

出國報告（實習）

# 新型加馬機(Perfexion)進階機器操作與 安全防護訓練+臨床見習

服務機關：神經醫學中心 癌病中心

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派赴國家：美國

出國期間：102-9-7 至 102-9-13

報告日期：102-9-23

## 摘要：（關鍵字:加馬機）

本院已通過預算並將與 102 年十月完成新型加馬機(Perfection)之安裝並計畫於十月底開始營運，嘉惠神經外科病患的治療，本次選派神經醫學中心功能性神經外科醫師與癌病中心醫事放射師至美國維吉尼亞州 University of Virginia (UVA)，參與由加馬機原廠 Elekta 公司所舉辦之進階加馬機訓練課程，確定熟悉新機器之操作與安全作業須知，以期能在新機器於本院開機後能提供病患更優質與安全的治療。

## 本文：

### 一、 目的

參與加馬機原廠所舉辦之進階機器操作訓練

### 二、 過程

為期三天的課程，包括新加馬機機械構造介紹與原理、臨床治療經驗分享、加馬機新功能與新適應症的簡介、實際操作訓練、新加馬機輻射安全防護作業注意事項、參觀 UVA 加馬刀治療中心與觀摩病患治療流程

本次所有課程均與技師認真參與討論，並提供台北榮總之治療經驗與與會者一起分享討論。

UVA加馬刀治療中心一是已成立超過 30 年，在美國有相當豐富的加馬刀治療經驗，並發表相當多重要的相關學術文章，本院與UVA加馬刀治療中心長期以來一直有學術上的交流，此次能親自前往參觀其目前治療概況，可說對後續本院加馬刀中心的改建有很多值得我們參考學習的地方。

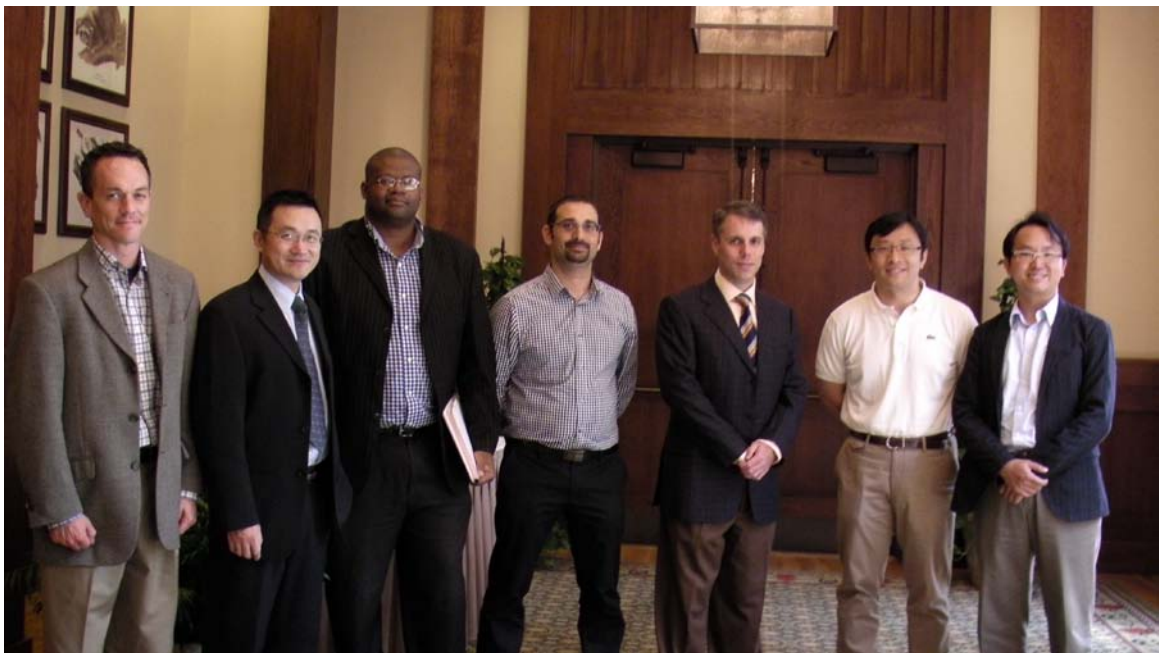
此次主要於會後一天請UVA 安排觀摩其他加馬刀免頭架固定分次放射手術治療的過程，傳統上加馬刀放射手術治療是以單次高劑量為原則，這一部分台北榮總已有 5000 例病患治療之經驗，但是此次新型加馬刀升級包括購買其齒模咬合免頭架固定系統，此系統可用來做分次加馬刀手術，此次主要觀摩UVA 利用此系統治療病患的過程，此病患因為腦腫瘤貼近視神經，為了保護其視力固採用新的加馬刀分次固定系統治療，希望能達到提高治療劑量又能達到保護病患視力神經的雙重目的，UVA 的醫師與技術員於期間詳細解釋病患治療流程與頭部固定的注意事項，我們也詢問了有關分次治療的適應症與治療成果，這些都可以作為日後我們使用新的固定系統服務更多病患的重要參考。

