

出國報告（出國類別：開會）

2011 CyberKnife Rototomic Radiosurgery Summit

2011 年電腦刀放射手術高峰會

服務機關：國防醫學院三軍總醫院

姓名職稱：洪東源主治醫師

派赴國家：美國

報告日期：100年2月17日

出國時間：100年2月09日至100年2月14日

摘要:

2011 年電腦刀放射手術高峰會 (2011 CyberKnife Rototic Radiosurgery Summit) 是全球最大型電腦刀國際會議，於 2011 年 2 月 10 日至 12 日在美國舊金山 舉行，邀請了世界各國的醫師演講最新的電腦刀放射手術進展。非常感謝國防部准予公假，身為軍醫出國開會總懷著一份使命感，希望能增廣見聞且發表三軍總醫院在電腦刀方面的臨床成果與研究進展，與國外電腦刀放射手術領域之專家交換心得。

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壹、參加目的:

電腦刀是以病人為中心所開發出的先進治療方式，本院電腦刀放射手術獲得國家生技品質獎，這項成果提高了三軍總醫院在國內醫學中心之地位，也成為國內各電腦刀放射手術中心的標竿；我們更進一步參加這一年一度在美國舉行的電腦刀使用者會議，以了解全世界最先進的電腦刀發展趨勢，包括每年最新開發的技術，得以精進治療技術。

貳、會議過程

來自十二個國家的 325 位電腦刀使用者參加此次會議，有 133 篇投稿，其中 45 篇臨床研究口頭報告、16 篇技術研究口頭報告及 59 篇研究海報報告。三軍總醫院電腦刀中心在這次會議也嶄露頭角，肝癌治療數目是全球第三名記錄。全球 200 多台電腦刀、超過 100,000 人接受電腦刀治療、500 多篇文章發表，亞洲地區台灣 5 台、中國大陸有 6 台、日本有 22 台、韓國 8 台。應用於治療肝癌、頭頸癌、胰臟癌、攝護腺癌、肺癌、脊椎病灶、顱內病灶及新開發的治療包括乳癌、子宮頸癌等。會議第一天 2/10 議程下午一點開始，主要是由佛羅里達州電腦刀放射手術聯盟主導發起討論及分享如何開闢電腦刀需求：面臨何種困難以及解決的方案；在開闢電腦刀市場方面：美國人態度與我們台灣在開闢電腦刀市場方式較接近，積極主動。法國及加拿大在開闢電腦刀需求方面與其政府給付制度有關，則偏向保守。值得關注的是立體定位身體放射手術，不容小覷的是乳癌佔女性腫瘤的大宗，這是開發中的大領域。

參、會議心得:

該會議除了學術研究角度，也致力於新穎治療技術開發的推廣，著名的首推可與隨著病人呼吸而調整的 synchrony 同步追蹤病灶，使得病人不必閉氣等待放射源照射，大大提高了病人舒適度，精準治療病灶，減少放射線合併症，不必等待閉氣時間，使治療時間縮短，讓醫院的儀器每日為更多量的病人治療服務，相對提高醫院的營運績效。電

腦刀最大的優點是非侵入性的治療方式，因此不會對病人造成疼痛，也不須切開人身體皮膚，因此不需要麻醉，也不會流血。以腦部放射治療而言傳統治療取每星期一至五低劑量 200 cGy 放射治療，往往需費時長達 6 週時間才能累積達 6000 cGy，對於得癌的人奔波往返於醫院與家庭的相當折磨耗時甚至要有至少一位家屬陪伴；以電腦刀治療時則可在一週內寡分次完成 1-2 Gy 治療。

肆、建議事項

感謝國防部核予公假前往美國進行學術交流與學習，開拓國際觀與增廣見聞。此次會議發現三軍總醫院在肝癌的臨床治療數量達全球第三名且是會場唯一提出基礎研究報告者，與其他國外醫學中心相較，本院在電腦刀朱大同主任領軍與放射腫瘤部共同努力下，已創造出高水準的臨床服務成效，未來電腦刀放射手術需要臨床各科與放射腫瘤合作治療。建議將來有志於腫瘤治療研究的醫師，可以參加此新穎放射電腦刀會議吸收更多腫瘤治療最新知識及參與國際合作。

伍、參加此會議對單位之貢獻

在這次2011年電腦刀放射手術高峰會中，本人提出的三篇論文研究成果報告，提昇三軍總醫院國際知名度；結識了美國、荷蘭、法國、加拿大等國的電腦刀放射手術醫師，有機會促進日後合作機會，並帶回最嶄新的電腦刀放射手術臨床研究新知，有助於提昇三軍總醫院未來電腦刀放射手術的研究；在院內電腦刀放射手術會議報告最新神經腫瘤新知，提昇同儕的醫學新知。

