GammaTile Therapy
for
Patients with Recurrent Brain Tumors

Brian J Vetter, RSO

SERVICE ★ INTEGRITY
PROFESSIONALISM

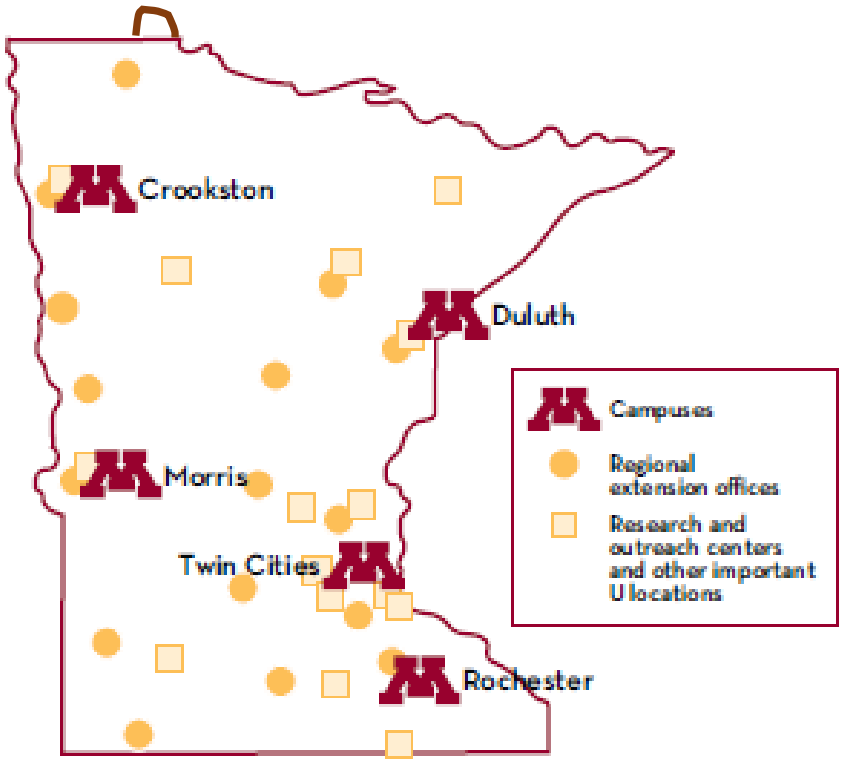
Organization of Agreement States

2019 Annual Meeting

Minneapolis, MN

University of Minnesota

- 5 Campuses
  - Twin Cities campus founded in 1851 – seven years before MN statehood
- 16 Extension offices
- 21 Research centers



University of Minnesota

- Medical license of broad scope issued by MN Dept. of Health
  - 2006 Agreement State
  - Medical Schools with teaching hospitals
  - Veterinary Medical School with teaching hospital
- License of broad scope issued by U.S. Nuclear Regulatory Commission