### 三、 心得

- 1.加馬機原廠安排之機器操作訓練與安全作業規範講習  
透過課程安排了解 Perfexion 機器設計原理與相關輻射安全作業規範，對日後實際臨床操作上確實有很大幫助
- 2.新加馬機之使用經驗分享、新功能與治療適應症之介紹  
由於機器設計的進步，新加馬機在治療計畫上與機器運作上有很多新的設計，讓病患的治療舒適度提升，治療時間也明顯縮短，是相當人性化的新一代放射手術設備
- 3.實際參觀新型加馬機之病患治療與機器校正作業  
UVA 之加馬機團隊過去與本院潘主任與鍾主任有許多淵源，這次有機會到當地參觀與目前在 UVA 的加馬機治療中心主任 Dr.Sheehan 見面研討，實屬相當難得的經驗，Dr.Sheehan 也當面相當重是台北榮總故去再加馬刀治療的經驗和成就，有當面提出許多往後兩院臨床研究的一些計畫，透過這次的交流，相信日後我們的治療成果會和國際上重要的加馬刀治療中心有更緊密的分享與交流，此次也有機會仔細參觀了新加馬機 extension 設備的治療流程，對於日後新機器在 hypofractionated radiosurgery 的操作上有了更多的認識，期待能應用在往後病患的治療上

#### 四、 建議事項

新型加馬機 Perfexion 確實有許多創新和突破，本院加馬刀治療的臨床經驗已經在國際上得到許多肯定，日後應繼續在前人努力建立的基礎上繼續邁進，希望新機器能嘉惠更多病患的治療，提供更優質與安全的治療外，也要在國際上發表更多本院得來不易的治療經驗，繼續維持本院在國際加馬刀放射手術治療上的地位與影響力



# 2013 Advanced Gamma Knife Course

(附件一)