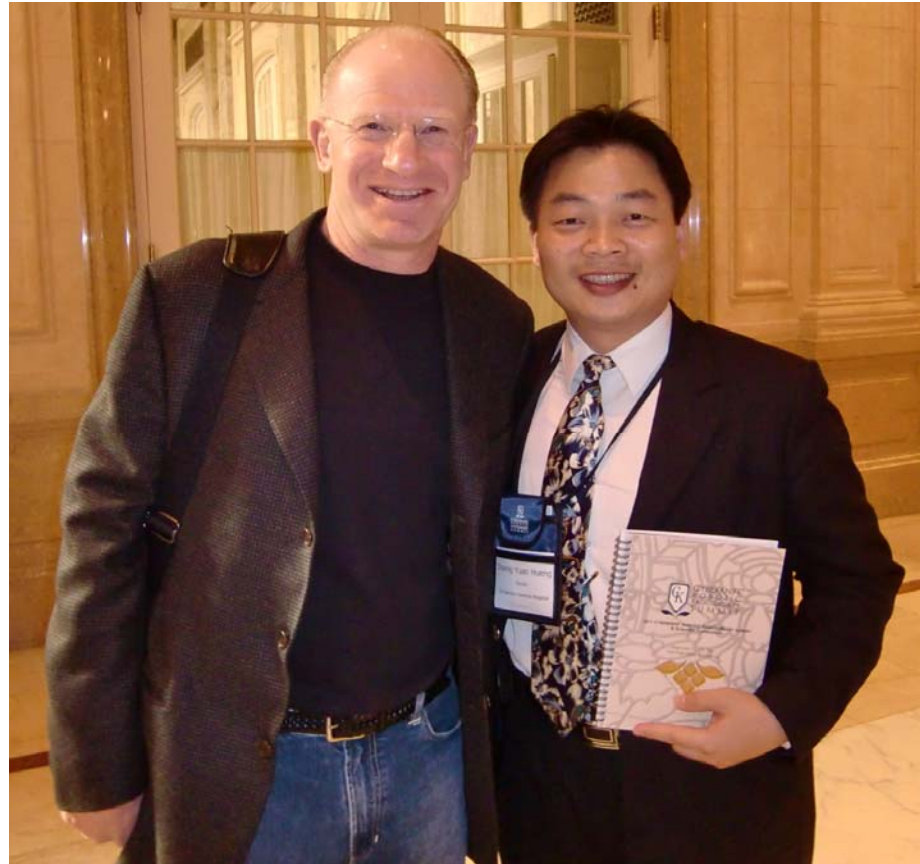
陸、附件資料

2011年電腦刀放射手術高峰會後報告--2011年2月17日於404會議室

Post 2011 CyberKnife Robotic Radiosurgery SUMMIT report

2011年電腦刀放射手術高峰會後報告

電腦刀發明人
John Adler



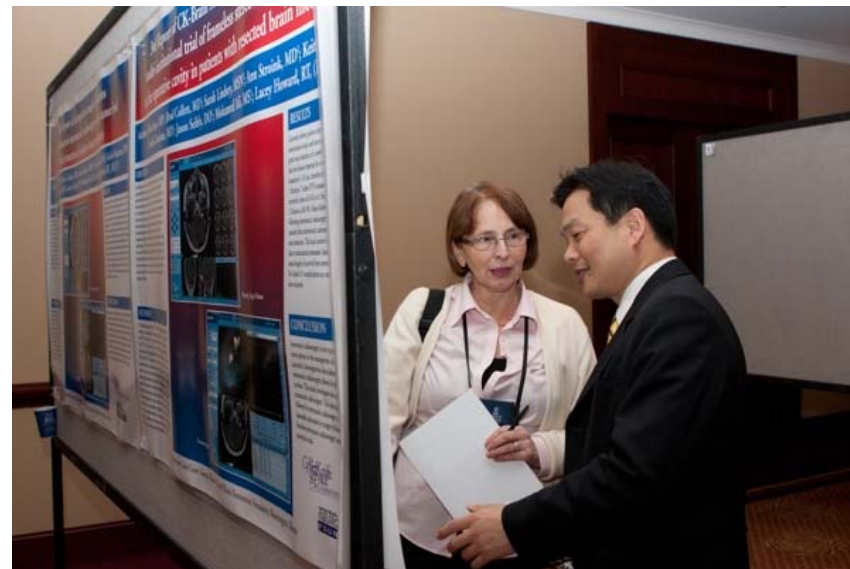
報告者：神經外科 洪東源 醫師

Supervisor：電腦刀立體定位放射手術中心 朱大同主任

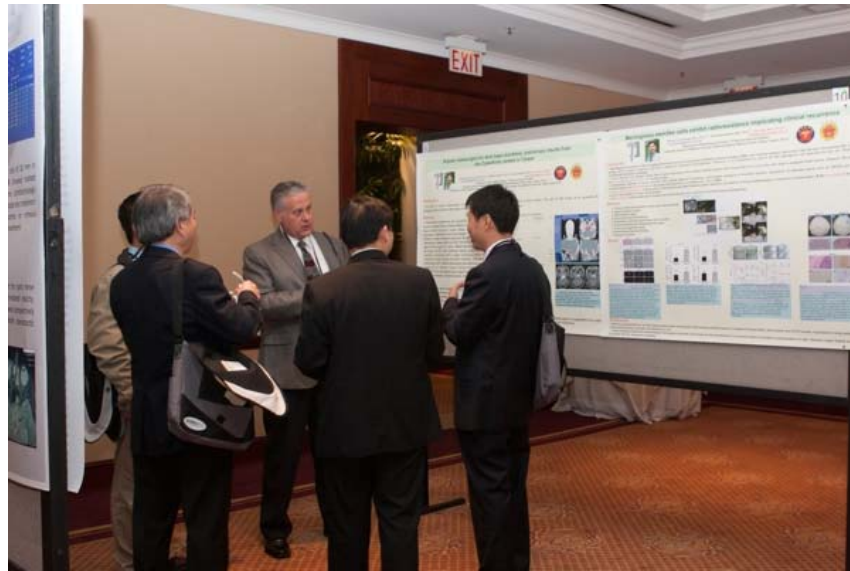
報告日期：100年2月17日



電腦刀放射手術會議海報展



電腦刀放射手術會議



電腦刀歷史

Founded	1992
Product	The CyberKnife® Robotic Radiosurgery System
FDA Market Clearance	1999, 2001
IPO	2007
Headquarters	Sunnyvale, CA
International Offices	Paris, Tokyo, Hong Kong

