

Abstract

In recent years, the progress of veterinary science has contributed to the longevity of animals. However, along this development, the number of metabolic and age-related disorders in animals has been rapidly increasing. Similarly to humans, many major diseases are related to metabolic conditions and the investigation of the metabolic biomarkers is beneficial for both animals and humans. In this study, we investigated and compared the metabolic systems in large animals, such as bottlenose dolphins (*Tursiops truncatus*, hereinafter referred to as dolphins), horses, and cows. Comparative studies are helpful because this knowledge can offer critical information, leading to establishing the basic standard data and discovering the distinct features of the animals. It is also advantageous to use this knowledge for other fields, including the human medical field.

As the results indicated, there were some similarities between dolphins and horses. First, although it was demonstrated that the energy metabolism in each animal group is different, dolphins and horses are both active animals and have good potential for energy production/usage efficiency. Second, dolphins and horses showed similar LDH isoenzyme patterns, with LDH-3 isoenzyme predominating. Third, as cholesterol lipoprotein patterns between these three animal species suggested, dolphins and horses are HDL-dominant groups and have a distinct fraction of LDL. Additionally, it was suggested that daily physical activity may help improve the metabolic ability and can attenuate the negative aging effects in active animals, such as riding horses. Although dolphins appear to have a unique metabolic system, it is speculated that their regular physical activity, including shows in the daytime, have a similar impact on their health management when they age. Moreover, dolphins and humans share several biological features, hence examining the unique metabolic system in dolphins can lead to striking and beneficial theories for new aspects of health and diseases in humans.

To improve the health management of animals, it is necessary to understand each metabolic system in order to prevent any dysregulation of metabolism, if it occurs. A comparative study can be the first step to more efficient management and disease prevention strategies. It can also offer new pragmatic avenues and therapeutic approaches for animals and humans.