

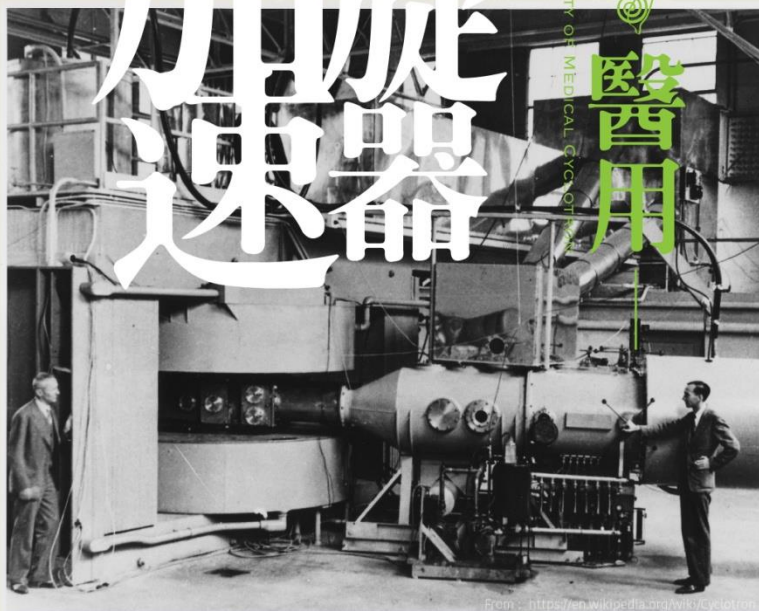
2019
10/26 11:00-16:30
(六)

迴旋加速器

臺灣

醫用

THE TAIWANESE SOCIETY OF MEDICAL CYCLOTRONS



學會 年會

暨第五屆第二次會員大會

斷層掃描正子放射同位素調製品質輔導 暨
法規研究第二次教育訓練暨討論會/座談會

● 國立台大獸醫專業學院獸醫三館 B01國際會議廳(台北市羅斯福路四段1號) ●

主辦單位:  衛生福利部食品藥物管理署  台灣醫用迴旋加速器學會

學會宗旨

促進迴旋加速器及正子製藥之醫學應用及研究發展，藉以提升迴旋加速器運作及正子製藥之水準。

理事長 高潘福

衛福部食藥署核備醫院調製 PET 藥品品項

F-18 FDG	F-18 FDOPA	F-18 NaF	C-11 Sodium Acetate	N-13 NH3	F-18 FLT	F-18 FCH	Ga-68 DOTATOC
台北榮總			台北榮總	台北榮總			
新光醫院							
臺大醫院		臺大醫院				臺大醫院	臺大醫院
三軍總醫院		三軍總醫院					
林口長庚		林口長庚	林口長庚				
中山附醫		中山附醫			中山附醫		
義大醫院		義大醫院					
阮綜合醫院		阮綜合醫院	阮綜合醫院				
花蓮慈濟	花蓮慈濟	花蓮慈濟	花蓮慈濟				

製藥廠：核研所、士宣生技股份有限公司

2019-10-01

今天



2019年6月

農曆四月 ~ 五月



月



週日 26 (廿二)	週一 27 (廿三) 台大 F-18 choline	週二 28 (廿四)	週三 29 (廿五)	週四 30 (廿六) 台中中山醫 F-18 FLT 花蓮慈濟 NaF	週五 31 (廿七)	週六 6月 1日(廿八)
2 (廿九)	3 (五月) 北榮 C-11 acetate	4 (初二)	5 (初三) 北榮 C-11 acetate	6 (芒種) 花蓮慈濟 NaF	7 (初五) 端午節彈性放假	8 (初六)
9 (初七)	10 (初八)	11 (初九)	12 (初十)	13 (十一) 台中中山醫 F-18 FLT	14 (十二) 花蓮慈濟 NaF	15 (十三)
16 (十四)				花蓮慈濟 NaF		
23 (廿一)	24 (廿二) 台大 F-18 choline	25 (廿三)	26 (廿四)	27 (廿五) 台中中山醫 F-18 FLT 花蓮慈濟 NaF	28 (廿六)	29 (廿七)
30 (廿八)	7月 1日(廿九)	2 (三十)	3 (六月)	4 (初二)	5 (初三)	6 (初四)

