

Cancer and virus

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In the general population, excluding violent deaths, cancer is the first cause of mortality, reaching 24% of the total, followed by cardiovascular disease, accounting for 22%⁽²⁾. Due to the advances in sanitary conditions and the use of antibiotics, currently infectious diseases account for only 5% of deaths. Similarly to what occurs with other diseases, both primary and secondary prevention as well as early detection, associated with increasingly more effective therapeutic approaches, constitute invaluable resources to the reduction of morbidity and mortality in neoplastic processes.

World statistics demonstrate that one among three individuals will develop some form of cancer at a certain moment of their lives, and the projections suggest that its incidence will increase dramatically, mainly in developed countries⁽⁶⁾.

According to the Instituto Nacional do Câncer (INCA), approximately 518,510 cases of cancer were diagnosed in Brazil in 2012, including 257,870 men and 260,640 women, and approximately 200,000 people died due to some form of this disease.

These data become even more astounding when we bear in mind that cancer is one of the most ancient diseases that have afflicted mankind. Furthermore, approximately 20% of all cancers are related to an avoidable cause, namely obesity⁽³⁾.

Accurately speaking, cancer is not one disease, but several diseases, which present a common characteristic: uncontrolled cell proliferation.

The economic aspects linked with this group of diseases are also astonishing. The US National Cancer Institute has an annual budget of 5 billion dollars. It is estimated that it has invested over 90 billion dollars in research, prevention and cancer treatment since 1971⁽⁵⁾. Moreover, pharmaceutical industries have allocated considerable resources for research into the development and feasibility of potential diagnostic and therapeutic agents in the oncologic area.

For some cancers, the mortality rate has diminished slightly in the last five years. For example, prostate cancer mortality has decreased 3.3%, breast cancer 2.2% and lungs 1.6%, respectively. On the other hand, it has risen in some other cancers such as liver (2.2%) and pancreas (0.6%)⁽¹⁾.

The question that remains to be answered is: are we winning or losing this battle?

Doubtlessly, our knowledge about cancer has improved exponentially in the last decades. The use of modern technologic tools, including new concepts such as genomics, proteomics, metabolomics and epigenomics, has allowed a better understanding of cellular, molecular and genetic aspects of neoplastic processes.

Despite these advances, grasping the primary cause of neoplastic processes still remains controversial. Until 1910's, the known causes of human cancer were restricted to chemical products such as paraffin and some dyes, soot and smoke from chimneys or exposure to ionizing radiation, sadly demonstrated by Marie Curie's leukemia. However, as these potential causes were insufficient to explain all cases, the infectious theory, more specifically the viral one, has remained tantalizing.

Peyton Rous was responsible for the objective demonstration of this possibility. In 1910, he successfully transmitted a fusiform cell sarcoma from one hen to others in repeated generations, making sure that only cell free liquid would be inoculated⁽⁸⁾. His data were corroborated and other researchers also obtained similar results, experimentally working with other animals and other forms of cancer.

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The presence of viral agents in human tumors was demonstrated only in the 1930's, though its causality relations remained obscure.

In 1962, the cover article from *Life* magazine suggested that cancer could be infectious, hence leading to predictable consequences such as the segregation of contaminated individuals, as it was recommended for tuberculosis patients⁽⁴⁾.

In this issue of Brazilian Journal of Pathology and Laboratory Medicine (BJPLM), an appropriate review of acknowledged cancer causing viruses is presented, addressing oncogenesis mechanisms and the importance of laboratory medicine in this area of knowledge⁽⁷⁾.

Although Rous's initial studies were not properly appreciated at that time, in 1966 he was awarded the Nobel Prize of Physiology and Medicine. During his ceremony speech, manifesting the humility of true researchers, he declared that the virus theory of cancer still required further investigations and clarification⁽⁹⁾.

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