Therapeutic Radioactive Material Use

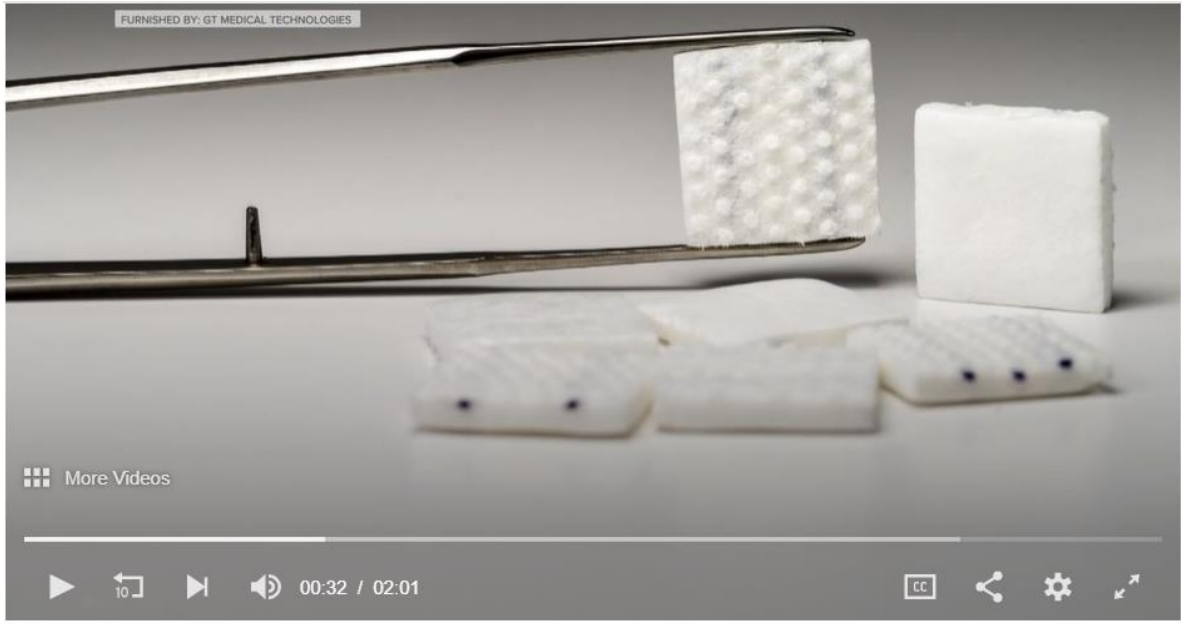
Radiation Oncology

- Gamma knife - Leksell ICON
- High dose-rate brachytherapy
- Low dose-rate brachytherapy
  - Prostate
  - Eye plaque
  - GammaTile

Nuclear Medicine

- Radioiodine, I-131
  - Thyroid: NaI
  - Neuroblastoma: mIBG
- Lutathera, Lu-177
- Xofigo, Ra-223
- Microsphere, Y-90
  - SIR-Spheres
  - TheraSphere