核醫學雜誌 正子藥物「推廣繼續教育專欄」



國內放射藥物學SWOT分析與展望

S 優勢

1. 國內既有迴旋加速器
正子斷層掃描儀
2. 核子醫學臨床發展成果
豐碩
3. 有藥學系、化學系、放
射系高教研究人才培育

W 劣勢

1. 新藥研發能力不足
2. 放射化學、藥學相關人士
人才缺乏
3. 國內相關法規管理的落
後

O 機會

1. 國際上新藥發展蓬勃
2. 配合國家南向政策推
展國內生技、放射藥品輸
出
3. 配合科技部發展科研
推廣教育

T 威脅

1. 短半衰期放射藥物無法
從國外進口
2. 鄰近日本、中國、韓國均
有很強大的研發、測試新藥
團隊

2019-07 [核子醫學放射藥物研發與應用推廣人才教育]計畫書
申請科技部補助全國性學術團體辦理學術推廣業務計畫

課程目標

Day 1

了解歐美的放射性藥物管制的相關法條 包含EP、USP、GMP
國內正子藥物的相關審核與演進
放射性元素的特性及其核種生產方式
基礎的放射物理
輻射偵測的基本原理

Day 2

放射化學 (F-18, C-11)
藥物動力學 藥理學基本概念
放射性藥物的特性
輻射劑量的基本概念
診斷與治療用藥物

Day 3 (在迴旋加速器中心上課)

迴旋加速器的原理與其製作藥物流程
了解品管的項目與其意義
迴旋加速器人員資格
藥證相關規定的使用與其運送

Day 4 (開放核醫醫師、放射師報名)

臨床使用的正子藥物使用與其介紹

The Future of Nuclear Medicine as an Independent Specialty

Johannes Czernin, Ida Sonni, Aria Razmaria, and Jeremie Calais

Ahmanson Translational Theranostics Division, Department of Molecular and Medical Pharmacology, David Geffen School of Medicine, UCLA, Los Angeles, California

JNM 2019(9);60(Supplement 2):3S-12S.

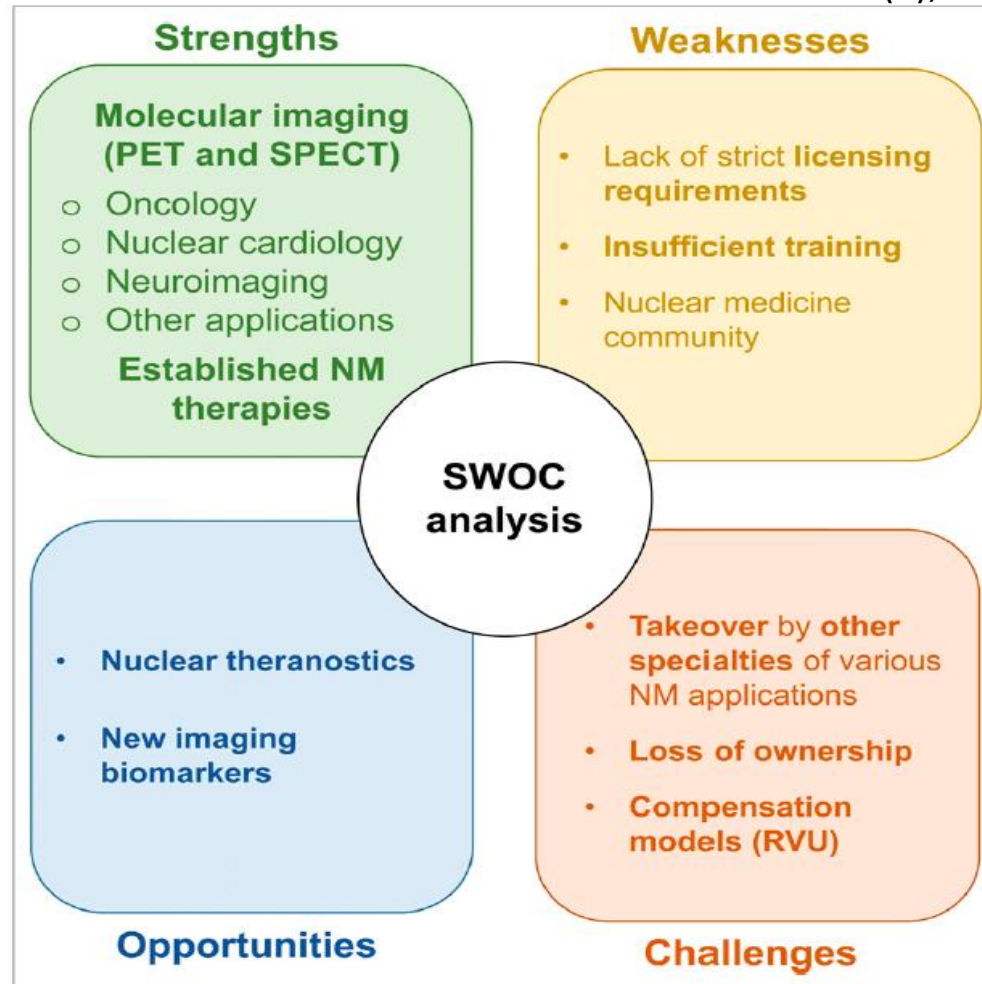


FIGURE 1. Schematic representation of SWOC (strengths, weaknesses, opportunities, and challenges) analysis. NM= nuclear medicine; RVU= relative value unit.

