# P-22 – Dr. Lajos Balogh, et al - Oncological and non-oncological applications of electromagnetic hyperthermia (Oncothermia®) in the veterinary clinics -2 years of experience

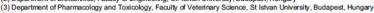
Oncological and non-oncological applications of electromagnetic hyperthermia (Oncothermia®) in the veterinary clinics 2 years of experience.



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Loco-regional hyperthermia in oncology has ambivalence discretion in the medical community. The extremely long history of the method as well as the supposed universal ability to complement all the existing traditional methods is not enough to prove its efficacy. The central point of the non univocal acceptance and the mixed feelings is the some-times unsuccessful ctive heat-delivery into the deep-seated tumors. The selectivity could be enhanced by electric field. Theoretical considerations showed the problem of the temperature dose-concept, and it is shown, that the thermal energy does not limit the electromagnetic effects through the membranes. Advantageous thermal and induced non-thermal effects of electromagnetic hypertermia (EHT, Oncothermia®) in human medicine is in use for decades. Surprisingly there are much less references about the veterinary utilities.

Our objective was to check the clinical utility of electromagnetic hypertermia as a single modality and in combinations in veterinary patients

### Materials and Methods

Dogs and cats affected by either primary or recurrent neoplasias referred to the National "F.J.C." Research Institute for Radiobiology and Radiohygiene (NRIRR) from April 2008 to June 2010, were included. Initial work-up consisted of a physical examination, hematology and serum biochemical profile. The diagnosis was confirmed, if not properly performed before referral, through a core biopsy or a cytological evaluation of the lesion and, if enlarged, of the regional lymph nodes. Eligibility criteria included the following: nonresectable, measurable tumors (measured by digital caliper, x-ray or ultrasonography, or scintigraphy, or CT, or PET/CT) and the surviving expectation of at least 1 month, no other antitumoral or corticosteroid or non-steroidal antiinflammatory treatments or surgery within 2 weeks of entry to trial, malignant primary tumor, with or without metastases to the regional lymph nodes, and without macroscopically evident (x-ray, or ultrasound, or scintigraphy, or CT or PET/CT) distant metastasis and/or other life-threatening metabolic diseases

We applied EHT with capacitive coupled modulated 13.56 MHz radiofrequency method (oncothermia OT). OT was provided for different canine and feline oncological patients (altogether more than 64 cases) as a single treatment (6/64), and in a combination with fractionated Cobalt irradiation (51/64) or with medical treatments (7/64). Dog patients suffering in other chronic diseases (4 osteoarthroses, 2 heart insufficiencies, 2 epileptic, 2 non-healing skin abscesses) were also co-treated with local (or regional) OT so that the original, non-eligible medical treatments were not changed.













Results

Single OT in oncological diseases resulted significant tumor size decrease 2 out of 6 cases 3 stable disease and 1 progression of disease. Cobalt irradiation followed by OT resulted 5/51 tumor-free status, 42/51 partial remissions, 3/51 stable disease, and progression of disese in 1 case. Chemotherapy boostered with OT resulted 2/7partial remission, 3/7 stable disease, and 2/7 progression of disese in late stage, metastatic cases. Side effects eg.: erythema (2 cases), necroses (2 cases) occurred at the learning phase of technique, later on we could prevent this side effects with the constant superficial and deep temperature control in or patients. OT proved to be useful in all the non-oncological diseases and no

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Sum	nmarized	results	of	treatm	ents

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Treatment methods	Tumor free status	Partial response	Stable disease	Progression of disease				
Oneothermia alone	0/6	2/6	3/6	1/6				
Oncothermia + Cobaltimad ation	5/51	42/51	3 / 51	1/51				
Oncothermia	0/7	2/7	3/7	2/7				

•In other non-oncological chronic diseases (4 osteoarthroses, 2 heart insufficiencies, 2 epileptic, 2 non-healing skin abscesses) oncothermia boostered medical treatment showed improvement in clinical symptoms on the base of owner's and handling veterinarian's observations.

## Case I., a complete response

Animal: sex spayed femal colour black age 10 years
Dg Recidiving mammary cardinoma

rged with axillary Inn metastases Before treatment: 24x16x8 cm huge cystic tumor mass in the axillary region

### Treatment:

6 x 30 minutes local oncothermia followed by immediate 6 x 4 5 Gray Cobalt irradiati Monday Wednesday Friday schedule, 2 w

After treatment:











### Case II., a complete response Animal: name Tomi rass Mixbreed

age 7 years
Dg Mastocytoma Grade III
in the elbow region

Before treatment:

2x3 cm (in diameter) large primary skin tumor Treatment: 6 x 30 minutes local oncothermia followed by immediate 6 x 5 Gray Cobalt irradiat on Monday Wednesday Friday schedule, 2 we

After treatment: No visible/palpable tumor mass only mild side effects of non controlle oncothermia is seen in the dog The dog has been considered tumor free 6 months after completing the thera

Animal: age 8 years Dg oral (non pigmen

Before treatment: 6 x 6 5 x 5 3 cm locally in ulce rating malignancy in the mouth

# Treatment:

Animal:

6 x 30 minutes local oncothermia followed by immediate 6 x 5 Gray Cobalt irradiation Monday Wednesday Friday schedule, 2 week

### After treatment:

Considerably smaller (28% of pretreatm tumor volume) has been detected after completing the treatment. The dog is ho not tumor free but living a normal life 3 months after completing the therap



Case III., a partial response



e





Case IV., a non-responding patient

## name Angle rass Breton spaniel sex spayed female

age 9 years ocreas exocrin carcinoma

Before treatment: Primary tumor lis a 2x 3x 3 cm lexocrin pancreas carcinoma with multiplex abdominal

6 x 30 minutes local oncothermia followedby carboplatin infusion and doxorubicin injection, 10 days

### After treatment:

The dog was initiated for oncothermia + chemother carboplatin and doxorubidin based protocol) but 10 days after she was euthanized on the request of owner and because of progression in symptoms. Many small multiplex metastases was found all around the surfaces of intraabdominal organs







## Conclusion

We concluded that local and regional OT could be a useful tool as a single antitumoral modality but even more clinical utilities could be reached in a combination with radiotherapy or with chemotherapy. OT could be advantageous in the treatment of a variety other chronic diseases too. Further pro- and retrospective clinical studies needed to implement this novel technique into veterinary medicine.

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