

Editorial Paper: Comparative Medicine in Iran



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ABSTRACT

A comparative medical science is a branch of science that is responsible for research on human and animal medicine through the animal models. Although the history of animal use in empirical medical research goes back hundreds of years, the modern era is only a few decades old. An important part of the experimental medical research in Iran is based on the use of laboratory animal models. The importance of comparative medical evolution in terms of ethics and science requires that Iran to have a new look at this branch of science. Hence, Shiraz University of Medical Sciences has reviewed both the hardware and software aspects of this important issue, through a fundamental reform in comparative medicine by constructing a referral center for comparative and experimental medicine while at the same time it has established a comparative biomedical science discipline for Ph.D. degree. This new approach in the field of comparative medicine and comparative biomedical sciences will lead to dramatic scientific achievements.

1. Introduction

A comparative medical approach to studies is to answer questions in the field of medicine and veterinary use of animal models. Therefore, all chemical and herbal medicines, surgical procedures, and medical equipment must be tested with appropriate animal models before being utilized in humans and livestock [1]. The use of animal models has a long history, going back to 5th-6th century BCE [2]. But significant advances in comparative medicine began in the 1970s. And thus, the great universities of

the world have paid special attention to this branch of science. It is noteworthy to say that significant advances in medicine were not possible without the use of animal models, and increasing the longevity and raising the level of health of human societies is heavily owed to animals [3].

2. Application of Animal Models in Iran

The first modern *in-vivo* researches in Iran coincided with the establishment of universities, veterinary colleges [4], the Pasteur Institute of Iran [5], and the Razi Vaccine and Serum Research Institute

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[6], more than 90 years ago. However much earlier, many great Iranian scientists, such as Abū Bakr Muhammad ibn Zakariyyā al-Rāzī (854–925 CE) [7], used animals in his medical research. An overview of the Google Scholar data between 2000 and 2019 suggests the publication of 30000, 40000, 20000, 200, and 16000 articles with a focus on the rat, mice, rabbit, hamster, and guinea pig models, respectively. The sum of these articles are approximately 106000. Furthermore, many studies have turned their attention to fish, ruminants, carnivores, and other species that are not mentioned in this article. Therefore, considering the number of animals used in each research from the beginning until now, we reached a stunning number in empirical research.

3. Comparative medical necessities

Despite the evolution of medical *in-vitro* studies, still the most similar environment to the human body is the body of animals. However, moral considerations limit the use of animals. For Iran to enter this domain, it has to make profound changes, both hardware and software; A) the construction of a central location with a special architecture and facilities for rearing laboratory animals, which has to be equipped with surgical, imaging, recovery and necropsy rooms, and advanced laboratories, and B) to training experts in the field of comparative biomedical sciences.

To sum up, the requirements of *in-vivo* studies are: 1) A building with a unique structure to be able to work with animal models in a way that the ethics of working with laboratory animals are fully respected. 2) Rising the awareness of university students and researchers with respect to principles of working with laboratory animals through workshops and training courses. 3) Ensuring the validity of the experimental *in-vivo studies*, so that it can be generalized to mankind. 4) Saving on project budget. 5) Creating diversity in animal models in such a way that any type of research becomes possible. 6) Create an economic advantage by producing lab animals such as transgenic animals. 7) Creating a convergence between engineering and medical research, for example, in the field of tissue engineering and regenerative medicine. 8) Analyze the existing animal models to improve research methods, and 9) Introduce new animal models.

Although the authors affiliation of the papers published in the comparative medical field in Iran are from a wide range of clinical and basic science specializations backgrounds, it should be noted that specialty in comparative biomedical sciences is a completely unique category. Therefore, the advice of these experts before designing a project as well as performing it, is an indispensable necessity. Trial and error on animal models should be prevented. In other words, repeating of a mistake does not make it correct.

Fortunately, Shiraz University of Medical Sciences has begun a fundamental reform in comparative medicine by constructing a referral center for comparative and experimental medicine while at the same time it has established a comparative biomedical science discipline for Ph.D. degree. Clearly, a constructive dialogue between experts and the governing bodies is essential for the advancement of this knowledge.

4. Prospective of Comparative Medicine

From the prospective of comparative medicine, the optimal and ethical use of animals is seen to promote human health. In this way, the dignity and welfare as well as the restrictions on the use of animals should be considered. In addition, comparative medicine as the medicine of future is a wide overlapping area of medicine and veterinary medicine [8]. In other words, thinking of “One Medicine, One Health” should replace the separation of different branches of medical sciences. As a result, the outcome of treating an ill animal can be transferred to human medicine and vice versa [9]. In this way, not only the creation of experimental lesions in animals are minimized but also the human and animal community will benefit from one another [10].

It is important to note that it is not only mouse and other conventional laboratory animals, which are similar to human, but other animals can be considered [11]. Therefore, to generalize the results of animal research for humans, the use of treatments for other spontaneous animal diseases such as dogs is essential, particularly the genetic similarity of an animal model with human is very important in each case [12]. Since the com-

parative medicine is the future, “One Medicine” should be the evolved form of comparative medicine.

5. Conclusion

Iran has the largest number of *in-vivo* medical research in the Middle East. It seems that the new approach in the field of comparative medicine and comparative biomedical sciences will lead to dramatic scientific achievements, and until then we must be patient.

Ethical Considerations

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Conflict of interest

No conflict of interest to declare.

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