TABLE 2
Selected FDA-Approved Imaging Biomarkers

Probe	Target	Process	Application	Biomarker type
^{18}F -FDG	Hexokinase 2, GLUT1, GLUT3, GLUT4	Glucose metabolism	Cancer, cardiovascular disease, neurodegenerative diseases, infectious disease	Diagnostic, phenotypic, prognostic, intermediate endpoint
^{18}F -NaF	Hydroxyapatite	Bone remodeling	Primary and metastatic bone cancers, degenerative/inflammatory bone disease	Diagnostic, prognostic
^{11}C -choline	Choline kinase	Lipid metabolism	(Prostate) cancer	Diagnostic, phenotypic
^{68}Ga -DOTATATE	Somatostatin receptors	Somatostatin receptor density	NETs	Diagnostic, predictive
^{18}F -fluciclovine	LAT1	Amino acid transport	(Prostate) cancer	Diagnostic, phenotypic
^{82}Rb	Na ⁺ /K ⁺ ion exchange	Myocardial blood flow	Detection of CAD	Diagnostic
^{13}N -ammonia	Incorporation into glutamine by glutamine synthetase	Myocardial blood flow	Detection of CAD	Diagnostic
^{123}I -ioflupane	Presynaptic dopamine transporter	Dopamine transport	Movement disorders	Diagnostic
^{18}F -labeled florbetapir, florbetaben, and flutemetamol	Amyloid	Amyloid deposition	Progressive neurodegenerative diseases	Diagnostic, prognostic

CAD = cardiovascular disease.

TABLE 3
Current and Future Nuclear Theranostic Approaches

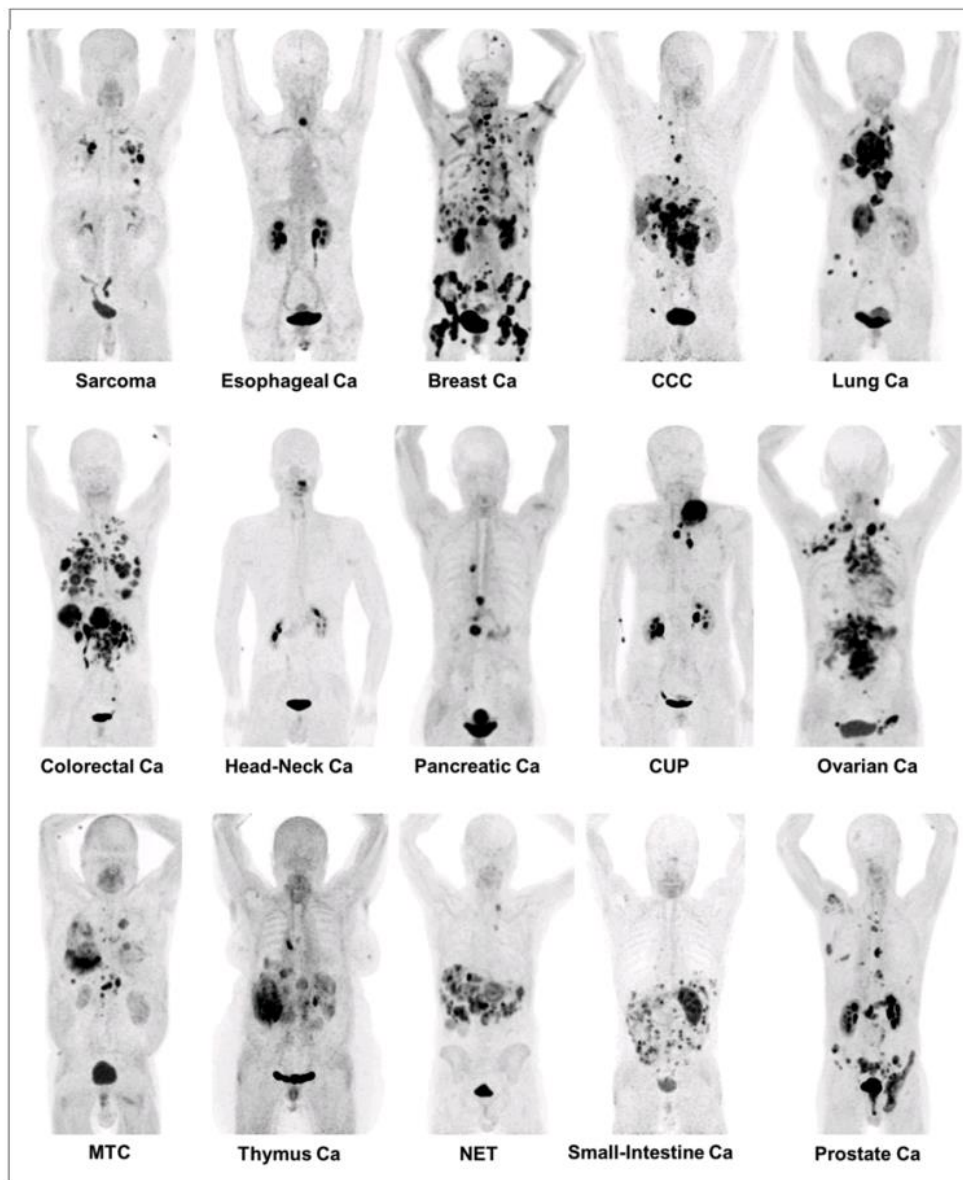
Nuclear theranostic pair	Target	Application
^{68}Ga - and ^{177}Lu -DOTATATE	Somatostatin receptors	NETs
^{68}Ga - and ^{177}Lu -PSMA	PSMA	Prostate cancer
^{123}I - and ^{131}I -iobenguane	Norepinephrine reuptake transporter	Neuroblastoma, paraganglioma, pheochromocytoma
^{68}Ga - and ^{177}Lu -FAPI	Fibroblast activation protein	Multiple cancers
^{68}Ga - and ^{177}Lu -3BP-227 NTR1 antagonist	Neurotensin receptor 1	Pancreatic cancer
^{124}I - and ^{131}I -girentuximab	Carbonic anhydrase 9	Renal cell cancer
^{123}I - and ^{131}I -iodine	Sodium/iodide symporter	Thyroid diseases

