GammaTile Therapy for Patients with Recurrent Brain Tumors

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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
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

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.
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

- Tile
  - Four seeds embedded in collagen
  - 1 cm inter-seed distance
  - Surface area of each tile: 2 x 2 cm²
  - 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 MedicalPhysicist(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

\[ D(\infty) = \frac{34.6 \, T}{Q_o \, T_p \, (0.25) \, (100 \, \text{cm})^2} \]
GammaTile Therapy

The Radiation Safety Journal

Health Physics

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Operational Topic

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

Menachem Z. Yonkof, * Theodore H. Schwartz, † John A. Boockvar, † Susan Pannullo, † Philip Sherg, † Albert Sabbas, † Albert Pavese, † Samuel Trichter, † Lucy Nedialkova, † Bhupesh Panthani, † Dattatreyudu Nori, † K.S. Clifford Chao, * and A. Gabriella Wernike-Koë‡

Abstract: Cesium-131 ($^{131}$Cs) brachytherapy is a safe and convenient treatment option for patients with select brain tumors. This study prospectively analyzed radiation exposure in the patient population who were treated with a maximally safe non-surgical 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 (8.09 d), the dose rate was extrapolated at these distances over a period of time (t = 30 d). Data from electroencephylographic and transcranial magnetic stimulation studies were collected and analyzed. Prospective, median dose rate of 0.247 mSv/h at 35 cm, 0.01 mSv/h, and 0.001 mSv/h at 100 cm, respectively. All but one patient received a dose equivalent to the skin of 0.147 mSv/h and 0.585 mSv/h, respectively. 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 families as this method is gaining in popularity. Health Phys., 122(4):403-408; 2017.

Key words: operational topic; exposure; radiation; Cesium; Brachytherapy; cancer; dose

INTRODUCTION

Permanent brachytherapy seed implants have been used for treatment of tumors of the brain and 100 cm, respectively. All but one patient received a dose equivalent to the skin of 0.147 mSv/h and 0.585 mSv/h, respectively. 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 families as this method is gaining in popularity. Health Phys., 122(4):403-408; 2017.

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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!