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Establishment of the Comparative Oncology Program in Iran

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ABSTRACT

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The role of comparative oncology has been highlighted in recent years. It refers to a discipline in which cancers among pets are studied in terms of etiology, biology and therapeutic approaches. This part of translational research finds the evidence needed to compare pets' cancers with similar human cancers in order to generalize the obtained results to medical oncology. As with humans, the prevalence of cancers is increasing among pet animals. Comparative oncology pays particular attention to malignancies in dogs due to the existing similarities between this animal and human-kind in terms of etiology, morphology, biology, clinical course, prognostic factors and therapeutic methods. Some believe that comparative oncology will find a place in clinical trials of medical oncology in the near future. This is because dogs with cancer may be able to replace human patients in phase I and II clinical trials. The National Cancer Institute (NCI) has launched the Comparative Oncology Trials Consortium (COTC) to provide evidence to replace humans with dogs in phase I and II clinical trials. The increasing interest of Iranians in pet animals has led to an increase in the number of academic medical centers and private veterinary hospitals in recent years. It seems that the incidence of malignancies in dogs has been rising in recent years due to the sudden increase in the pet population, the use of advanced imaging systems in pet animal treatment centers and the development of laboratory centers. The increasing incidence of cancer among pets can prepare the ground for Iranian researchers to enter the arena of the comparative oncology program. Authorities are recommended to establish comparative oncology infrastructures in collaboration with cancer research centers and academic veterinary clinics and to conduct studies on etiology, molecular epidemiology and common risk factors; this can facilitate Iran's accession to networks such as the COTC.

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The role of comparative oncology has been highlighted in recent years. It refers to a discipline in which cancers among pets are studied in terms of etiology, biology and therapeutic approaches¹. This part of translational research finds the evidence needed to compare pets' cancers with similar human cancers in order to generalize obtained results to medical oncology².

As with humans, the prevalence of cancers is increasing among pet animals². In recent decades, due to the increased level of health care and the provision of advanced veterinary services, the epidemiologic stage of diseases has shifted from infections to degenerative diseases in pet animals²⁻³. Meanwhile, the increased incidence of neoplastic diseases has attracted the attention of veterinarians.

Pets include a wide range of domestic animals; however, in comparative oncology, researchers pay particular attention to malignancies in dogs. The physiological and anatomical characteristics of dogs are very similar to those of humans and studies show that mammary, gastrointestinal, skin, hematological, sarcoma tumors, etc. are comparable to those of humans, in terms of etiology, morphology, biology, clinical course, prognostic factors and therapeutic methods⁴.

Human breast cancer (HBC) is the most important malignancy in humans, and canine mammary tumor (CMT) is the most important tumor in female dogs; therefore, we have focused on these two tumors in our study. Epidemiological statistics show that the incidence of CMT in the U.S. is 198 per 100,000 dogs⁵. Meanwhile, in the U.S., the incidence rate of HBC was estimated to be about 125 per 100,000 people in 2017⁶. Over the past two decades, many valid papers have highlighted the similarities between CMT and HBC from basic research to clinical practice³.

Some believe that comparative oncology will play a

pivotal role in clinical trials of medical oncology in the near future⁷. This is because dogs with cancer may be able to replace human patients in phase I and II clinical trials⁷.

The National Cancer Institute (NCI) launched a comparative oncology program in 2003, in collaboration with the Center for Veterinary Medicine (based in the U.S.) and ever since, extensive research has been conducted in the area of common risk factors, biological behaviors and treatment responses at this Institute⁸. The Comparative Oncology Trials Consortium (COTC) has been recently established with a network of 20 academic veterinary oncology centers managed by the NIH-NCI Center. The NIH-NCI has established the consortium to provide evidence to replace humans with dogs in phase I and II clinical trials⁸ (Figure 1). Accumulating evidence confirms the concordance of pharmacogenomics between humans and dogs⁹⁻¹¹.

The increasing interest of Iranians in pet animals has led to an increase in the number of academic medical centers and private veterinary hospitals in recent years. As of 2017, 21 pet hospitals were providing service in Tehran¹². Due to the lack of a pet cancer registry program in Iran, there is no reliable evidence on the incidence of various types of veterinary tumors. However, Iranian clinicians and veterinary pathologists believe that the incidence of malignancies has been rising in recent years. This can be attributed to the sudden increase in the pet population, the use of advanced imaging systems in pet animal treatment centers and the development of laboratory centers (cytology and pathology laboratories). A review of pathology records and reports, documented from 2015 to 2017 at our pathology laboratory shows that 319 cases of malignancy were found in 503 biopsy and surgical samples collected from mammary masses of dogs (unpublished data). The author had previously performed similar studies and these results were in sup-