FAPI = fibroblast activation protein inhibitor.

⁶⁸Ga-FAPI PET/CT: Tracer Uptake in 28 Different Kinds of Cancer

Clemens Kratochwil*¹, Paul Flechsig*^{1,2}, Thomas Lindner¹, Labidi Abderrahim¹, Annette Altmann^{1,3}, Walter Mier¹, Sebastian Adeberg^{4,5}, Hendrik Rathke¹, Manuel Röhrich¹, Hauke Winter^{2,6}, Peter K. Plinkert⁷, Frederik Marme^{8,9}, Matthias Lang¹⁰, Hans-Ulrich Kauczor^{2,11}, Dirk Jäger^{12,13}, Jürgen Debus^{4,5,14}, Uwe Haberkorn^{1–3}, and Frederik L. Giesel¹

Several tumor entities, such as breast, colon, and pancreatic carcinomas, are characterized by a strong desmoplastic reaction (1). Cancer-associated fibroblasts and extracellular fibrosis can contribute up to 90% of the gross tumor mass, leaving original tumor cells in the minority (2,3). Many cancer-associated fibroblasts differ from normal fibroblasts by their relative specific expression of **fibroblast activation protein (FAP)**. Therefore, **FAP-specific inhibitors** were first developed as anticancer drugs and then were consecutively advanced into tumor-targeting radiopharmaceuticals (4,5).



68Ga-FAPI PET/CT: Tracer Uptake in 28 Different Kinds of Cancer

Kratochwil C, et al. J Nucl Med 2019; 60:801–5.

Image of the Year 2019.
Henry N. Wagner, Jr, MD Award

Maximum-intensity projections of 68Ga-FAPI PET/CT in patients reflecting 15 different histologically proven tumor entities (sorted by uptake in descending order). Ca 5 cancer; CCC 5 cholangiocellular carcinoma; CUP 5 carcinoma of unknown primary; MTC 5 medullary thyroid cancer; NET 5 neuroendocrine tumor.