75+ issued patents

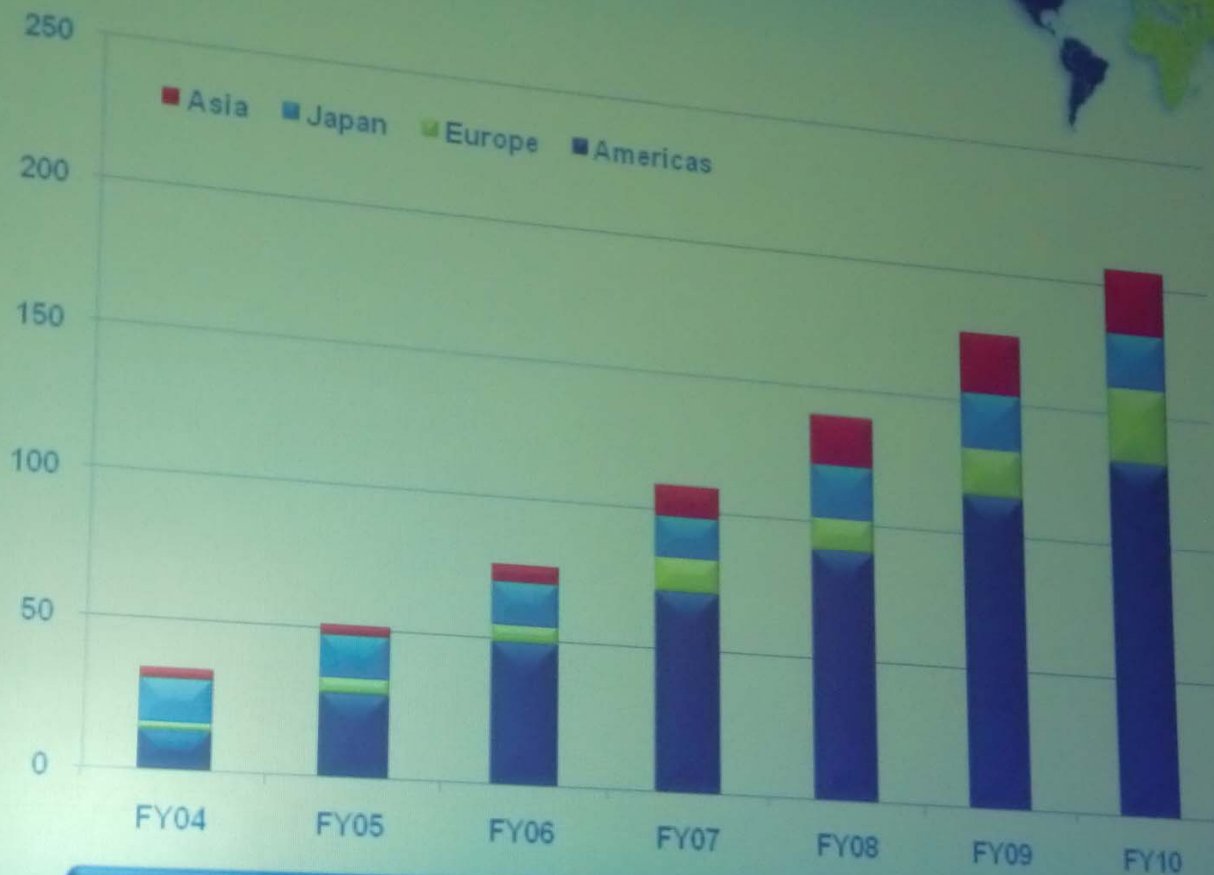
500+ publications

200+ systems installed

100,000+ patients treated

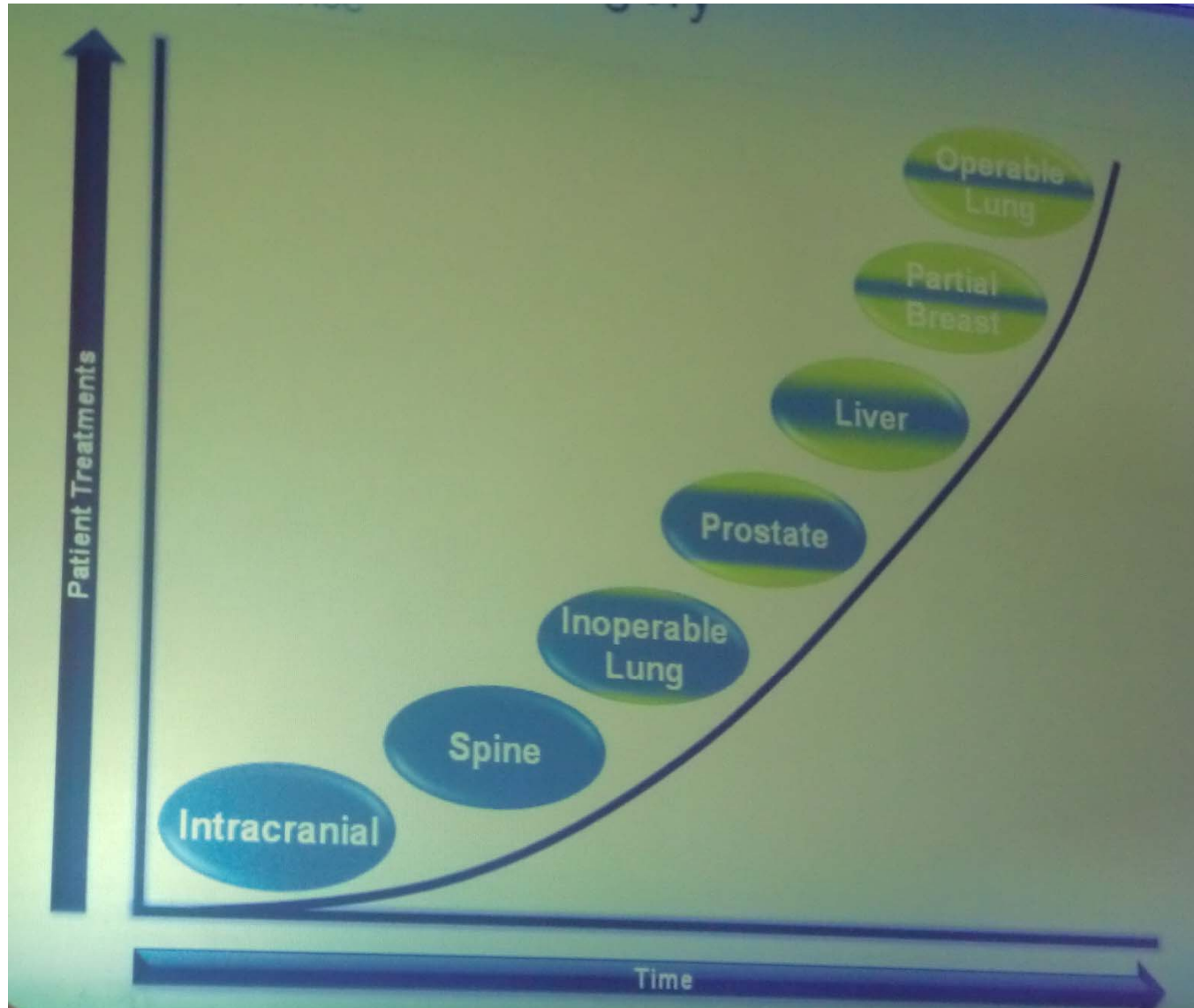
Corporate Development

Worldwide CyberKnife® Installed Base



YTD: 222 CyberKnife® Systems Installed Worldwide*

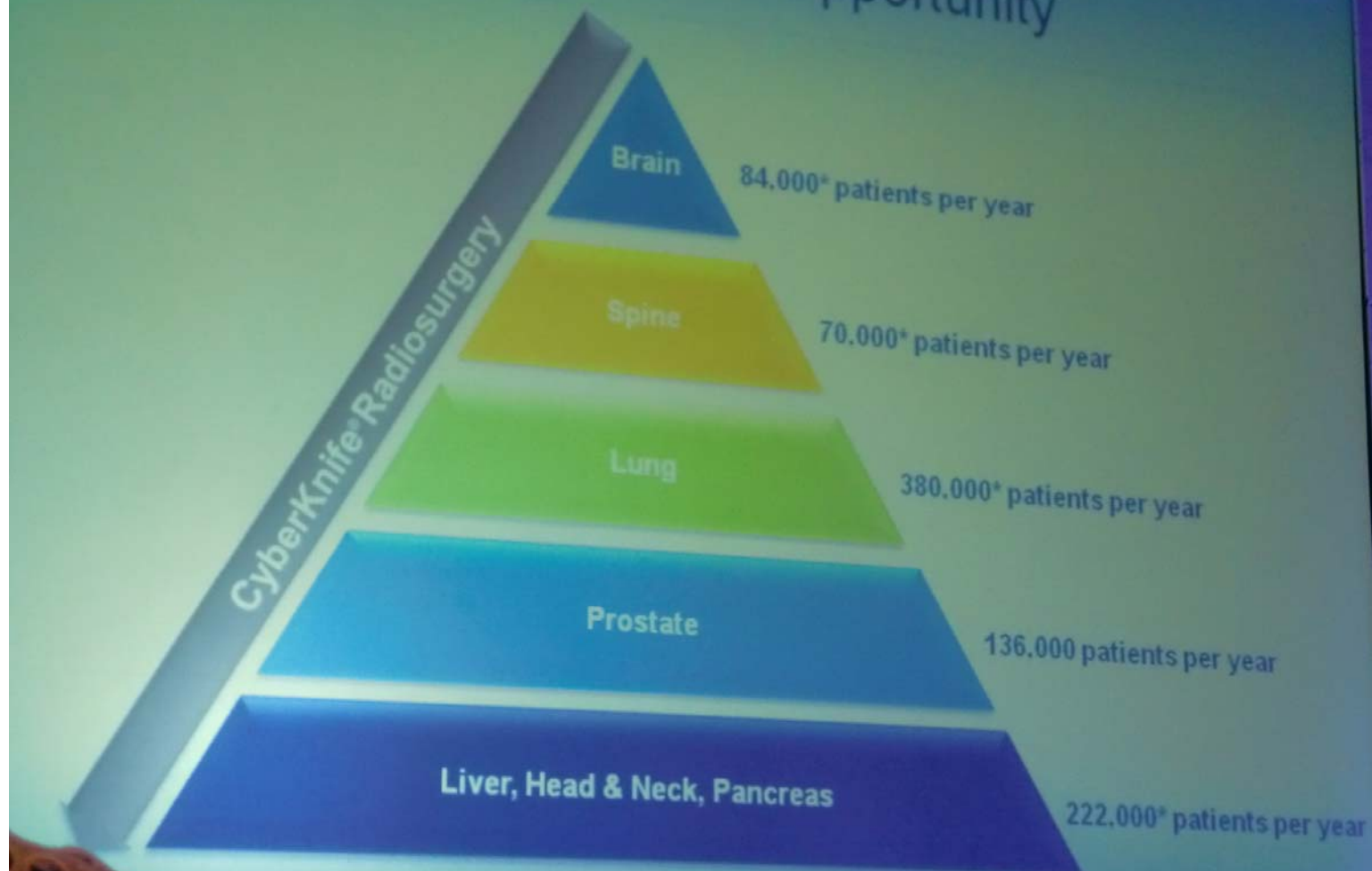
CyberKnife Radiosurgery



Other Important Recent Developments

- **LOT launched**
 - Fiducial free lung treatments
 - Reinforces continued innovation
- **5 Year Prostate Publication**
 - "Leading edge" of data
 - Comparable with surgery
- **Establish Medical Affairs Department**
 - Led by Dr. Omar Dawood
 - Non-commercial group
- **New Chief Marketing Officer**
 - Eric Pauwels
 - Bio-pharmaceutical background (more than 20 brands launched)