## Monday, September 9, 2013

Time	Registration and Breakfast
7:15 - 8:00 a.m.	Dr. Mark Shaffrey - Opening Remarks
8:00 - 8:15 a.m.	Dr. Jason Sheehan - History of Stereotactic Radiosurgery
8:15 - 8:45 a.m.	Dr. Edward Nemerlut - Monitored Anesthesia for Gamma Knife (GK) frame placement
8:45 - 9:00 a.m.	Dr. Steve Newman - Ophthalmological considerations for Pituitary patients undergoing Gamma Knife Surgery (GKS)
9:00 - 9:30 a.m.	Break
9:30 - 10:00 a.m.	Dr. Mary Lee Vance - Endocrine considerations for Cushing's Disease, Nelson's, and non-functioning Adenomas
10:00 - 10:35 a.m.	Dr. Michael Thorne - Endocrine considerations for Acromegaly and Prolactinomas
10:35 - 11:10 a.m.	Dr. Sugoto Mukherjee - Neuro-Imaging for GKS of Pituitary Adenomas
11:10 - 11:45 p.m.	Lunch
11:45 - 12:45 p.m.	Dr. John Jane, Jr. - Endoscopic Resection of Pituitary Adenomas versus GKS
12:45 - 1:20 p.m.	Dr. Edward Oldfield - Transsphenoidal, Microcapsular Resection of Pituitary Adenomas versus GKS
1:20 - 1:55 p.m.	Dr. Jason Sheehan - GKS for Pituitary Adenomas & Methods to Avoid Damage to the Optic Apparatus
1:55 - 2:45 p.m.	Roundtable Discussion on GKS for Pituitary Adenomas with Drs. Jane Jr., Oldfield, Sheehan, Thorne and Vance
2:45 - 3:15 p.m.	Break
3:15 - 4:00 p.m.	Dr. David Schlesinger - GKS Dose Planning for Pituitary Tumors
4:00 - 4:30 p.m.	Dr. David Schlesinger, Dr. Jason Sheehan, and Dr. Zhiyuan Xu - Hands-on Dose Planning:
4:30 - 5:00 p.m.	<ul style="list-style-type: none"> <li>• Strategy with the Perfexion,</li> <li>• Dynamic beam shaping and shielding</li> <li>• Composite Shots</li> <li>• Discussion of participants cases</li> </ul>
6:30 p.m.	Dinner

## Tuesday, September 10, 2013

Time	Registration and Breakfast
6:00 - 7:00 a.m.	Dr. David Schlesinger - Technical Introduction to the Gamma Knife Perfexion
7:00 - 8:00 a.m.	<ul style="list-style-type: none"> <li>• Unit Description</li> <li>• Radiation Unit Safety</li> <li>• Treatment Procedures</li> <li>• Emergency Procedures</li> <li>• NRC Regulations</li> </ul>
8:00 - 8:30 a.m.	Dr. Sugoto Mukherjee - Neuro-Imaging of AVMs for GKS
8:30 - 9:00 a.m.	Dr. Webster Crowley - Embolization of AVMs prior to GKS
9:00 - 9:30 a.m.	Dr. Kenneth Liu - Surgical Resection versus GKS of AVMs
9:30 - 10:00 a.m.	Dr. Mark Quigg - GKS for Epilepsy
10:00 - 10:15 a.m.	Break
10:15 - 11:00 a.m.	Dr. Chun-Po Yen - GKS for AVMs
11:00 - 11:30 a.m.	<ul style="list-style-type: none"> <li>• Patient selection for GKS</li> <li>• Adverse Effects</li> <li>• Repeat GKS</li> <li>• Treatment of Pediatric Cases</li> <li>• Brainstem treat</li> <li>• Treatment of Large AVMs</li> </ul>
11:30 - 12:30 p.m.	Roundtable Discussion on GKS for Vascular Lesions with Drs. Crowley, Liu, Sheehan, and Yen
12:30 - 1:00 p.m.	Lunch
1:00 - 2:00 p.m.	Ms. Sophia Lee Yu - Coding and Reimbursement for the Perfexion.
2:00 - 2:30 p.m.	Dr. Jason Sheehan - Indications and clinical application of Extend System
2:30 - 3:30 p.m.	Dr. David Schlesinger - Workflow and O/A of Extend System
3:30 - 4:00 p.m.	Drs. Sheehan, Schlesinger, Xu and Yen - Demonstration of Gamma Knife Perfexion and Extend System
4:00 p.m.	Drs. Sheehan, Schlesinger, Xu and Yen Hands-on dose planning strategy
6:30 p.m.	Tour of UVA Hospital or Historical Tour of UVA (optional) Dinner

