

Background of National Veterinary School of Alfort Maisons-Alfort, France

- The National Veterinary School of Alfort (École nationale vétérinaire d'Alfort) is the world's second oldest veterinary school (the world's oldest veterinary school is in Lyon, France). Claude Bourgelat founded both the Alfort and Lyon schools.
- Wanting to expand veterinary education in France, Henri Léonard Jean Baptiste Bertin, French Minister of State under King Louis XV, asked Bourgelat to establish a veterinary school in Paris in 1765. Due to its more rural environment and other logistics, the small hamlet of Alfort was instead chosen as the school's location.
- Opening its doors to students in October 1766, the National Veterinary School of Alfort is the world's oldest veterinary school remaining on its original site. It sits on an 11 hectare estate (about 27 acres), and many of the buildings are protected as historical buildings. The estate includes a sculpture park which has a statue of Bourgelat. The statue was unveiled October 30, 1879, and is still in its original location in the center of the courtyard facing the school's main entrance.
- The veterinary school's main campus is in the heart of Maisons-Alfort, 8.4 kilometers (about 5.2 miles) from the center of Paris. The school also includes an educational center in Champignelles in the Burgundy region, and the Centre for Research and Imaging of Equine Locomotor Disorders (CIRALE) in Goustranville in the Lower Normandy region. Acquired in 1975, the center in Champignelles includes a teaching farm with herds of sheep, cattle, and deer. Built in 1999, CIRALE is internationally recognized in the study of musculoskeletal diseases in horses.
- Veterinary studies last 7 years. Graduates can practice veterinary medicine in France and throughout the European Union.

**INTEREST AND USE AS A PRACTICE OF MICROWAVE MOLECULAR
HYPERTHERMIA IN FUNCTIONAL DOG RE-EDUCATION**

**THESIS
For VETERINARY DOCTORATE**

**Presented and supported publicly in front of
THE FACULTY OF MEDICINE OF CRÉTEIL PARIS FRANCE
September 15th, 2011**

Thanks to:

To Doctor Aknine of the company BioThermatics, who lent us the device of molecular hyperthermia Itherm.

Summary of the study:

REF Page #6

- 1- Hydrotherapy
- 2- Hot Towel
- 3- Hot Cream
- 4- Hot Pack
- 5- Ultrasound
- 6- Infra-red
- 7- Inductive Radiofrequency
- 8- Capacitive Radiofrequency
- 9- Molecular Microwave Hyperthermia

All of this equipment was used to treat the dogs' pathologies. All dogs received several session of Hydrotherapy up to 45, ultrasound, and infrared. None of the dogs responded at all to this equipment. Then they used Molecular Microwave Hyperthermia. In this thesis are the results of Microwave Hyperthermia versus all the other equipment.

Introduction: Page 10 (pdf 13)

This thesis appears in two parties. In a first bibliographical part, we shall approach the principles and the applications of molecular hyperthermia, whether it is in short waves or in microwaves. Then, in the second experimental part, we shall present the cases treated within the department of functional re-education, the results obtained, as well as a discussion of the results.

Different Techniques used at present time: From pages 11 (pdf 14) to page 22 (pdf 25) are descriptions of the different technique used i.e. infrared, ultrasound, hot cream, hot pack etc....

Molecular Hyperthermia Description: From page 23 (pdf 26) to page 36 (pdf 39)

Analgesic Effects of Molecular Hyperthermia: From pages 37 (pdf 40) to page 41 (pdf44)

Effect of the hyperthermia on these painful mechanisms: page 40 (pdf 43)

Acceleration of the elimination of the pro-inflammatory molecules: page 40 (pdf43)

Decrease pressure of the interstitial fluid: page 41 (pdf 44)

Decrease muscular spasms: page 41 (pdf44)

Action on the " Pain gate control ": page 41 (pdf 44)

Alteration of the nervous transmission: page 41 (pdf 44)

Recapitulative action of hyperthermia on pain: page 41 (pdf44)

Molecular hyperthermia decreases the painful sensation, whether it is an acute or chronic phenomenon, by using various mechanisms. First, it eliminates the cause of the pain by decreasing the inflammation and by allowing the elimination of the pro-inflammatory molecules. The increase of the drip is going to also allow a faster contribution and in bigger quantity of anti-inflammatory and analgesic molecules, then they are endogenous or exogenous. The modification of nerve conduction information is also changed, by the mechanism of the " bread gate ",

as well as by direct modification of the nervous transmission, by increasing the threshold of pain.

Anti-inflammatory action: page 42 (pdf 45)

Recapitulative anti-inflammatory action of the molecular hyperthermia ITherm:
page 43 (pdf 46)

Molecular hyperthermia reduces the inflammation of various mechanisms. First, it allows for a faster elimination of pro-inflammatory substances. It also decreases the inflammatory phenomenon in itself, by allowing faster drainage of the edema to accelerate the necessary enzymatic reactions and to raise the muscular cramp if it exists. Finally, it decreases the painful sensation. The use of the molecular hyperthermia is recommended in the second phase of the inflammation or in chronic inflammation. Indeed, in the first phase of the inflammation, during the active congestion, it would be rather noxious and would risk deteriorating the tissular hurts by increasing the blood burst.

