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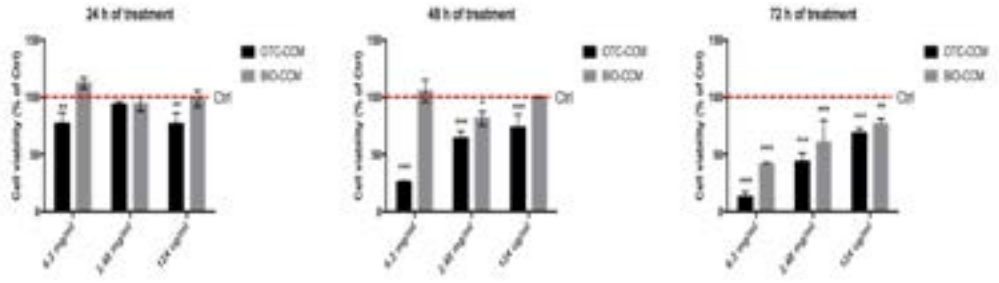
Alessandro Di Cerbo

University of Modena and Reggio Emilia, Italy

Oxytetracycline-loaded food and toxic manifestations in humans and pets

According to a recent World Health Organization (WHO) report the term "Antimicrobial Resistance" is referred to the change of a microorganism once exposed to antimicrobial drugs. Nowadays, antimicrobial resistance represents a serious concern particularly in two correlated fields, i.e. medical and agriculture. In poultry, for instance, antibiotics are used to promote growth and to treat, control and prevent overcrowding diseases. A routine exposure to antibiotics induces a selection for resistant bacteria that can persist on meat and in animal waste with a vertical transmission through maternal generations of breeding stocks. Such bacteria can get in contact with humans in food-animal production facilities, in meat processing plants but also consuming contaminated meat. Recently, Mueller et al. hypothesized that food allergens e.g. beef, fish and chicken could drag antibiotics and hormones thus representing the cause for the onset of dermatological symptoms in cats. Among pharmacologically active substances, tetracyclines (in particular oxytetracycline, OTC) and their metabolites present in meats and meat-based foods for humans and pets were considered and studied. We firstly hypothesized and observed the role of OTC as an underlying cause of some chronic inflammatory pathology. Due to its low cost and high efficacy, OTC is widely employed in the intensive farming of poultry, livestock and aquaculture. However, OTC has a high affinity for calcium, mainly present within bones, and a very low and long clearance in treated animals. Further, pet food production, which mainly relies on poultry by-products, also avails itself as an important percentage of bone meal (20-30%) with a consequent dragging of OTC residues that are frequently found within commercially available diets. Despite the setting of maximum residue limits in foods by Food and Drug Administration and World Health Organization OTC residues may still persist since bone is not considered as an edible tissue, thus making pet food potentially dangerous. We evaluated the toxicity of OTC present within bones of only OTC-treated chicken according to standard withdrawal times and investigated the OTC form responsible for such toxicity.



Graphical representation of the effects of conditioned medium with bone with (OTC-CCM) and without (BIO-CCM) oxyteracycline on K562 cell line at different incubation times (24, 48 and 72h) and at different bone concentrations (124, 90, 6, 2.48 mg and 124 µg). $*p < 0.05$, $***p < 0.001$.

Recent Publications:

1. Devaraj N K (2017) Antibiotic resistance: a real menace. Oman Med. J. 32(6):531. Doi:10.5001/omj.2017.102.
2. Palmieri B, A Di Cerbo and C Laurino (2014) Antibiotic treatments in zootechnology and effects induced on the food chain of domestic species and, comparatively, the human specie. Nutr. Hosp. 29(6):1427-1433. Doi:10.3305/nh.2014.29.6.7350.
3. Mueller R S, T Olivry and P Prelaud (2016) Critically appraised topic on adverse food reactions of companion animals (2): common food allergen sources in dogs and cats. BMC Vet. Res. 12:9. Doi:10.1186/s12917-016-0633-8.
4. Di Cerbo A et al. (2014) Unusual antibiotic presence in gym trained subjects with food intolerance: a case report. Nutr. Hosp. 30(2):395-398. Doi:10.3305/nh.2014.30.2.7594.
5. Di Cerbo A et al. (2018) Adverse food reactions in dogs due to antibiotic residues in pet food: a preliminary study. Vet. Ital. Doi: 10.12834/VetIt.1357.7466.2.

Biography

Alessandro Di Cerbo obtained his Bachelor's Degree in Medical and Pharmaceutical Biotechnologies (2005) from the Vita Salute San Raffaele University, Milan, Italy. He pursued his Master's Degree in Medical Biotechnologies (2007) and PhD in Nanoscience and Nanotechnology from the University of Modena and Reggio Emilia (2011) respectively. He has specialized in Clinical Biochemistry from the D Annunzio University of Chieti Pescara (Italy). His scientific activities are highly interdisciplinary, ranging from nanotechnology to nanomedicine, microbiology, nutrition and translational medicine. He has published more than 50 papers in reputed journals.

alessandro811@hotmail.it

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