## Wednesday, September 11, 2013

Time	Registration and Breakfast
6:00 - 7:00 a.m.	Dr. David Schlesinger Overview of Perfexion Physics
7:00 - 8:00 a.m.	<ul style="list-style-type: none"> <li>• Basic Physics Concepts</li> <li>• Perfexion Beam Collimation and Modeling</li> <li>• Loading and Commissioning</li> <li>• Perfexion Dosimetry &amp; Treatment Planning</li> <li>• Perfexion Quality Assurance</li> </ul>
8:00 - 8:30 a.m.	Dr. Max Wintermark - Advancing imaging techniques for GKS
8:30 - 9:00 a.m.	Dr. Deric Park - Medical Management of Brain Metastasis Patients
9:00 - 9:30 a.m.	Dr. Mark Shaffrey - Surgical Resection versus GKS of Brain Metastasis
9:30 - 10:00 a.m.	Break
10:00 - 10:30 a.m.	Dr. James Larner -
10:30 - 11:00 a.m.	<ul style="list-style-type: none"> <li>• Radiobiology of Radiosurgery</li> <li>• WBRT versus GKS for Brain Metastasis</li> </ul>
11:00 - 11:30 a.m.	Dr. Jason Sheehan - Gamma Knife Surgery (GKS) for Brain Metastasis
11:30 - 12:00 p.m.	Dr. Zhiyuan Xu
12:00 - 1:00 p.m.	<ul style="list-style-type: none"> <li>• Receptor Status and Brain Metastasis</li> <li>• GPA and Brain Metastasis</li> </ul>
1:00 - 2:00 p.m.	Round Table Discussion on Gamma Knife Surgery for Brain Metastasis with Drs. Larner, Park, Shaffrey and Sheehan
2:00 - 2:30 p.m.	Lunch
2:30 - 3:00 p.m.	Drs. Schlesinger, Sheehan, Xu and Yen Hands-on dose planning strategy with the Perfexion and discussion of participants' cases
3:00 - 3:30 p.m.	Dr. Jason Sheehan - Review and Concluding Remarks
3:30 - 4:00 p.m.	Tour of Monticello (OPTIONAL)

# 2013 Advanced Gamma Knife Course

## Course Information

### Date, Time and Location

Participants will arrive on the evening of September 8th, 2013. Classes will begin on Monday, September 9th, 8:00am in Pavilion III, situated at The Boar's Head. The course will conclude on Wednesday, September 11th, 2:30 pm.

### Topics

Gamma Knife Perfixion with specific focus on its use for Pituitary Adenomas, AVM's and Brain Metastasis.

### Size and Participation

Individual participation in discussion and hands-on exercises is expected. The course is limited to 20 participants to foster an effective learning environment. Target audience: Neurosurgeons, Medical Physicists, Radiation Oncologists, Medical Oncologists, Neuro-Oncologists and Otolaryngologists.

### Course Overview

In this course, participants will develop a fundamental knowledge of radiosurgical principles using the Gamma Knife (GK) Perfixion. We will cover the use of the GK Perfixion. Participants will have a thorough knowledge of all aspects of Perfixion's practical for intracranial radiosurgery.

New to the program this year, participants will learn about indications and techniques for multisession radiosurgery with the Gamma Knife Extend System.

We will focus upon the nuances of Gamma Knife surgery for the treatment of AVM's, Pituitary Adenomas, and Brain Metastasis. For AVM's, we will detail our protocol and outcomes for large AVM's, the role of embolization, retreatment of AVM's, a definition of subtotal obliteration and its prognosis, and the delayed changes (e.g. cyst formation and neoplasia) that may follow radiosurgery.

For pituitary adenomas, we will highlight the challenges of retreatment and treatment when there is no discernible lesion on MRI. We will outline the timing for endocrinological remission and the small chance of recurrence despite an initial remission. The potential complications (e.g. delayed hypopituitarism, visual dysfunction, secondary tumors, and stroke) associated with Gamma Knife surgery for pituitary adenomas will also be detailed. The importance of creating an appropriate distance between the tumor and optic pathways prior to Gamma surgery and methods for achieving this will be discussed.

With regard to Brain Metastasis, we will focus on the changing treatment paradigms with regard to the management of patients with stage IV carcinoma. Gamma Knife surgery along with other treatment options will be discussed. In particular, the role of initial and repeat GKS for the Brain Metastasis along with GKS of a surgical resection cavity will be discussed.

The course will also offer much "hands on" training. We will schedule cases relevant to the particular topics being covered on each day. Each day will begin with stereotactic frame placement performed in the operating room. The advantages of frame placement under monitored anesthesia will be discussed. Participants will observe frame placement in the operating room.