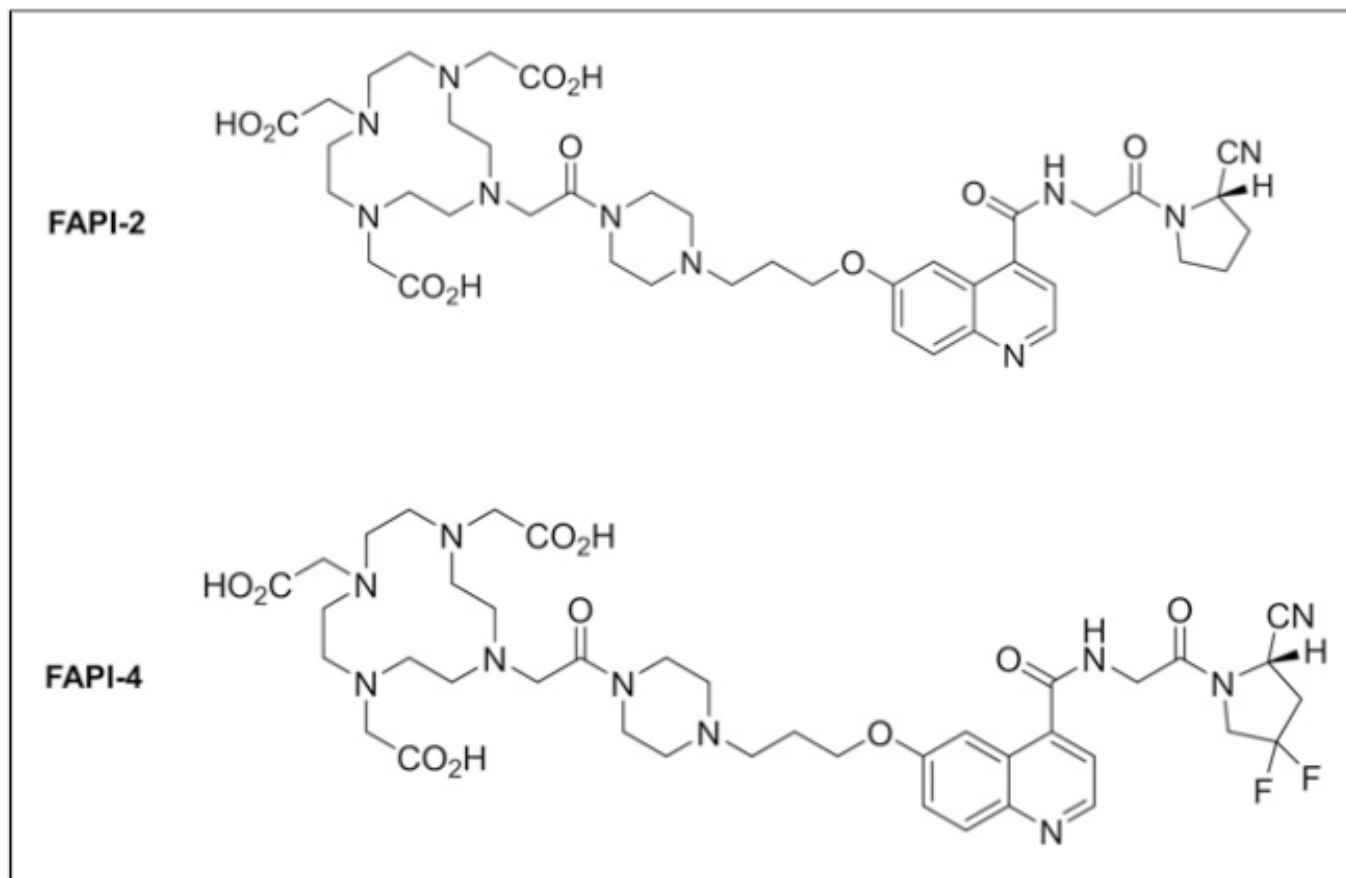


FIGURE 1. Molecular structure of ^{68}Ga -FAP1-2 and ^{68}Ga -FAP1-4.