Role of the HSP (heat shock protein) in the protection of the muscular fibers:
page 48 (pdf 51)

During a thermal stress in 41°C (Displayed Front panel) by the molecular hyperthermia, the HSP, in particular the HSP 70 are produced by muscles in more important quantity. When the intracellular concentration of HSP increases, the cellular metabolism is turned to the anabolism: the protein synthesis increases and the protein degradation decreases.

Furthermore, we suppose that certain HSP, in which the HSP 70 decreases the risk of muscular tear during the effort, would provide an interest to the use of the diathermy during the heating (warm-up) (12).

Description of Itherm Unit: page 57 (pdf 60)

Protocols used: page 59 (pdf 62)

Pad placement: page 62 (pdf 65) to page 64 (pdf 67)

III. Results: page 65 (pdf 68)

The study with the iTherm MHT System was conducted on a total of 32 dogs. One dog was used twice in the study because it was successively treated in hips and in elbows. Among all these cases, three were removed from this synthesis of the study because protocols were not led to their term. There are thus 30 cases included in this study.

Every case is individually retailed below. For every case, a brief history gives the commemorative. A locomotive assessment is before realized and after every protocol of hyperthermia. The physical state of the dog is estimated before the protocol. The implemented protocol is detailed. In the term of every protocol, the clinician realizes a subjective evaluation of the efficiency of the treatment, by taking into account the evolution of the clinical examination, and the perceptions of the owner. Four dogs were not noted in this way: TEXAN, REX and IRE, which did not follow the protocol, and LASSO, which has been developed a tumor.

Breed recapitulative and numbers of dog per breed: page 65 (pdf 68)

German shepherd 5
Belgian shepherd 2
Boxer 1
French pointer 1
Collie 1
Crossed 4
Dingo 1
Mastiff of Bordeaux 1
French spaniel 1
Golden retriever 3
Greyhound 1
Labrador 9
Rottweiler 1
Saint Bernard 1
New Earth 2

Age of dogs treated 62% > 8 years old: page 67 (pdf 70)

26% 2 to 7 years old

12% < 2 years old

Diseases treated: page 67 (pdf 70)

Degenerative osteoarthritis hip; 19 dogs
Degenerative osteoarthritis elbow; 4 dogs
Tendinitis; 3 dogs
Break of crossed ligament; 2 dogs
Muscular break; 2 dogs
Degenerative osteoarthritis knee; 1 dog

In conclusion the main pathology treated was; Degenerative osteoarthritis of the hip.

59% of the dogs treated were not under analgesic treatment. Page 68 (pdf 71)

Results: page 70 (pdf 73) to page 118 (pdf 141) **See level of responses on graphic color chart.**

Subjective efficiency of the treatment for the dog named Eros German Sheppard;
Example Results: 10 /10 see page 70 (pdf 73) see the graphic color chart with the arrow.

See also all graphic color charts from pages 70 (pdf 73) to page 118 (pdf 141) for the other results of the other dogs.

Global response of the therapy: page 123 (pdf 126) UP TO 75%

Conclusion: page 133 (pdf 136)

The use of hyperthermia in the field of functional re-education turns out to be thus in seen the first results appear very interesting. The treatment of the pain in the case of the degenerative osteoarthritis is the one, which was the most informed, and the hyperthermia seems a therapeutics adapted to the treatment of the degenerative osteoarthritis. As for the muscular and tendinous breaks, the treatment with hyperthermia seems interesting, but not enough case were treated.

With regard to the treatment of degenerative osteoarthritis of the elbow, the knee, the RLCA or the exeges head neck of the femur, certain results seem encouraging, but follow-up studies must be realized.

Besides the domain of the functional re-education, molecular hyperthermia is a therapeutic tool, which can be used in numerous domains, including cancer research and ophthalmology.

Molecular hyperthermia is thus a new and promising therapy. We saw here its interest in functional re-education. You should not forget nevertheless the efficiency as adjunct therapy to chemotherapy in the fight against numerous cancers. The research must be pursued, to clarify all mechanisms of actions, as well as all the possible uses of this new therapeutic tool.

English summary at the last page of the document:

MICROWAVE HYPERTHERMIA NEED AND PRACTICAL USE IN DOG'S FUNCTIONAL REHABILITATION

SURNAME: PETIT

Given name: Marie-Claire

Summary:

Firstly, different kinds of thermotherapy have been studied. The microwave diathermy machine and the effect of microwave has been described. The microwaves effects as a medicinal way for functional rehabilitation coming from literature has been compiled. Secondly, a study about 32 dogs brought to U.M.E.S. is described. Hyperthermia machine is a ALgitherm MHT-System, produced by BioThermatics. It delivers waves at 434 MHz. Among the 32 treated dogs, 23 suffer from osteoarthritis, 5 put up with muscular or tendinous disease, and 4 were treated after a surgery. The therapeutic scheme consists in 6 sessions, within 2 or 3 weeks. It seems that for osteoarthritis, and muscular or tendinous disease results are pretty good. One of the subjects, who put up with muscular tear, developed a hemangiopericytoma, but no direct link between the treatment and the tumor has been clearly established.

Keywords: FUNCTIONAL REHABILITATION, MICROWAVE
DIATHERMY, SMALL ANIMAL, DOG.

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