GammaTile Therapy

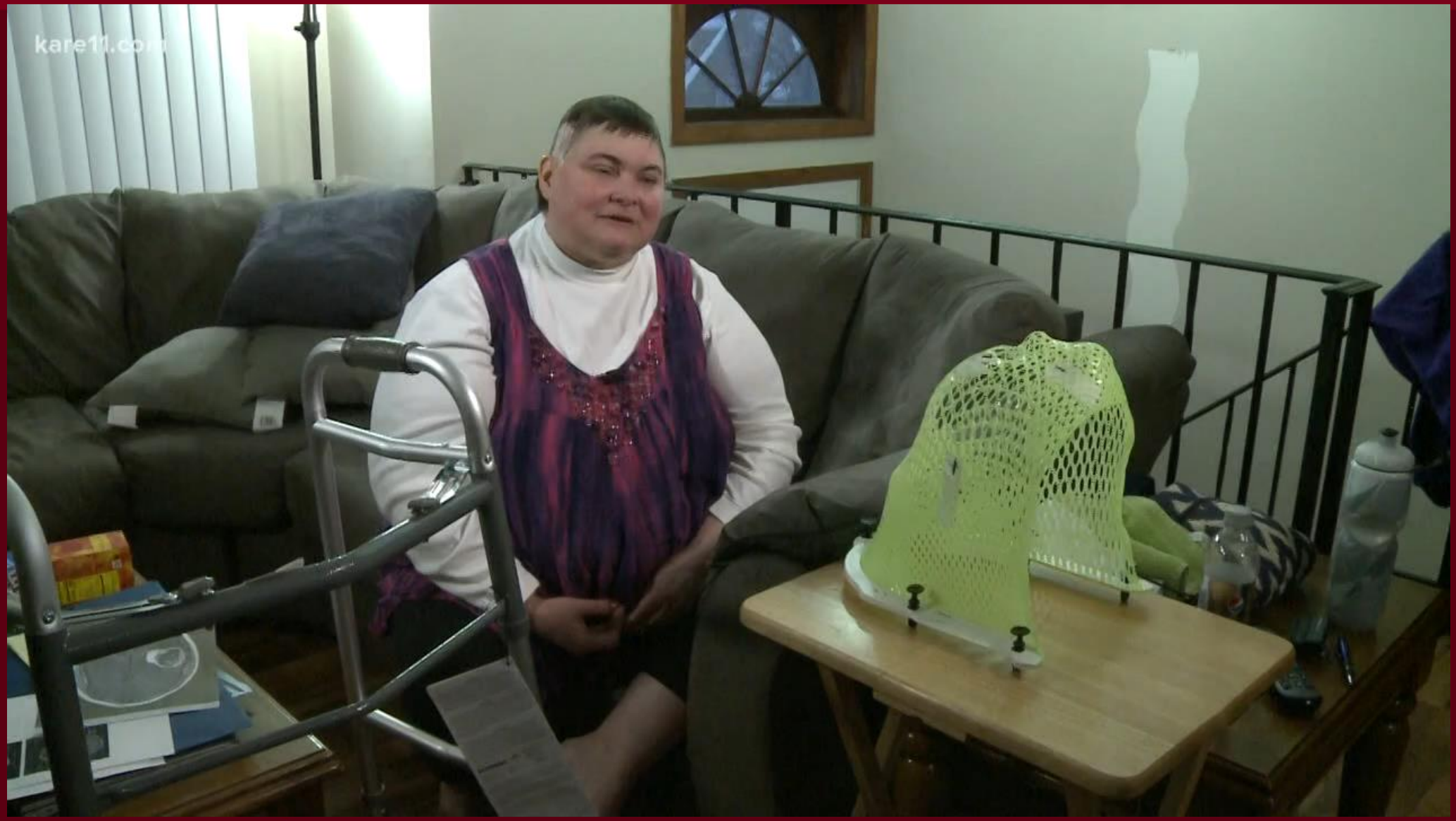


NEWS

Video: KARE 11

New brain cancer treatment at the University of Minnesota

Doctors at the University of Minnesota are the first in the country to use a breakthrough brain cancer treatment.

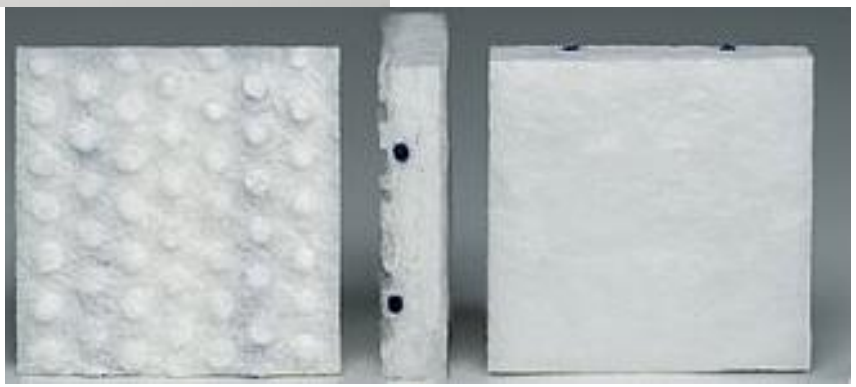

kare11.com

GammaTile Therapy

- Cs-131 seeds
  - Platinum encapsulated
  - 4.5 mm x 0.8 mm
  - Half-Life: 9.7 days
  - Average energy: 30.4 keV
  - ~ 82.5 MBq (2.2 mCi) per seed

GT Medical TECHNOLOGIES

- Tile
  - Four seeds embedded in collagen
  - 1 cm inter-seed distance
  - Surface area of each tile: 2 x 2 cm^2
  - 3 mm distance from brain tissue