Lutetium 銩 $_{71}\text{Lu}$

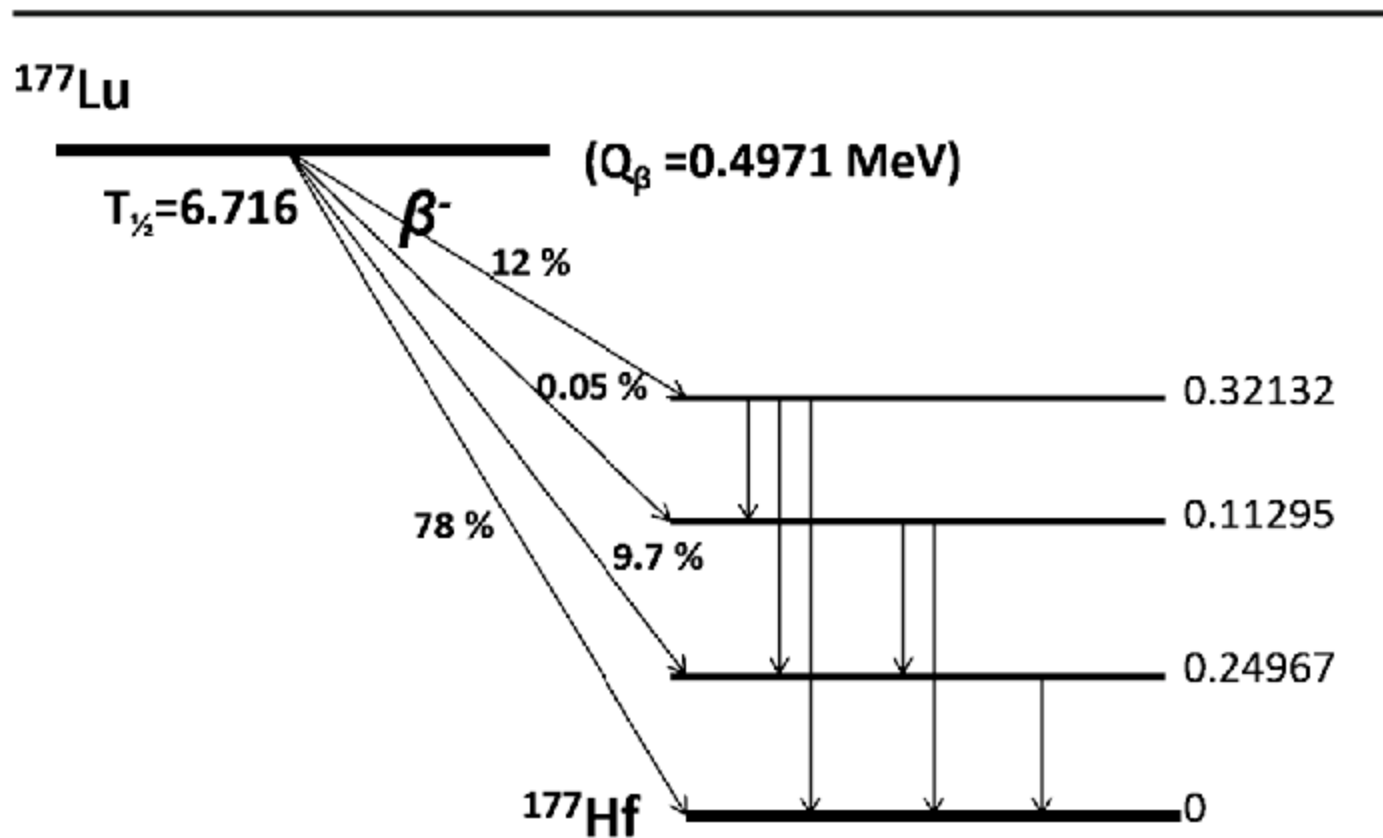
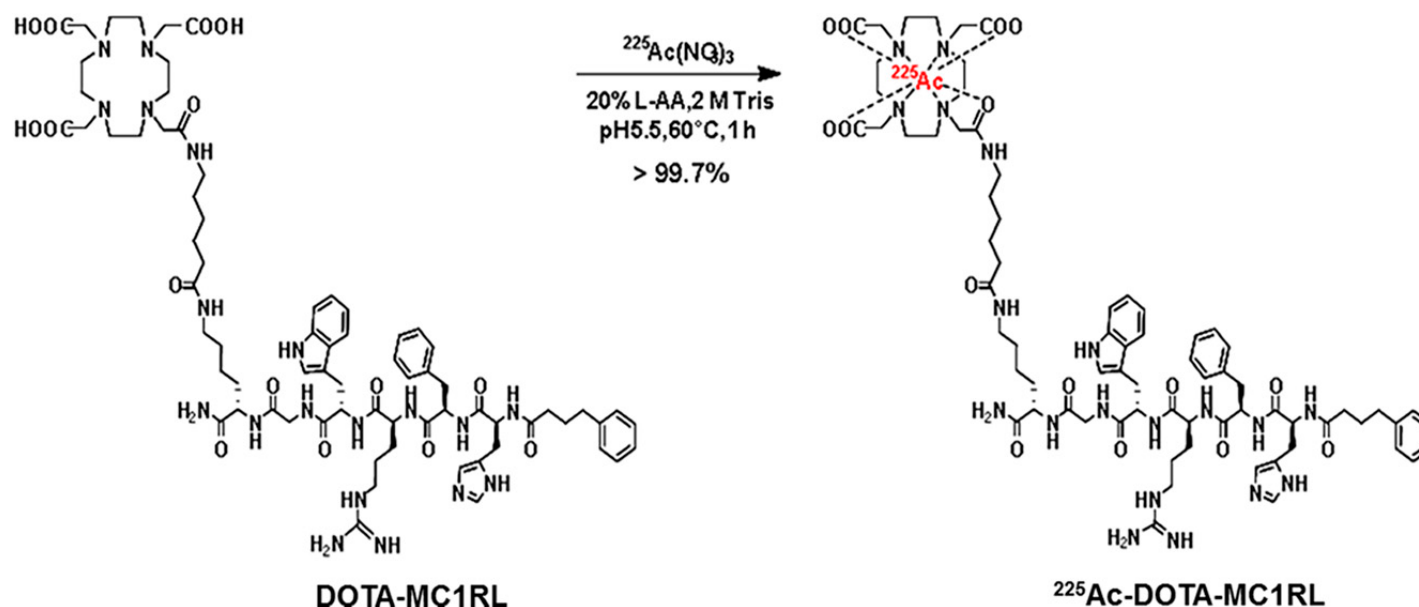