CyberKnife® US Market Opportunity

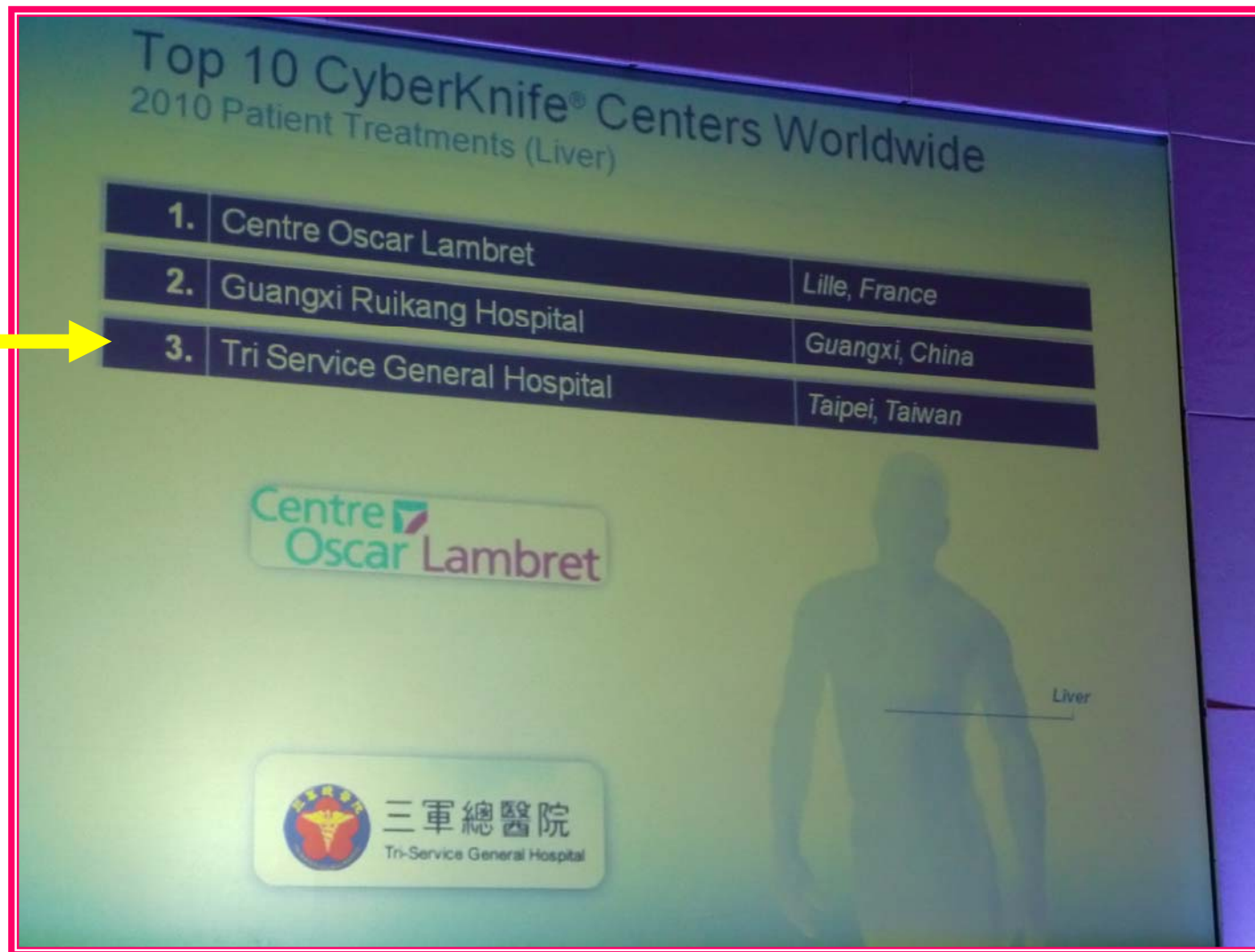


Treatable subset based on annual incidence data reported by the American Cancer Society and collected from published literature