GammaTile Therapy

License considerations

- ✓ Isotope authorization and possession limit compliance
- ✓ Authorized User(s) credentialed and trained
  - Written directive modification
- ✓ Authorized Medical Physicist(s) credentialed and trained
- ✓ Patient care staff trained
  - Operating Room, Post-anesthesia, Neuro Intensive Care, Patient care unit, Physical Therapy
- ✓ Patient release criteria
  - Maximally exposed care-giver, patient instruction, duration of restrictions

GammaTile Therapy

License considerations

- ✓Patient release criteria

$$D(\infty) = \frac{34.6\ \Gamma\ Q_0\ T_p\ (0.25)}{(100\ cm)^2}$$

MINNESOTA MDH DEPARTMENT OF HEALTH

GammaTile Therapy

THE RADIATION SAFETY JOURNAL
HEALTH PHYSICS

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Operational Topic

The use of ^{131}Cs brachytherapy for the treatment of brain tumors is safe and effective; therefore, the radiation exposure data are critically important, providing practical information for the practitioners utilizing this technique.

Radiation Exposure and Safety Precautions Following ^{131}Cs Brachytherapy in Patients with Brain Tumors

Menachem Z. Yondorf, Theodore H. Schwartz,† John A. Boockvar,† Susan Pannullo,† Philip Stieg,† Albert Sabbas,* Albert Pavese,* Samuel Trichter,* Lucy Nedialkova,* Bhupesh Parashar,* Dattatreyudu Nori,* K.S. Clifford Chao,* and A. Gabriella Wernicke*†*

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Conflict of interest: none
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(Manuscript accepted 28 April 2016)

Abstract: *Cesium-131 (^{131}Cs) brachytherapy is a safe and convenient treatment option for patients with resected brain tumors. This study prospectively analyzes radiation exposure in the patient population who were treated with a maximally safe neurosurgical resection and ^{131}Cs brachytherapy. Following implantation, radiation dose rate measurements were taken at the surface, 35 cm, and 100 cm distances. Using the half-life of ^{131}Cs (9.69 d), the dose rates were extrapolated at these distances over a period of time (t = 30 d). Data from dosimetry badges and rings worn by surgeons and radiation oncologists were collected and analyzed. Postoperatively, median dose rate was 0.2475 mSv h^{-1}, 0.01 mSv h^{-1}, and 0.001 mSv h^{-1} and at 30 d post-implant, 0.0298 mSv h^{-1}, 0.0012 mSv h^{-1}, and 0.0001 mSv h^{-1} at the surface, 35 cm, and 100 cm, respectively. All but one badge and ring measured a dose equivalent corresponding to rates of 0.1475 mSv h^{-1} and 0.5565 mSv h^{-1}, respectively (p = 0.0015). Using National Council on Radiation Protection guidelines, this study shows that dose equivalent from permanent ^{131}Cs brachytherapy for the treatment of brain tumors is limited, and it maintains safe levels of exposure to family and medical personnel. Such information is critical knowledge for the neurosurgeons, radiation oncologists, nurses, hospital staff, and family as this method is gaining nationwide popularity. Health Phys. 112(4):403–408; 2017.*

Key words: *operational topics; exposure, radiation; Cesium; brachytherapy; cancer, dose*

INTRODUCTION

Permanent brachytherapy seed implants have been used for treatment of tumors of the brain KeV. This relatively long half-life makes it convenient for storage and its low energy requires limited shielding. However, this half-life also causes the dosage to be delivered over a longer period of time which is not only suboptimal in terms of controlling the tumor but also renders increased exposure to medical personnel and families of the patient.

Cesium-131 (^{131}Cs) radioactive isotope (IsoRay Medical, 350 Hills St # 106, Richland, WA) has been introduced into clinical practice for permanent seed implant for cancer after its clearance by

GammaTile Therapy

Time-consuming challenges (Wait… What?! When?!)

- Establishing a purchasing agreement
- Just-in-time training for patient care staff
- License condition review

Satisfying conditions and outcomes

- Patient health
- Relationship with regulatory authority
- First call for help from medical staff

Thank you!