Fig. 1 Simnplified decav scheme of ^{177}Lu

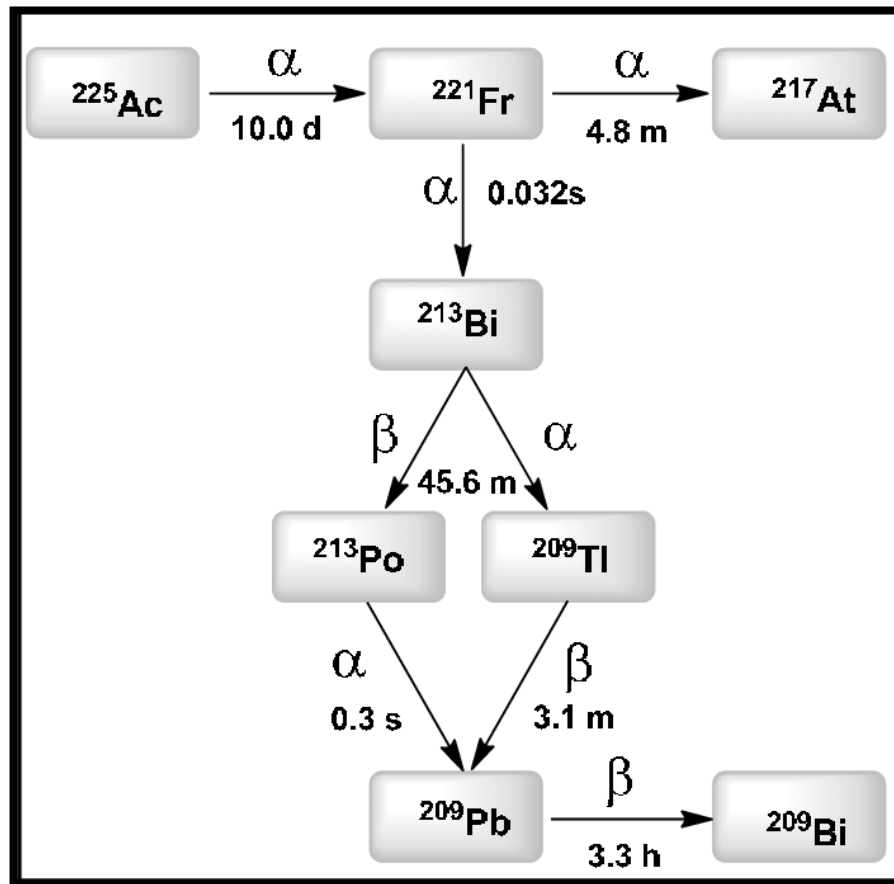
Hf: hafnium 銩

Melanocortin 1 Receptor–Targeted α -Particle Therapy for Metastatic Uveal Melanoma

Narges K. Tafreshi^{*1}, Christopher J. Tichacek^{*1–3}, Darpan N. Pandya^{*4}, Michael L. Doligalski^{*1}, Mikalai M. Budzevich⁵, HyunJoo Kil⁶, Nikunj B. Bhatt⁴, Nancy D. Kock⁷, Jane L. Messina^{8–10}, Epifanio E. Ruiz⁵, Nella C. Delva¹, Adam Weaver¹¹, William R. Gibbons¹¹, David C. Boulware¹², Nikhil I. Khushalani¹³, Ghassan El-Haddad¹⁴, Pierre L. Triozzi¹⁵, Eduardo G. Moros^{1–3,10}, Mark L. McLaughlin⁶, Thaddeus J. Wadas⁴, and David L. Morse^{1,3,5,10}



Actinium 錒 $_{89}\text{Ac}$



Decay chain of actinium-225/bismuth-213 radionuclide generator.

[Kitson SL](#), et al. **Radionuclide antibody-conjugates, a targeted therapy towards cancer.**
[Curr Radiopharm.](#) 2013 Jun 6;6(2):57-71.

