Letter to Editor

Subject: The role of organoids in veterinary medicine in the future
To: Prof. Dr. Rabie Fayed
The Editor of the Journal of applied Veterinary Sciences
Dear Editor
I am Dr. Hussein A. Kaoud, a Full professor in Faculty of Veterinary Medicine, Cairo Univ, Egypt. I am writing to you in order to highlight the utmost advanced and promised veterinary research on the role of organoids in veterinary medicine in the future.

Organoids are organ-like structures that replicate many of the features of a particular organ in vitro. Significant advancements in the development of three-dimensional (3D) culture systems for stem cell-derived organoids have been made in recent decades. These incredible 3D organoid constructs are a major technological advance that connects traditional 2D in vitro models and in vivo animal models. They offer a previously unheard-of chance to study the intricacies of veterinary diseases, from their etiology to prevention, treatment, or even potential organ replacement techniques. Organoids have demonstrated significant promise in both basic and clinical research as created cell-based models that replicate pertinent physiological structures and functions of interest. Here, I summarize a few applications in veterinary research: drug discovery and development studies, Biomarker research (as organoids can maintain the genomic profile of the parent tissue, drug screening can be used to provide connections between genetic mutations and drug responses, and precision medicine applications (often synonymous with genomics). and Biology of common and rare diseases (organoids have demonstrated significant utility in modeling and investigating both common and rare diseases arising from various different organs).

In breeding programs, it would require a high-throughput, large-scale application of organoids and a low-cost organoid platform to allow standard-level, reproductive and accurate measurements of the in vitro performance of epithelial functions. Further, if tissues for deriving organoids could be obtained from biopsies from live animals, this would have the advantage that after in vitro phenotyping, the high merit animals are still available as breeding stock. Veterinary research places greater emphasis on infectious diseases, nutritional disorders and breeding. Given the wide variety of animal species, organoids therefore exhibit their special effectiveness because they can be customized from certain species and tissues to study veterinary-important disorders.

The 3D structures can serve as effective models for disease research if they are assembled in vitro with a highly organized architecture. The widespread applications of murine and human organoid models have accelerated the development of various areas in veterinary medicine, such as developmental and stem cell biology, disease modeling and mechanism exploration, toxicology and drug screening. The present state of the art or known achievements in veterinary disease modeling, which includes metabolic disorders, malignancies, and viral and inflammatory diseases. Although they are still in their early stages, organoid technology applications in veterinary disease modeling have a bright future. Mechanistic and novel therapeutic investigations of various enteropathogenic and wasting diseases can be performed, which could ultimately lead to improving the animal production. Investigations of host-pathogen

interactions in zoonotic infectious diseases can improve public health through better understanding of the pathophysiology and potential discovery of new therapeutic strategies for the diseases.

Thanking you,

Yours sincerely,

Prof. Dr. Hussein A. Kaoud

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