*primary and metastatic

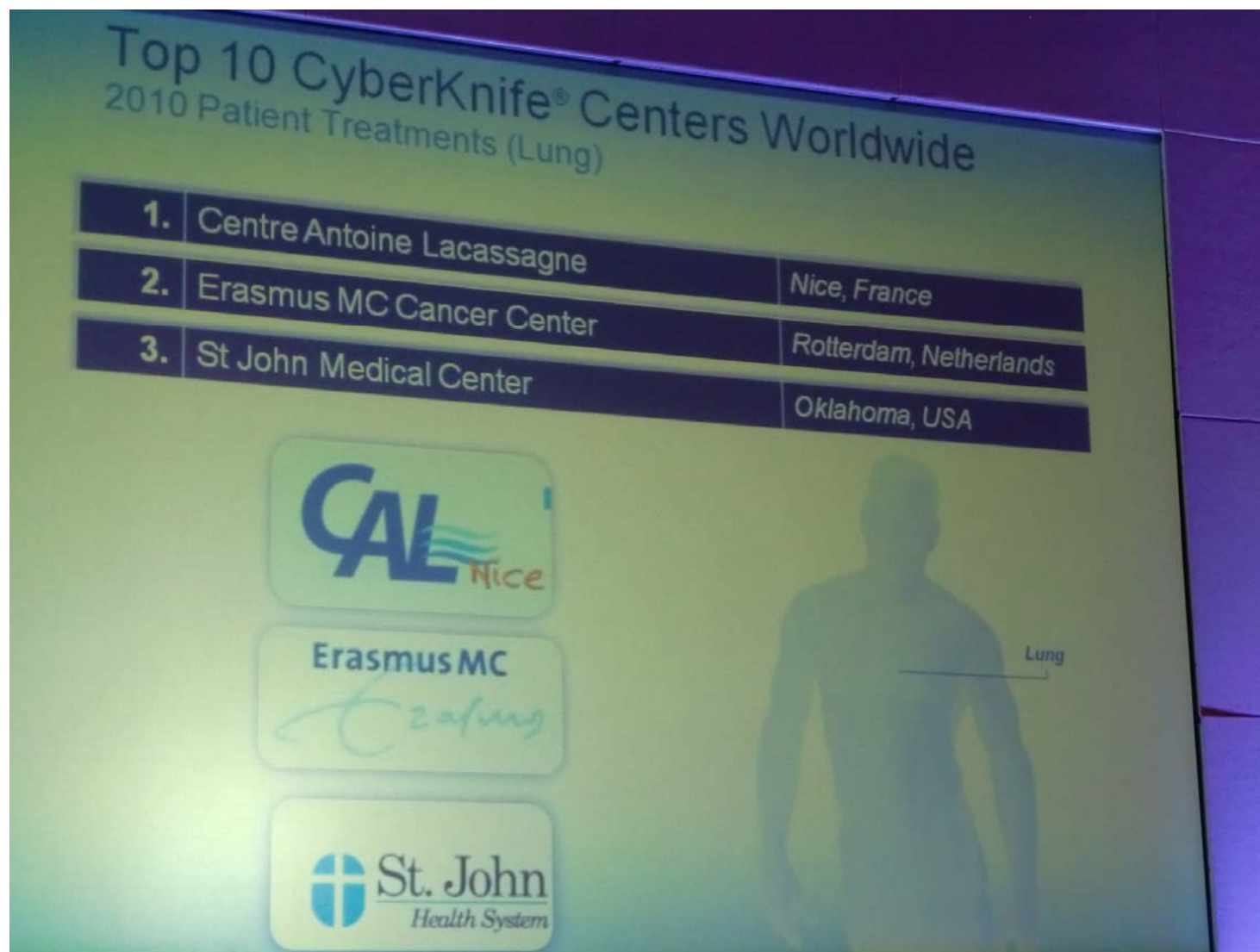
全世界前10名電腦刀中心治療肝癌排行榜

三軍總醫院第3名



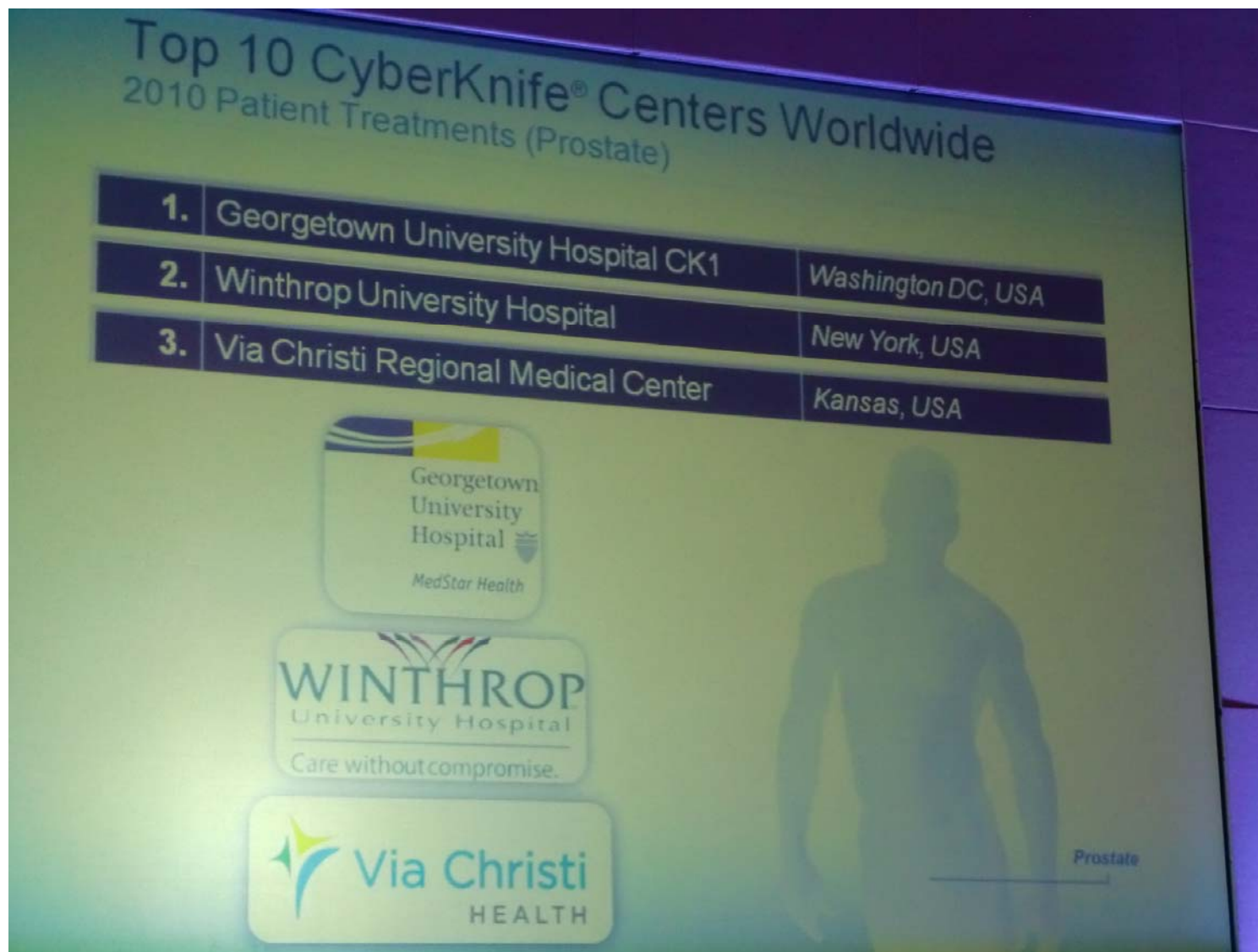
全世界前10名電腦刀中心治療肺癌排行榜

前3名：法國 荷蘭 美國



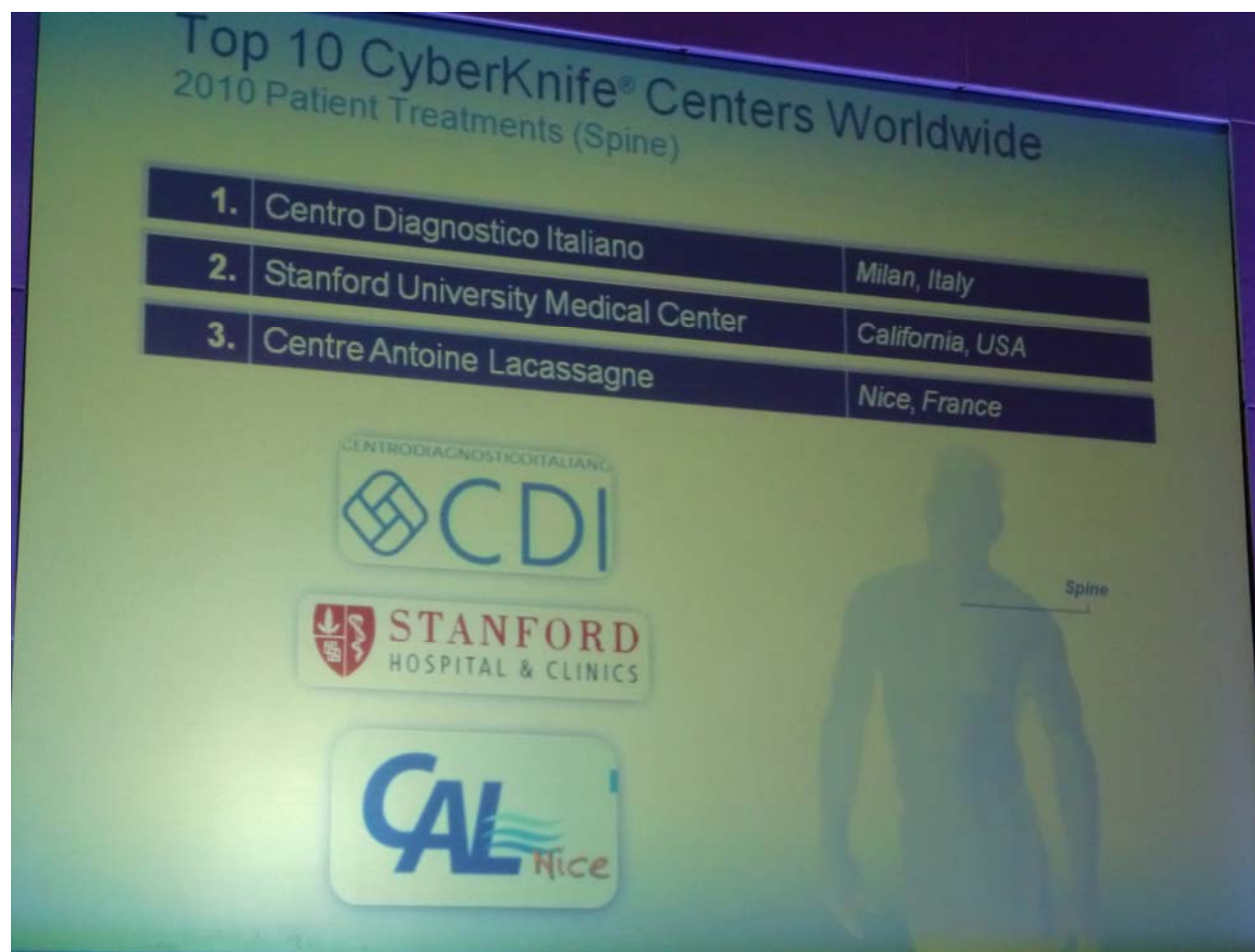
全世界前10名電腦刀中心治療攝護腺癌排行榜

前3名：美國



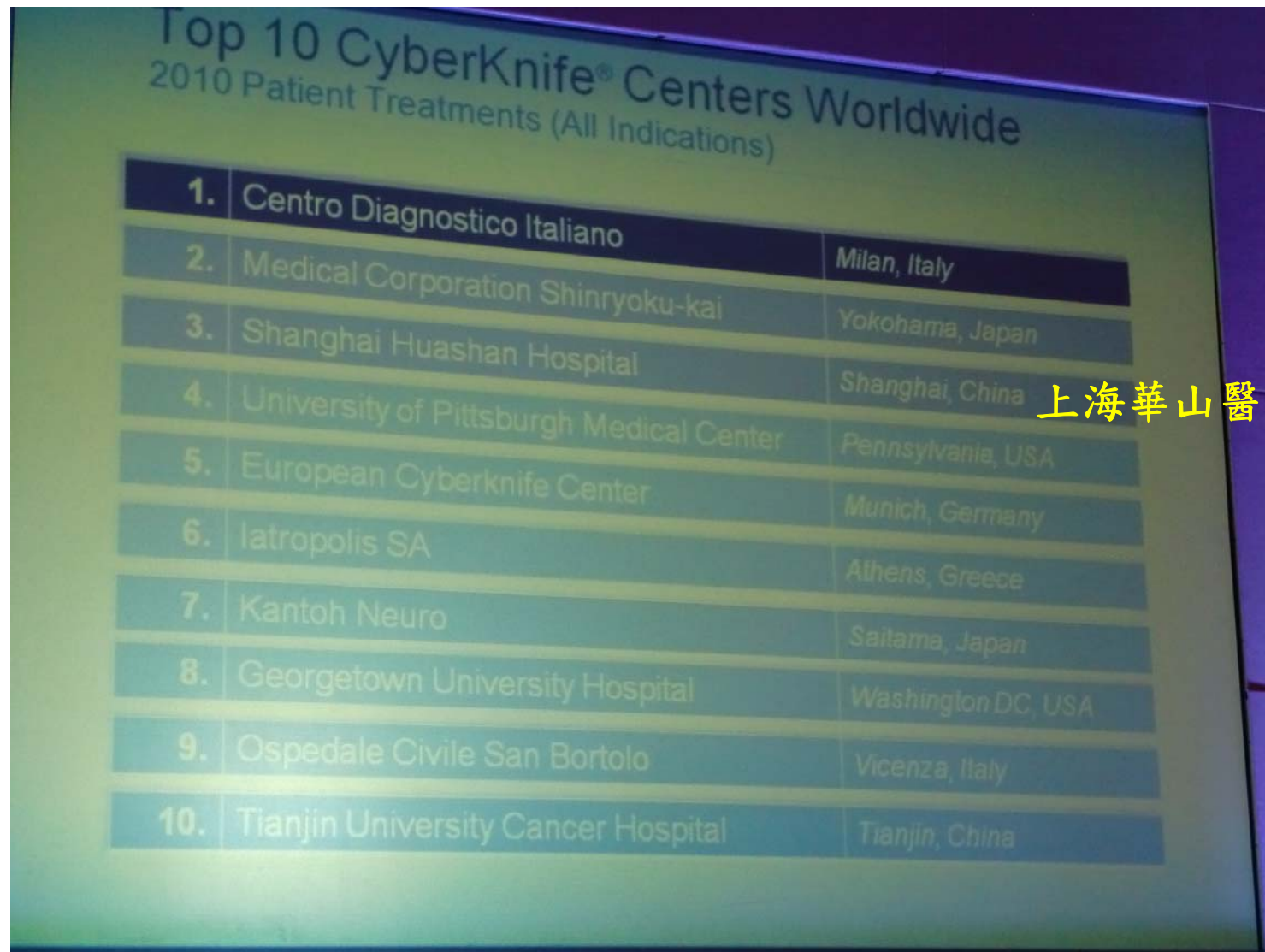
全世界前10名電腦刀中心治療spine排行榜

前3名：義大利 美國 法國



全世界前10名電腦刀中心治療總數排行榜

前3名：義大利 日本 中國



1.	Centro Diagnostico Italiano	Milan, Italy
2.	Medical Corporation Shinryoku-kai	Yokohama, Japan
3.	Shanghai Huashan Hospital	Shanghai, China
4.	University of Pittsburgh Medical Center	Pennsylvania, USA
5.	European Cyberknife Center	Munich, Germany
6.	Iatropolis SA	Athens, Greece
7.	Kantoh Neuro	Saitama, Japan
8.	Georgetown University Hospital	Washington DC, USA
9.	Ospedale Civile San Bortolo	Vicenza, Italy
10.	Tianjin University Cancer Hospital	Tianjin, China

上海華山醫院



Expanding in Your Local Market

Mark Frank
CAO, Denver CyberKnife

February 10, 2011

Where are the lung tumors?

- Of first 75 patient cases treated, only 4 were lung tumors (5.3%)
- What had been done:
 - Meetings and demonstrations with 10+ pulmonologists and 6 thoracic surgeons
 - Dinners and speaking event with key doctors in area
 - Presentations at lung tumor boards
- Assessment - what was really happening
- How we worked to fix the situation
 - Heavy explanation and education on clinical studies of inoperable NSCLC, comparing results of RTOG 0236 vs. Netherlands CK study
 - Continued pressure on referring physicians

Zero referrals from med oncs...