Solid (g/cm³, 20°C)
 Liquid (g/mL, 20°C)
 Gas (g/L, 0°C, 1atm)
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Protactinium

Atomic Weight: 231.036

Oxidation State: +5, +4, +3

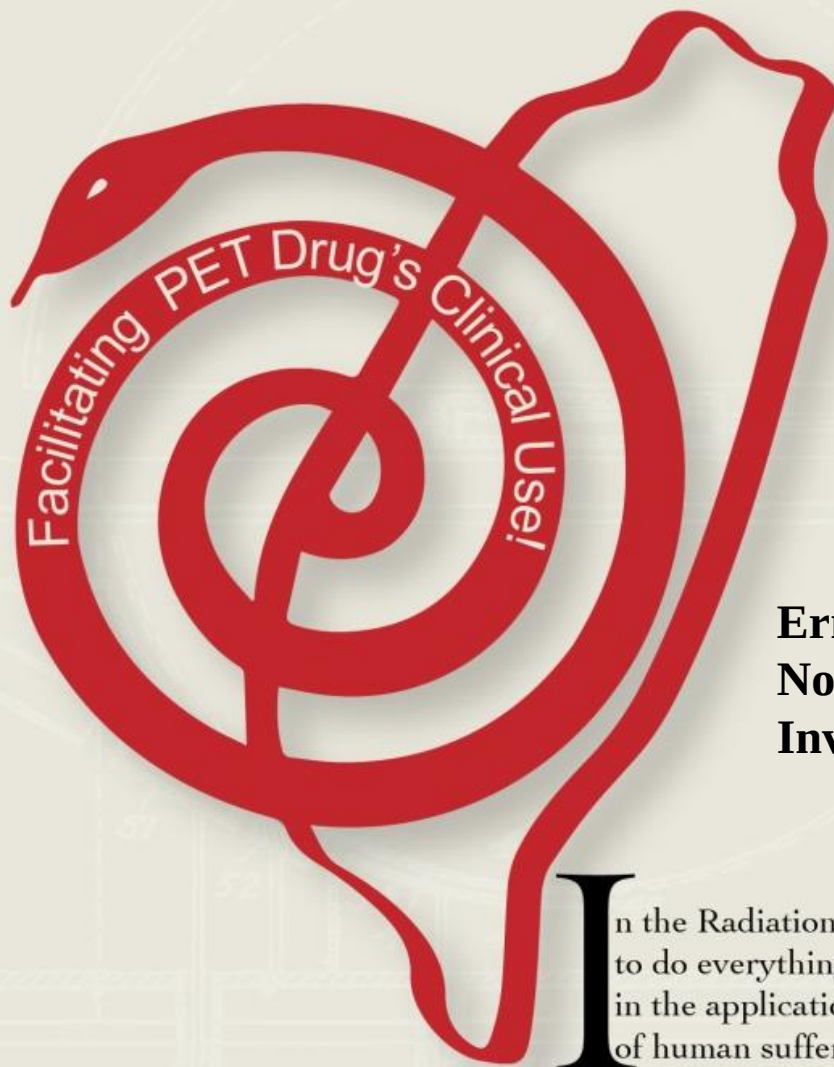
**2019臺灣醫用迴旋加速器學會年會暨第五屆第二次會員大會/斷層掃描正子放射
同位素調製品質輔導暨法規研究、第二次教育訓練暨討論會/座談會
節目表**

地點：國立臺灣大學獸醫學系三館

日期：108年10月26日(星期六)

時間：11:00-16:30

時間	內容
10:30-11:00	報到
11:00-11:10	理事長致詞
11:10-11:50	許耘萱：醫用迴旋加速器中心潔淨室消毒劑適用性研究初探 座長：詹東榮博士
11:50-13:00	午餐(理監事聯席會議)
	LUNCH SYMPOSIUM: The intego PET infusion system (現代儀器股份有限公司)
13:00-13:40	會員大會
13:40-14:20	姚正祥： $^{68}\text{Ga}/^{177}\text{Lu}$ 物性及化性與在 PSMA-11的調製 座長：魏孝萍博士
14:20-15:00	曾敬仁：The role of PSMA PET in prostate cancer diagnosis-CGMH experience 座長：林昆儒博士
15:00-15:20	Coffee break
15:20-16:00	鄭媚方：In the Era of Theranostics -- Somatostatin Receptor PET Imaging in NETs 座長：顏若芳主任
16:00-16:30	魏孝萍、詹東榮、高潘福：正子藥物調製作業綜合討論



Ernest Orlando Lawrence, PhD.
Nobel Prize in Physics (1939)
Invention of the cyclotron

In the Radiation Laboratory we count it a privilege to do everything we can to assist our medical colleagues in the application of these new tools to the problems of human suffering.

— Ernest Orlando Lawrence

感謝大家的參與和貢獻！