In order to offer a diverse and well rounded course, we have invited others to speak about the history and future of radiosurgery and the roles of medical management, microsurgery and neuro-interventional approaches in the context of Radiosurgery patients.

In summation, we believe the course outlined below will represent a course unlike that offered by other institutions. It will hopefully help allow us to share a different philosophy and a set of techniques not covered in other courses or written about in the literature.

### Accreditation

The University of Virginia School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

The University of Virginia, Office of CME designates this live activity for a maximum of 20.5 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The University of Virginia School of Medicine awards 20.5 hours of participation (equivalent to *AMA PRA Category 1 Credits™*) to each non-physician participant who successfully completes this educational activity. The University of Virginia School of Medicine maintains a permanent record of participation for six (6) years.

University of Virginia Faculty Lecturers

Webster Crowley, MD

Department of Neurosurgery

John A. Jane, Jr., MD

Department of Neurosurgery

James Larner, MD

Department of Radiation Oncology

Kenneth Liu, MD

Department of Neurosurgery

Sugoto Mukherjee, MD

Department of Radiology

Edward Nemerlut, MD  
Department of Anesthesiology

Steven A. Newman, MD  
Department of Ophthalmology

Edward Oldfield, MD  
Department of Neurological Surgery

Deric Park, MD  
Department of Neurosurgery

Mark Quigg, MD  
Department of Neurology

Mark Shaffrey, MD  
Department of Neurosurgery

David Schlesinger, PhD  
Department of Neurosurgery

Jason P. Sheehan MD, PhD  
Department of Neurosurgery

Michael Thorne, MD  
Division of Endocrinology and Metabolism

Mary L. Vance, MD  
Division of Endocrinology and Metabolism

Max Wintermark, MD  
Division of Neuroradiology

Zhiyuan Xu, MD  
Department of Neurosurgery

Chun-Po Yen, MD  
Department of Neurosurgery

Ms. Sophia Lee Yu  
Department of Neurosurgery / Gamma Knife

## Area Information

### Meals and Lodging

All meals are included with the Advanced Course. Breakfast, lunch, dinner and a variety of refreshments will be provided through catered meals. For information about lodging, please see the contact information below:

#### Boar's Head Inn

200 Ednam Drive

Phone: (434) 296-2181 Fax: (434) 972-6021

Rate: \$155.00/night (not inclusive of taxes and resort fee of \$23.50)

\*To get this rate, please make your reservation through us.

#### Courtyard by Marriott

1201 West Main St.

Phone: (434) 977-1700 Fax: (434) 977-2600

Rate: \$155.00/night (not inclusive of taxes)

\*To get this rate, please use booking code GKCGKA, or mention Gamma Knife

**Charlottesville** - home to the University of Virginia, the birthplace of Thomas Jefferson, and a true representative of the heartland of historic Virginia. Located in central Virginia in the foothills of the Blue Ridge Mountains, Charlottesville has a population of 42,000 in a rural/metropolitan area of about 88,400. Washington, D.C. is less than two hours away, but there are many things to see and do here in town.

**Jefferson's Academical Village**- The University of Virginia is famed for the beauty of its buildings. Designed by Thomas Jefferson, they are considered among the finest examples of classic American architecture. The University is also noted for its scholarly achievements and historical associations. It began with Jefferson's concept and design for a community of scholars, and "academical village." The Rotunda, modeled after the Roman Pantheon, served as focal point, library and classroom. Two ranges extended from the Rotunda; professors lived and taught in the large Pavilions, and students lived in the smaller rooms in between. This tradition is carried on today and the Department of Neurological Surgery holds its teaching conferences in Pavilion V regularly.