CYBERKNIFE
CKC
COALITION

- One integrated oncology organization in metro Denver employs ~75% of all medical oncologists
 - Additional 15% employed or strongly partnered with one of major hospital systems
- "Bread and butter" CyberKnife patients were not getting access to this treatment option
- Also affected surgeon referrals, due to pressure not to send outside of the integrated oncology organization
- Possible solutions?
 - Collaboration with surgeons to form CyberKnife tumor boards
 - Joint marketing ventures to build referral stream not dependent on med oncs
 - Continued education to med oncs of CyberKnife benefits over other systems

CyberKnife radiosurgery treatment field

- **Intracranial**
- **Spinal**
- **Body**
- **Marketing**

Intracranial CyberKnife

- **CyberKnife in elderly good performance GBM**
- **Post-op boost CKS in brain mets**
- **CyberKnife in Vestibular Schwannoma:**

Intracranial CyberKnife

- **CyberKnife in elderly good performance GBM:**
 - Shorten the radiotherapy duration in 5 fractions
 - Age > 65 yo, KPS > 70
 - Outcome as good as conventional radiotherapy
- **CyberKnife in Vestibular Schwannoma:**
 - 18 Gy/ 3 fractions (Stanford)

CyberKnife Stereotactic Radiosurgery for Organ-confined Prostate Cancer: Early Toxicity, PSA & Quality of Life Outcomes from a Multi-Institutional Study

Robert Meier, MD

Swedish Cancer Institute & Seattle Prostate Institute, Seattle WA

A. Beckman², I. Kaplan³, N. Mohideen⁴, E. Shieh⁵,
G. Henning⁶, B. Walz⁷, C. Cotrutz¹, M. Sanda³

²*Central Baptist Hospital, Lexington, KY*

³*Beth Israel Deaconess Medical Center, Boston, MA*

⁴*Northwest Community Hospital, Arlington Heights, IL*

⁵*Jupiter Medical Center, Jupiter, FL*

⁶*St. Joseph Mercy Hospital, Ypsilanti, MI*

⁷*St. Louis University, St. Louis, MO*

SRS for Prostate CA: Conclusions

- In this multi-center SRS study, CyberKnife delivered a very high biologic dose ($BED_{\alpha/\beta=2} = 200 \text{ Gy}$) in 5 fractions
- Rates of acute toxicity are acceptable
- With limited follow-up, rates of late toxicity appear acceptable.
- With limited follow-up, QOL for urinary, bowel and sexual function appear favorable compared to other radiotherapy modalities.
- Initial PSA responses are encouraging, but longer follow up is needed to assess durable responses.

CONCLUSIONS

- Excellent results for hypofractionated SBRT
- Doesn't appear necessary to increase the total dose beyond 35 Gy, at least for low- to low-intermediate-risk patients.

Stereotactic Radiotherapy for Low Risk Prostate Cancer: Five year outcomes

Debra Freeman, MD – Naples
Christopher King, MD, PhD - Stanford

Summary

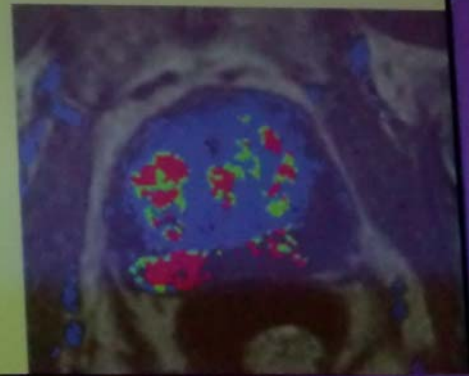
- Five-year results of SBRT for localized prostate cancer demonstrate the efficacy and safety of shorter courses of high dose per fraction radiation delivered with SBRT technique.
- Ongoing clinical trials are underway to further explore this treatment approach.

CyberKnife Robotic Radiosurgery Summit 2011

Use of Dynamic Contrast-Enhanced MRI of Prostate Cancer to Assess Response to CyberKnife Robotic Stereotactic Body Radiotherapy - 2 Year Follow Up

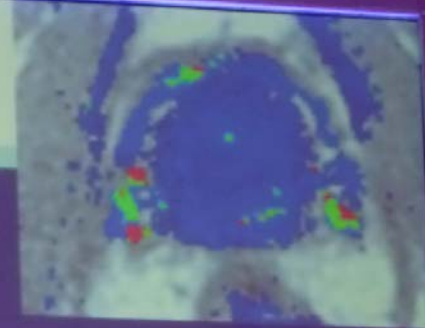
Russell N. Low, MD
Donald B. Fuller, MD
Naira Muradyan, PhD

February 10 – 12, 2011





Conclusions



- Dynamic contrast-enhanced MRI effectively evaluates prostate cancer before and following CyberKnife Radiotherapy.
- Changes in tumor permeability are a better indicator of tumor response to CyberKnife than is the morphologic assessment of tumor size on T2 images

Radical CyberKnife Radiosurgery for Primary Malignant and Metastatic Vertebral Body Tumors: Report of Local Control + Toxicity

Beant Gill, BA

Department of Radiation Medicine
Georgetown University Hospital
Washington, DC



SRS Cavity Boost - Conclusion

- Effective local control
 - Alternative to post-operative WBI, with higher risk of distant failure
- Technique–
 - GTV + 2mm margin better in our series
 - Optimal dose/fractionation unknown

Conclusions

- Largest series of SCIMs treated with CyberKnife
- Our patients had multiple other metastases, overall survival was poor, but ...
 - Treatment **preserved function**
 - There were **no local recurrences**
 - There was radiation **no toxicity**
 - **Fewer sessions** than conventional radiation
 - **Less morbidity** than open surgery
- **SRS a good option for intramedullary spinal cord metastases.**



Meeting abstract deadlines

Meeting Abstract Deadlines	
AAPM - American Association of Physics in Medicine	
Abstract Deadline:	March 7, 2011 (5pm ET)
Meeting Details:	July, 31 – August 4, 2011 in Vancouver, BC
Meeting Website:	http://www.aapm.org/meetings/2011AM
ASTRO – American Society for Radiation Oncology	
Abstract Deadline:	March 16, 2011 (11:59 pm EST)
Meeting Details:	October 2-6, 2011 in Miami Beach, FL
Meeting Website:	http://www.astro.org/Meetings/AnnualMeetings/
CNS - Congress of Neurological Surgeons	
Abstract Deadline:	March 17, 2011
Meeting Details:	October 1-6, 2011 in Washington, DC
Meeting Website:	http://w3.cns.org/meetings/2011/index.asp