(4) Medical Equipment Evaluation. This programme's aims are to establish and promote international protocols and standards for Performance Testing, Quality Assurance, Safety and Environmental aspects.

22.
CURRENT STATUS OF SYSTEMATIC RADIOPHARMACEUTICALS FOR THE TREATMENT OF PAINFUL METASTATIC BONR DISEASE

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Intractable bone pain secondary to bone metastasis from prostate or breast cancer, or other malignancies is a major problem in the management of the oncological patient. Treatment often includes the use of analgesic drug therapy; however, radiation therapy, hormonal therapy, chemotherapy, and surgery may also be needed. Advances in systemic radionuclide therapy have increased the number of treatment options available for patients with painful osseous metastases. This treatment modality offers three major advantages i.) by addressing all sites of involvement; and ii) by limiting irradiation of normal tissues due to selective absorption into bone which results in an improved therapeutic ratio. Patients with a positive bone scan are eligible for treatment, and indications and contraindications for use are well defined. Large, prospectively randomized clinical trials have established the efficacy of samarium-153 EDTMP and strontium-89 Cl as a first-line therapy. When these agents are used, pain relief often occurs rapidly and lasts several weeks to months with responses seen in 60-80% of patients, depending on the extent and stage of the disease. With the introduction of modern bone-seeking radiopharmaceuticals as Sm-153 EDTMP toxicity is rare and restricted to reversible myelosuppression. In summary, evidenced based literature suggests that these radiopharmaceuticals can significantly reduce pain and analgesic requirements, improve quality of life, reduce lifetime radiotherapy requirements and management costs, and may even slow the progression of painful metastatic lesions. Retreatment is safe and effective.

23.
PRINCIPLES OF RADIOIODINE TREATMENT (^{131} I) FOR PATIENTS WITH DIFFERENTIATED THYROID CARCINOMAS

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The aims of radioiodine (^{131} I) therapy for patients with differentiated thyroid carcinomas:

- Destruction of thyroid tissue remaining after thyroidectomy
- Destruction of microcarcinoma focus in site of thyroid
- Destruction of metastases in lymph nodes
- Destruction of distant metastases

Therapeutic indications for radioiodine (^{131} I) treatment in differentiated thyroid carcinomas

- **Complementary treatment**

This treatment is recommended in all patients with follicular or papillary carcinomas in stage pT_{1b-4} N_{0-1} M_0 after total thyroidectomy. In some cases it could be as the complementary treatment after incomplete thyroidectomy.
The recommended radioiodine activity for the complementary therapy is from 1.75 to 3.5 GBq (60 – 150 mCi)

- **Radical treatment**

This kind of treatment is recommended for patients with differentiated thyroid carcinomas and remote metastases. If the lesions concentrate ^{131} I in quantities sufficient for radical treatment - the patient can be treated with the isotope.

- **Palliative treatment**

Palliative treatment is recommended for patients with inoperable thyroid carcinoma or with local recurrence, or with remote metastases concentrating radioiodine in quantities non sufficient for radical treatment.

Contraindications for radioiodine (^{131} I) treatment

- Pregnancy
- Breast-feeding

The contraception for women is necessary during 12 months after radioiodine treatment. For men the 4 – 6 months contraception is recommended.

Method of radioiodine (^{131} I) administration

- Patient serum TSH concentration should be above 30 uIU/ml

- Isotope administration is possible 4 – 6 weeks after total thyroidectomy or 4 –6 weeks after L-thyroxin treatment withdrawal
- radioiodine therapy should be followed by body radioiodine scan performed at 72 hours after the therapeutic dose – to asses focuses concentrating radioiodine
- After administration of therapeutic radioiodine dose the patient for 14 days should avoid to be in contact with other persons, especially with children and pregnant women

Complications after radioiodine (^{131} I) treatment

The complications are very rare and usually without clinical manifestations.

Follow-up after radioiodine (^{131} I) treatment

Follow-up at intervals 6 – 12 months after radioiodine treatment should include careful physical examination, neck ultrasonography, needle biopsy examination is indicated if a lump is noted. Serum thyroglobulin and TSH concentration should be measured. Radioiodine body scan should be performed 6 months after treatment - after 4 – 6 weeks of L-thyroxin treatment withdrawal

24.
VALIDATION OF CONFORMAL RADIOTHERAPY TREATMENT PLANNING SYSTEMS USING AN ANTROPOMORPHIC PHANTOM AND THERMOLUMINESCENCE DOSIMETRY

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Within the requirements of a Quality Assurance programme in a radiotherapy department, the ability of a treatment planning system (TPS) to accurately calculate dose distributions under realistic conditions encountered in radiotherapy (RT) should be validated. This may be accomplished by thermoluminescence (TL) dosimetry in simulated treatment of antropomorphic phantoms. In our radiotherapy department, several planning systems are used concurrently in 3D conformal treatment of larger volumes (with irregular fields obtained via individual shielding or multileaf collimation) and of very small volumes (stereotactic technique), by external megavoltage photon beams. Realistic 3D treatment plans were prepared using CadPlan, Theraplan and BrainLab TPS for treating volumes in an Alderson phantom, which was prepared for topometry (CT-scanned) and irradiated in fully simulated conditions of patient RT. Suitably selected TL detectors (some custom-produced for these measurements), were placed inside and around the treated volumes in the phantom. For every photon beam applied (Co-60, 6 MV or 9 MV) the TL detectors, individually corrected, were calibrated in a standard solid phantom against ionisation chamber dosimetry. For irradiation of larger volumes, standard MTS-N (LiF:Mg,Ti) detectors were used. For stereotactic irradiation of small volumes in the head (6 MV) special miniature thermoluminescent LiF:Mg,Ti and LiF:Mg,Cu,P were developed. The technique of detector calibration, preparation of Alderson phantom for simulated RT, detector readout and interpretation of the measured versus calculated values of dose at measurement points inside the phantom, will be described.

25.
ASSESSMENT OF THE ACCURACY OF RADIOTHERAPY BY DIGITAL SUPERPOSITION OF PORTAL AND RFERENCE IMAGES

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Teleradiotherapy imposes the requirement of **high accuracy** in reference to its medical as well as technical aspects. Close adherence to the geometrical parameters set up in therapy planning is vital. The current location of the irradiation field and anatomical structures can be recorded in the *portal image* acquired during the therapy course. Assessment of the treatment accuracy consists in registration (overlaying) of the reference and the portal image to compare the layout of anatomical structures and the irradiation field. Edges of the compared features are difficult to find in the portal image, which is inherently of low contrast. Hence, not all the edges present in the reference image can be found in the portal one, and the comparison of geometries in these images is difficult and time-