

## Skin healing in one equine by therapy with ozone

### Cura de la piel de un equino con terapia con ozono

César Augusto Garcia<sup>1</sup>, Duvaldo Eurides<sup>1</sup>, Ricardo Prado Berbert<sup>1</sup>, Matheus Mickael Neves Rodrigues<sup>1</sup>, Siara Mabel Nara Neves<sup>1</sup>, Flávia Cristina Queiroz Rinaldi<sup>1</sup>

Corresponding author at:

Av. Pará, 1720 – Faculdade de Medicina Veterinária, Universidade Federal de Uberlândia, Campus Umuarama - Bloco 2T, 38400-902 Uberlândia - Minas Gerais – Brazil. Tel.: +55 34 3218-2228. E-mail address: drvirus@famev.ufu.br (C.A. Garcia).

\* This work was supported by FAPEMIG.

---

#### ABSTRACT

*Habronema muscae*, is a parasite of horses, ponies, donkey and zebras. The adult form lives on the mucosae with your cephalic region introduced in the tissue. The eggs are long and fine and contain larva that are set free on wounds or inside of the stomach for accidental ingestion where the maturity is reached in two months. The effect of ozone on the skin happens for the reaction with polyunsaturated fatty acid and water present in the stratum corneum, to originate reactive species of oxygen and lipoperoxides as hydrogen peroxide, that are partially reduced by glutathione, glutathione peroxidase, superoxide dismutase, catalase, isoforms of vitamin E, vitamin C, acid uric and ubiquinol, or they are partially absorbed by lymphatic or sanguineous capillaries. An equine of unknown race, with 15 years old, coming from the City of Uberlândia - MG, are attend in the Veterinarian Hospital of the Federal University of Uberlândia. The horse has an extensive lesion in the left back member, in the height of the distal extremity of the Metatarsus, measuring approximately 15 cm X 9 cm, with clinical diagnostic of cutaneous habronemosis. Treatment with ozonized water and oil and rectal insufflations with oxygen-ozone mixture was indicated. 2 months after of the treatment the animal presented cicatrization of the lesion.

**Keywords:** *Habronema muscae* ; Rectal insufflation; Ozone; Horse

#### INTRODUCTION

Habronemosis conjunctival, cutaneous and gastric caused by *Habromena spp* were related.<sup>8,10,6,4</sup> *Habronema muscae* is a parasite of horses, ponies, donkeys and zebras. The adult lives in the mucous membranes with his heads introduced in the tissue .The eggs are long and fine and contain larva.<sup>2,8</sup> The horses are infected by the consumption of fly that fall in the water or food. The larva are liberated inside the stomach where reach maturity in two months. The mainly effect of Habromena in the stomach is going to stimulate the secretion of big quantities of phlegm with hyperplasia and overstretches of the secreting cells of phlegm, beyond that, gastritis mucus, ulcers, diarrhea and loses of weight have been associated to the infection with *Habronema muscae*. The Ozone possessed biological actions and therapeutic estates. It is an unstable gas and extremely reactive. The mechanisms through which that gas acts are straightly related with products generated by the selective interaction of that gas with present organic components in the plasma and cellular membrane. Due to that selectivity, the reaction of the ozone with lipid occurs in the double connection of carbon, present in the polyunsaturated fatty acid, generating organic peroxides and ozonides. The topical ozone showed to be efficient against dermatomycoses, osteomyelitis and wound infected, illnesses of the udder of bovine and equine.<sup>7</sup> The effect of ozone about the skin itself must to his reaction with polyunsaturated fatty acid and lines of