**University of Virginia Health System** can trace its beginnings directly to Thomas Jefferson, under whose leadership as Rector, eight schools including a School of Anatomy and Medicine opened on March 7, 1825. Jefferson chose the school's original faculty, a single professor, Robley Dunglison, whose first class of 20 students met in his home on the Grounds. Walter Reed is among the alumni of the Medical School. The teaching hospital, which opened in 1901 as a 25-bed facility, is today housed

in theories and practices. All faculty presenters participating in an accredited CME activity are expected to disclose relevant financial relationships with commercial entities occurring within the past 12 months (such as grants, or research support, employee, consultant, stock holder, member of speakers bureau, etc.) The University of Virginia School of Medicine will employ appropriate mechanisms to resolve potential conflicts of interest to maintain the standards of fair and balanced education to the reader. Questions about specific strategies can be directed to the Office of Continuing Medical Education, University of Virginia School of Medicine, Charlottesville, Virginia.

The faculty and staff of the University of Virginia Continuing Medical Education have no financial affiliations to disclose.

### Disclosure of discussion of non-FDA approved uses for pharmaceutical products and/or medical devices

The University of Virginia School of Medicine, as an ACCME provider, requires that all faculty presenters identify and disclose any "off label" uses for pharmaceutical and medical devices/products. The University of Virginia School of Medicine recommends that each physician fully review all the available data on new products or procedures to instituting them with patients.

### Disclosure for attendance records and certificate distribution

The University of Virginia Office of Continuing Medical Education requires that all participants sign attendance sheets daily to confirm participation in the CME activity for that day.

Certificates of attendance, designating the maximum number of hours of participation, can be printed from the website after attendees have completed the evaluation form online.

### Special Needs

The Americans with Disabilities Act of 1992 requires that all individuals, regardless of their disabilities, have equal access. The Office of Continuing Medical Education of the University of Virginia School of Medicine is pleased to assist participants with special needs. **Requests need to be made in writing and sent to the Office of Continuing Medical Education, Box 800711, 6202 Hospital West, University of Virginia School of Medicine, Charlottesville, VA 22908-0711.**

in a new eight-story building with 597 beds and 30 bassinets. It has nearly 100 intensive care beds. A recent report by U.S. News and World Report listed the Neurosciences clinical program at UVA as among the best in the nation.

**Monticello** - Thomas Jefferson began construction on this architectural masterpiece in 1769 and continued for more than 40 years. He also designed the grounds of his "little mountain home." The roundabout walks, oval flowerbeds, vegetable gardens, vineyards, grove, and graveyard have been fully restored. (434) 984-9800, Hours 9-5. Fee.

**Michie Tavern Museum** - This famous tavern of the 1700's still serves meals in the "Ordinary," a converted log cabin used 200 years ago. Guests enjoy food of the colonial times and can tour the Tavern, outbuildings, general store, and Meadow Run Grist Mill. The general store sells handcrafts and antiques of Virginia. (434) 977-1234, Hours 9-5. Fee.

**Ash Lawn** - Home of President James Monroe, Ash Lawn is a 550-acre historic estate and has been almost fully restored as a working plantation. Special events at Ash Lawn include operas, concerts, and festivals. (434) 293-8000, Hours: 9-6. Fee.

**Wineries** - There are many local wineries that offer tours, wine tastings and sales. Ask us for further information.

**Skyline Drive/Blue Ridge Parkway** - Enjoy the beauty of the Blue Ridge Mountains, scenic overlooks, exhibits, and hiking trails. Located 25 miles west of Charlottesville with easy access via I-64.

For more information about Charlottesville and its surrounding area, visit: <http://www.charlottesville.org/> and <http://www.pursuecharlottesville.com/>

## Other Information

### Disclosure of faculty financial affiliations

The University of Virginia School of Medicine, as an ACCME accredited provider, endorses and strives to comply with the Accreditation Council for Continuing Medical Education (ACCME), Standards of Commercial Support, Commonwealth of Virginia statutes, University of Virginia policies and procedures, and associated federal and private regulations and guidelines on the need for disclosure and monitoring of property and financial interests that may affect the scientific integrity and balance of content delivered in continuing medical education activities under our auspices. The University of Virginia School of Medicine requires that all CME activities accredited through this institution be developed independently and be scientifically rigorous, balanced and objective in the presentation/discussion of its content,