



Abstracts from the 37th Workshop FOCHOS 2019 - “Physics in human and environment protection”, organized by the BSBPE - Bulgarian Society of Biomedical Physics and Engineering

Intraoperative radiotherapy with balloon-based electronic brachytherapy system – First Bulgarian experience in breast cancer patients

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Introduction: Xoft® Axxent® Electronic Brachytherapy (eBx®) System® is balloon-based technique for intraoperative radiotherapy (IORT) that uses a tungsten target to generate low energy X-ray beam (50 kV, tube current 0.3 mA and half-value layer of 0.5 mmAl). This system is available in 11 countries around Europe and the published data regarding its application is very limited. We report the first results of IORT with this system in Bulgaria.

Material and Methods: This is a prospective case series of 12 early breast cancer patients fulfilling the GEC- ESTRO low risk group criteria for partial breast irradiation and treated with IORT at Alexandrovskaya University Hospital, Sofia, Bulgaria. For intraoperative evaluation (IOE) of resection margins, rapid frozen section examination was performed. For IOE of sentinel node, marked with 99mTc-MIBI, the College of American Pathologists protocol was followed.

Results: The median values of patients, tumors and irradiation characteristics are as follows: age 59.5 (55–73); tumor size -14.5 mm (8–24); balloon applicator size –47.5 cc (30–70); time of irradiation - 12.75 min (8.38–18.02); skin dose – 7.5 Gy (6–10). In all patients distance from the skin was more than 7 mm (7–11). No radiation-induced skin reactions were observed and the cosmetic results were excellent. With median follow up of 15 months no recurrence was observed.

Conclusions: Four hospitals in Bulgaria have Axxent® eBx®. We report the results of the center with biggest experience with this system. The small number of patients treated is due to the additional expenses for payment of the applicator’s price, which are not covered by the National Health Insurance Fund. The first Bulgarian results prove that this system is effective and convenient for patients, significantly shortening the irradiation time and is less aggressive to the skin. Longer follow up is necessary to confirm the low recurrence rate, comparable to other techniques.

Key words: Intraoperative radiotherapy, Early breast cancer, Axxent electronic brachytherapy

<https://doi.org/10.1016/j.ejmp.2019.10.004>

Animal models based on telemetry for investigation of mechanisms of neurological and cardiovascular diseases (in vivo)

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Introduction: The complexity and diversity of the animal organism goes beyond any in vitro systems, the use of animal model systems gives us the chance to investigate the molecular and cellular mechanisms of the disease, following the principles of medical ethics, and at the same time without losing natural regulation chemical and signal transduction pathways typical for in vivo systems.

Animal models are:

1. Models with chemically induced diseases.
2. Models with defined traumatism (cerebral artery ligation, induced thromboembolism).
3. Models with genetic modifications.

The best animal models of disease are almost similar in etiology (mechanism of development) and phenotype (signs and symptoms) to the human equivalent.

Material and methods: Animal models and Methods for Animal model monitoring

In our laboratory we use method for telemetrically evaluation of vital signs and parameters from conscious animals (Stellar Telemetry Ltd.)

Stellar Telemetry is the next generation of implantable telemetry technology – The system allows monitoring of unlimited animals with just one receiver thus allowing group housing, social interaction studies and monitoring of animals.

Animals are allowed to roam freely and interact in groups with no restriction in number.

The Stellar Telemetry system can be implanted into any animal from mice to swine with no additional items required. Finally an implantable telemetry system for research that performs with great efficiency.

Results and Discussion: The Stellar Telemetry system allow us to measure and collect vital signs.

Stellar Telemetry transmitters allow measurement of activity, pressure (P), electrocardiogram (ECG), electro-encephalogram (EEG), electromyography (EMG), electrooculography (EOG), heart