present water in the upper layer of the dermis (stratum corneum) generating species you reactivate of oxygen (ROS) and lipoperoxides (LOP), between which is the hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). Only ROS and LOPs promptly formed from that reaction can be partially limited by the enzymatic antioxidants of the skin (glutathione peroxidase, superoxide dismutase, catalase) and not enzymatic of bass molecular weight (isoforms of vitamin E, vitamin C, glutathione, uric acid and ubiquinol) or partially absorbed by lymphatic capillaries and for intravenous. The ROS are the more effective and natural agents against the pathogen resistant to antibiotic. Beyond that, improvement the metabolism and the immunological functions, contributing for a satisfactory recuperation.<sup>11</sup> Among the possible biological effects caused by the big autohemotherapy ozonized and topical application of ozone is able to itself exemplify the diminution of the fibrinogenemia and of the cholesterol in the plasma, increase of the glycolysis, of the ATP, of the 2-3 diphosphoglycerate and of the availability of the oxygen, with reduction in the rate of sedimentation of the erythrocytes, maintenance of the blood pressure and remains of the venous pressures. In the chips is able to growth factors increase be observed like TGF  $\beta$ ; and PDGF. In the leukocytes is able to increase of the PGE<sub>2</sub> be observed.<sup>1</sup> The objective of this work was evaluating the efficiency of the topical use of the water and oil ozonized, in association with big autohemotherapy ozonized in the handling of cutaneous habronemosis in a horse.

## **MATERIALS AND METHODS**

A horse with approximately 15 years old, indeterminate race presenting extensive wound located in the pore distal in the left back member, in the height of the metatarsus, with suspicion of cutaneous habronemosis, was evaluated with respect efficiency of the ozone therapy in the cicatrization of cutaneous damage. Two thousand and five hundred milliliters of deionized, double distilled water and hundred milliliters of oil of sunflower were ozonized through of a generator of ozone with capacity for produce 0.0014 g / O<sub>3</sub> / hour, fed by ampoule of O<sub>2</sub> with 99.5% of purity, pressure of 200 Kgf / cm<sup>2</sup>, in a stream of 1 L / minute, maintaining itself the flasks inside isothermic box rmic containing purses of ice you recycled. Immediately after the ozonization, the water and the ozonized oil were applied in their wounds, twice in a day, since the first day of handling at to present date. Twice weekly, the animal received handling systemic saw rectal insufflation of the mixture oxygen ozone, in the same concentrates utilized in the local handling, during an initial time of 5 minutes that progressively was increased at reach 10 minutes. This procedure was repeated during two months.

## RESULTS AND DISCUSSION

The results obtained can be visualized by the photographs.



Photograph 1 – 1<sup>o</sup> day of handling



Photograph 2 – present Period of training of the handling.

## CONCLUSIONS

The oxygen-ozone mixture in the concentrations and dosage utilized by topical and by rectal insufflation that clinical case, showed itself efficient in the scarring of cutaneous wound in a horse. The time spent in the handling up to present phase of regeneration, as well like the therapeutic costs, are compatible with the traditional procedures of handling. Bigger studies with an aim to the standardization of dosage for this kind of illness should be encouraged.

## BIBLIOGRAPHY REFERENCES

1. Bocci V. Ozone as a bioregulator. Pharmacology and toxicology of ozonotherapy today. *Journal of Biological Regulators and Homeostatic Agents*. 1996;10(2-3): 31-53.
2. Bowman DD, Lynn RC. *Georgis' parasitology for veterinarians*. 7 ed. Saunders, Philadelphia, 1999.
3. Dunn AM. *Veterinary helminthology*, 2 ed., William Heinmann, London, 1978.
4. Gasthuy FM, Van HM, Vercruysse J. Conjunctival habronemiasis in a horse in Belgium. *Vet. Rec*. 2004;154(24):757-8.
5. Levine ND. *Nematode parasites of domestic animals and man*. Burgess, Minneapolis, 1968.
6. Mohamed FH, Abu Samra MT, Ibrahim KE, Idres SO. Cutaneous habronemiasis in horses and domestic donkeys (*Equus asinus asinus*). *Rev. Elev. Med. Vet. Pays. Trop*. 42(4): 535-40, 1990.
7. Sartori HE. *Ozone the eternal purifier of the earth and cleanser of all living beings*. Life Science Foundation, Flórida, 269p., 1994.
8. Soulsby E.J.L. *Textbook of veterinary clinical parasitology*. v.1. Helminths, Blackwell, Oxford, 1965.

9. Soulsby E.J.L. Helminths, arthropods and protozoa of domesticated animals. Bailliere Tindall, London, 1986.
10. Trees A.J., May S.A., Baker J.B. Apparent case of equine cutaneous habronemiasis. *Vet. Rec.* 1984;115(1):14-15.
11. Valacchi G, Fortino V, Bocci V. The dual actions of ozone on the skin. *British Journal of Dermatology.* 2005; 153:1096-100.