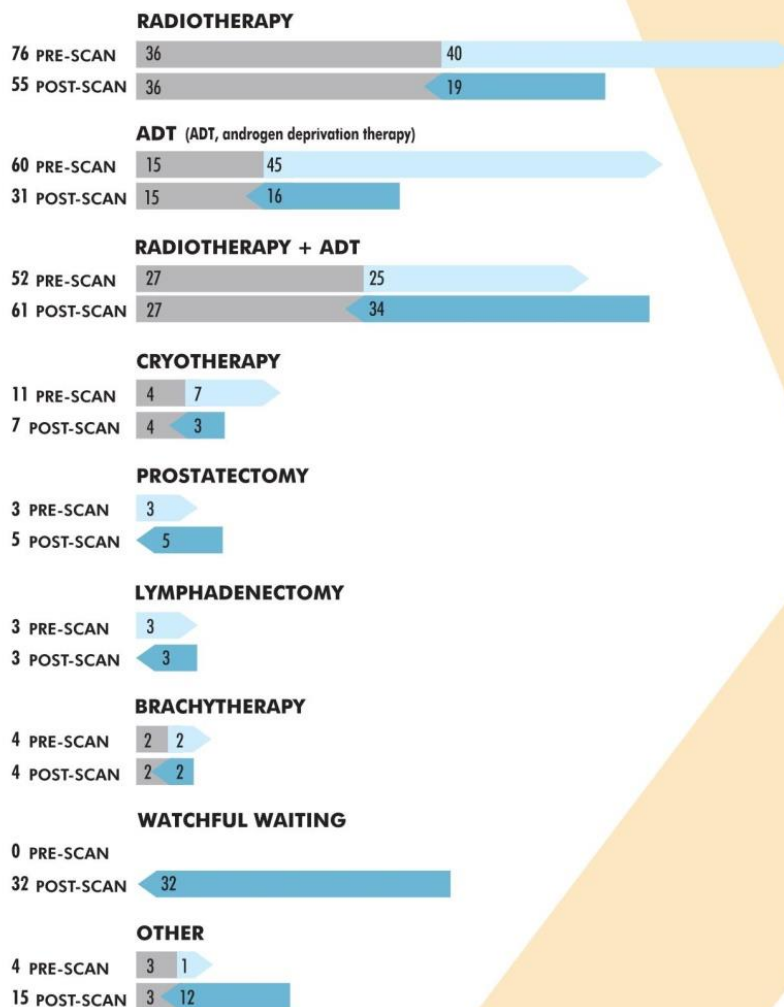
'MAJOR'

59%
n=126

Type of change

22%
n=28

'OTHER'



- ▶ The number of patients who were given a particular intended management before the Axumin (fluciclovine F 18) scan (pre-scan) and how many were assigned to that management after the Axumin scan results were available (post-scan).

Patients with no change in management (n=87)

Patients whose intended management was changed (n=126)

Patients's assigned management post-scan (n=126)

1. Savir-Baruch B, et al.. AJR Am J Roentgenol. 2019;213(4):851-858.
2. Bach-Gansmo, et al. J Urol. 2017;197:676-683
3. Andriole, et al. J Urol. 2019;201(2):322-331.

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GMS Laboratories Taichung
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臺北榮民總醫院：臺北市石牌路二段 201 號

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週六	首班 07:00 - 末班 18:00(每 10 分鐘發車乙班)
週日(國定例假日)	首班 07:00 - 末班 18:00(每 10 分鐘發車乙班)



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Administration Section : Wen-Pin Hsieh (Leader), Yuan-Chung Wu, Che-Hao Li, Chien-Ying Li, Shan-Fan Yao, Wen-Yi Chang

Public Relations Section : Bang-Hung Yang (Leader)

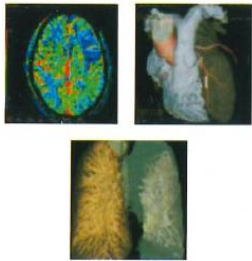
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Word Processing Section : Wen-Yi Chang (Leader), Jung-Hung Chou, Ling-Shih Chen, Hung-Yin Chen, Chia-Jung Chang

正子暨電腦斷層造影檢查

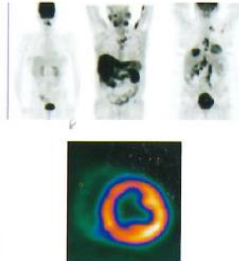
64排容積CT

- 1 秒單器官
- 5 秒心臟
- 10 秒全身



高靈敏度PET

- 一半的檢查劑量
- 一半的檢查時間
- 最佳的圖像品質



正子暨電腦斷層造影在診療腫瘤方面的應用

- 一、區分腫瘤於良性或惡性
- 二、進行癌症分期及評估治療計畫
- 三、評估癌症治療效過
- 四、偵測癌症復發
- 五、搜尋隱藏癌症

正子暨電腦斷層造影在診療腦神經疾病方面的應用

- 一、評估中風位置、範圍與預後
- 二、偵測癲癇病灶
- 三、評估失智症病程變化
- 四、評估神經受體功能狀態

正子暨電腦斷層造影在診療心臟疾病面的應用

- 一、心肌血流檢查
- 二、心肌活性檢查

當心臟血流供應減少的狀況下，心肌細胞為了維持細胞存活而降低其代謝功能稱為"心肌冬眠"。心肌冬眠在臨床上的表現為心室壁運動異常，經由心臟血管重建之後心臟血流供應，這些"冬眠"的心肌功能也會隨之恢復正常。正子影像心肌活性檢查可以幫助選擇能得益於心臟血管重建的患者，因此具有十分重要的臨床價值。

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服務地點：臺北市北投區石牌路二段 201 號(轉正子中心)

服務電話：02-28757301#570

服務時間：週一至週五(8:00-17:30)



2020 International Forum of Advanced Nuclear Medicine

50th Anniversary of Nuclear Medicine, TVGH

2020 國際核醫前瞻論壇暨北榮核醫部50週年

11 / FRI. 20
13:00~17:00



**Hall 4, Chih-Teh Building,
Taipei Veterans General Hospital**



Dr. Ryan Yudistiro

Supply/Development of Radiopharmaceutical in Indonesia and MRCCC Siloam Hospitals Semanggi



Hong-Jae Lee M.S.

Supply/Development of Radiopharmaceutical in Korea and Seoul National University Hospital



Dr. Chanisa Chotipanich

Supply/Development of Radiopharmaceutical in Thailand and Chulabhorn Hospital



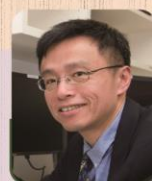
Dr. Ming-Chi Shih

Supply/Development of Radiopharmaceutical in Brazil



Dr. Peter Lin

Supply/Development of Radiopharmaceutical in Australia and Liverpool Hospital



Mai Lin Ph.D.

Supply/Development of Radiopharmaceutical in USA and MD Anderson Cancer Center

