Radioactive Bone Cement

Tech ID: 34652 / UC Case 2009-550-0

BRIEF DESCRIPTION

The core innovation is a dosimetry-driven approach that determines the activity concentration of a radioisotope based on the distance between the cement surface and the target tissue, enabling predictable, volume-independent radiation dosing.

SUGGESTED USES

- Targeted Treatment of Bone Tumors
- Augmenting Vertebroplasty / Kyphoplasty with Therapeutic Radiation
- Radiation Delivery in Anatomically Constrained Areas
- Post-Curettage Adjuvant Therapy
- Palliative Treatment for Painful Bone Metastases
- Multi-Isotope Therapy for Optimized Dose Profiles
- Software-Driven Personalized Dosimetry
- Radiation-Sparing Applications
- Gamma-Attenuated Cement for Deep or Irregular Targets
- Standardized, Volume-Independent Brachytherapy

ADVANTAGES

- **Predictable, Geometry-Driven Radiation Dosing:** Eliminates one of the biggest uncertainties in cement-based brachytherapy.
- **Superior Protection of Healthy Tissue:** Built-in safety mechanism that minimizes radiation to spinal cord, nerves, and other critical structures.
- **Seamless Integration Into Existing Orthopedic Procedures:** No new surgical tools or complex training required; easy adoption in vertebroplasty, kyphoplasty, and tumor curettage.
- **Personalized, Software-Driven Treatment Planning:** Enables standardized, clinician-friendly planning tools that support personalized therapy and reduce operator variability.
- **Flexible Isotope Selection and Dose Shaping:** Tailors penetration depth, dose rate, and duration to tumor biology and anatomical constraints.
- **Volume-Independent Dose Distribution:** Reliable therapy even when cement distribution is irregular or unpredictable in cancellous bone.
- **Built-In Radiation-Sparing Algorithms:** Reduces toxicity and expands eligibility for patients with tumors near sensitive structures.
- **Enables Combined Structural + Radiotherapeutic Treatment:** Single-procedure treatment for painful or unstable metastatic lesions.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Radioactive bone cement, Brachytherapy, Internal radiation therapy, Distance-based dosimetry, Activity concentration, Matrix-based radiation delivery, Bone tumor treatment, Targeted radiation

CATEGORIZED AS

- **Medical**
  - Delivery Systems
  - Devices
  - Disease: Cancer

» **Expands Brachytherapy to Previously Inaccessible Sites:** Opens new therapeutic territory in spine oncology and orthopedic oncology.

» **Supports Multi-Phase Treatment Through Half-Life Engineering:** Optimizes tumor control without repeated interventions.

» Disease: Musculoskeletal Disorders

» Therapeutics

RELATED CASES

2009-550-0

FULL DESCRIPTION

This invention introduces a breakthrough approach to internal radiation therapy by transforming bone cement into a precision-controlled brachytherapy source, where radiation dose is determined not by cement volume but by the measured distance between the cement surface and the target tissue. By mixing beta- or gamma-emitting isotopes into a matrix engineered to attenuate emissions so that therapeutic radiation originates only from a thin layer near the surface, clinicians can deliver predictable, patient-specific doses while sparing nearby healthy structures. The platform supports single or multi-isotope formulations, integrates seamlessly with vertebral and orthopedic workflows, and enables software-driven, distance-based dosimetry that standardizes treatment and expands the therapeutic potential of cement-based interventions.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,478,568	10/25/2022	2009-550
United States Of America	Issued Patent	10,272,173	04/30/2019	2009-550
United States Of America	Issued Patent	9,597,427	03/21/2017	2009-550
United States Of America	Issued Patent	9,198,989	12/01/2015	2009-550

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Device For Creating A Void Inside A Bone Using A Minamally Invasive Surgery

UCI Beall Applied Innovation

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