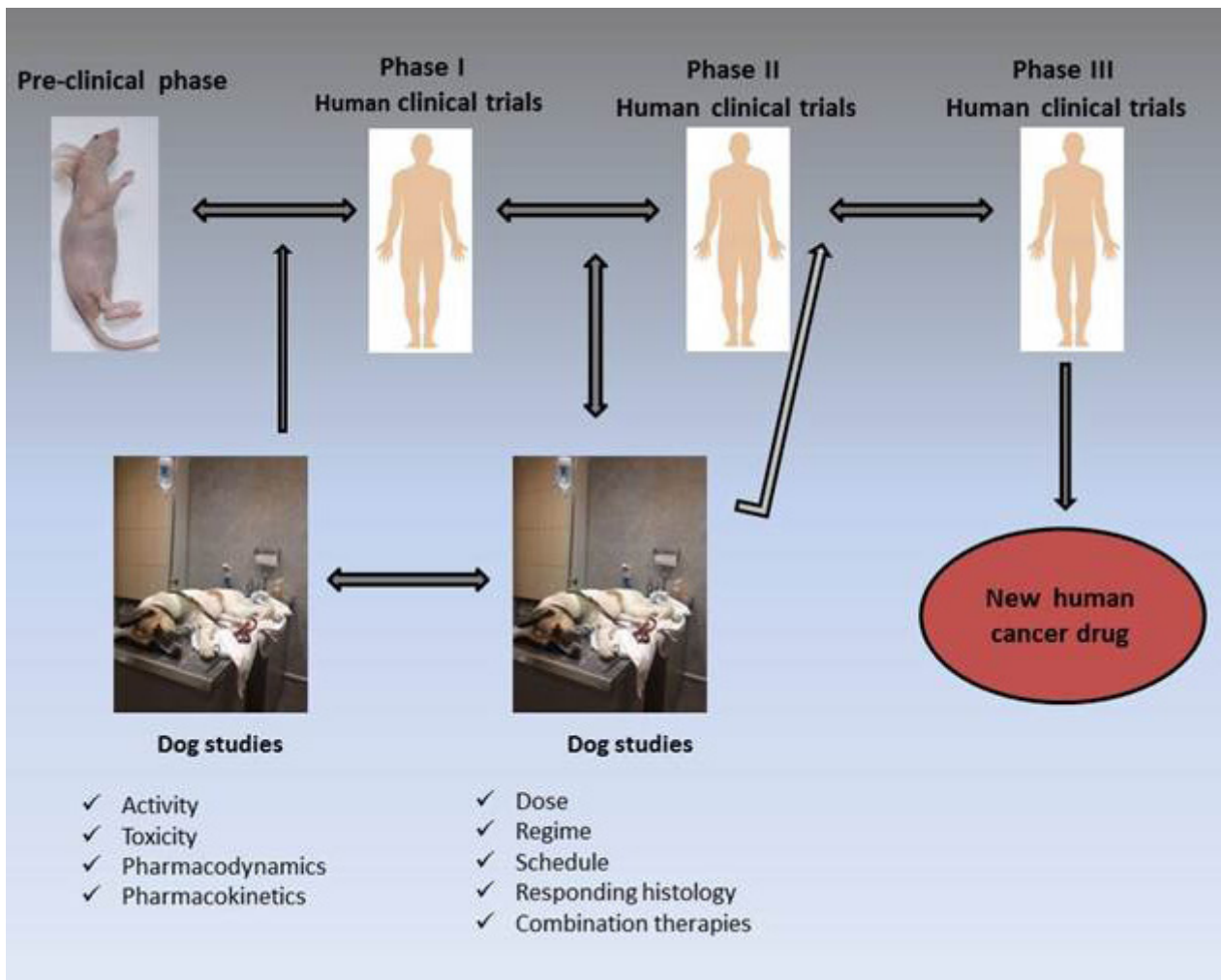


Figure 1. Schematic diagram of comparative oncology program. This diagram has been adapted from Comparative Oncology Program/ Center for Cancer Research⁸. As illustrated, the main goal of comparative oncology program is to replace the dogs with cancer instead of human in clinical trials.

port of other works¹³⁻¹⁴. These statistics only belong to this laboratory; however, more comprehensive data may be obtained after reviewing veterinary educational centers located in Tehran and other cities in Iran. The increasing incidence of cancer in pets can prepare the ground for Iranian researchers to enter the arena of comparative oncology program. It should be noted that comparative oncology does not merely benefit humans; pets with cancer will also benefit from this

program. Like humans, the treatment of animals with cancer is very costly and many owners cannot afford relevant treatment costs. One of the global objectives of the comparative oncology program is to help provide new and standard treatments for pets with malignancies.

Authorities are recommended to establish comparative oncology infrastructures in collaboration with cancer research centers and academic veterinary clinics and to

conduct studies on etiology, molecular epidemiology and common risk factors; this can facilitate Iran's accession to networks such as the COTC.

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