

The aim of this project is to investigate the effects of clenbuterol on the immune system in race horses.

Clenbuterol has been used for many years by medical doctors. It is a β_2 -adrenoceptor agonist, already accepted for the treatment of respiratory disorders including equine asthma (previously Recurrent Airways Obstruction – RAO). The beneficial effects of the drug in RAO is the dilation of the respiratory tract. In the other hand, clenbuterol affects also many other processes in the body. However, nowadays it is gaining the growing popularity because of its effects on the weight loss and insulin resistance. For this reason **it is used without medical advice, by the people, who want to lose weight (ie. chemical liposuction)**. This drug is also **popular in bodybuilding and professional sports**, due to the effects similar to anabolic steroids, however, it is prohibited by anti-doping regulations because of the stimulant properties and potential support an aerobic capacity. **Nevertheless, The Fédération Internationale de Football Association (FIFA) indicated that clenbuterol is one of the most commonly detected substances in anti-doping trials.** Moreover, the use of clenbuterol without medical advice, especially for a long time in high doses **can have adverse effects** on a cardiac function and the tolerance of heavy exertion.

Clenbuterol has also beneficial effects including the inhibition of the inflammatory and proinflammatory states. **Despite the extensive medical literature, the effect of clenbuterol on the immune system remains unclear.** Leafing through the literature leads to many questions. May clenbuterol influence on all components of the immune system? How does it affect on the individual populations of immune cells? These questions still remain unanswered. This suggests the need of investigation the clenbuterol *in vitro* effect on the acquired and innate immunity in a horse, including proliferation activity and apoptosis of lymphocytes, cell surface antigens expression, cytokine synthesis and the activity of neutrophils and monocytes. The project will cover all available components of the immune system of racing horses.

All types of races pose a huge challenge to the horse's organism, and require proper conditioning. Arabians horses are one of the most popular breeds used in horse racing worldwide and has received a considerable attention in sport medicine. Horse racing is a multi-million industry. The main goal of breeding of racehorses is achieving the largest possible number of wins in the horse career. Because of that some trainers use illegal substances such as clenbuterol, which have a beneficial effect on horse performance. For these reason, these animals become the most likely group in which clenbuterol is used. **Moreover, sport horses appear to be a good model for human athletes as the group that the biggest abuse of clenbuterol is recorded.**

The results obtained in this project may have implications for pharmacotherapy of both animals and human. They may contribute to a new indications for clenbuterol in the treatment of animals and to better understanding its mode of action in human, including the prediction of the side effects. This is important due **to the common usage of clenbuterol without medical advice in order to reduce body fat** in particular. Furthermore, it can open up new research directions of its use in the treatment of chronic diseases (eg, meningitis, methabolic syndrome), which plays an important role in a persistent inflammatory state.

The investigation of clenbuterol's effects on the immune system cells will be carried out for the first time, therefore the results are particularly exciting and extend the knowledge in this field.