WORLD DECLARATION
FOR RESEARCH ON CANCER

There is a need for the active involvement of citizens, enterprises, institutions and leaders in diverse areas and activities to join efforts to promote research in order to improve survival rates and the quality of life of cancer patients.

Cancer is projected to become the leading cause of death worldwide, and an increase of 21.6 million new cases per year is foreseen by 2030 (1). The loss years of life and productivity together with disability from cancer account for the largest economic cost on a global scale, compared to other causes of death including infectious diseases (2). Urgent action must be taken to prevent unnecessary deaths and suffering due to cancer and to reduce the great economic burden and social impact of this disease.

This initiative is conceived as a contribution to the goals of the World Cancer Declaration (3) to promote research on cancer and avoid setbacks in its development in order to succeed in making scientific advances towards our ultimate goal: to defeat cancer.

SOCIAL IMPACT OF CANCER

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SOCIAL IMPACT OF CANCER

It is estimated that cancer will be the leading cause of death worldwide and an increase of 21.6 million new cases per year is foreseen by 2030. According to GLOBOCAN report, in 2012 there were 14 million new cases diagnosed and 8.2 million cancer-related deaths worldwide (1).

As cancer mortality rate has declined globally, the number of survivors has increased. This trend shows that progress is being made to fight this disease, but there is still much work to do. Prevention campaigns also play key role in this war, since a third of all cancers could be avoided with a healthy lifestyle (4). However, the main risk factor for developing cancer is aging. Age, coupled with smoking and obesity, forecast an increasing incidence of cancer in the coming years, expecting 16.8 million new cases diagnosed worldwide in 2020 and 21.6 millions in 2030.

Although cancer is considered a disease that mainly affects developed countries, trends nowadays are changing and now more than 60% of new cancer cases in the world arise in Africa, Asia and Central and South America. These regions account for 70% of all cancer deaths. Cancer is a growing problem in these countries, where incidence is expected to increase, reaching 70% of new cases diagnosed worldwide by 2030 (1).

ECONOMIC IMPACT
OF CANCER

The loss years of life and productivity together with disability from cancer account for the largest economic cost on a global scale, compared to other causes of death including infectious diseases (2).

According to the American Cancer Society the total economic impact of premature death, lost of productivity and disability from cancer worldwide was $895 billon in 2008. This figure represents 1.5% of World´s gross domestic product. **These estimates contrast with the global investment in cancer research on 2008, $19 billion (2), accounting for just a 2% of the economic impact derived from the disease.**

The WHO and global health experts believe that significant costs from cancer could be mitigated by targeted, cost-effective interventions. Without a substantive global response, cancer could overwhelm public health systems, threaten social structures, and undermine economic development efforts.

It is necessary to act fast to avert unneeded death and suffering from cancer and to reduce its devastating economic impact.

The implementation of prevention, early detection and treatment strategies could potentially save 2.4 million to 3.7 million lives every year, accounting the vast majority in low and middle income countries (5). Moreover, it has been estimated that the implementation of these strategies would have a global economic impact of over $400 billion.

These predictions calls for greater supportive efforts on different fields. One of the most important areas is to continue to support and promote research on cancer as a key tool for controlling the progression of the disease. Joining efforts towards the discovery of a definitive cure for cancer or transforming the disease into a chronic illness with a high survival rate.

Cancer findings to date are responsible for the current opportunities to prevent up to 50% of cancer, for the 50% survival rate among those who are diagnosed with the disease and for the development of less aggressive treatments of some tumors, thus improving the quality of life of cancer patients.

IMPORTANCE OF CANCER RESEARCH

The predicted increase in the burden of cancer calls for greater supportive efforts on different areas. One of the most important areas is to support and promote research on the causes, prevention and early detection of cancer as a key foundation for controlling the disease. This increased investment will complement vital efforts towards the discovery of a cure for cancer or transforming the disease into a chronic illness, both approaches translating into higher survival rates.

Currently, oncology is one of the most exciting fields in biomedical research because of the many high impact results that are being continuously achieved by the researchers.

The beginning of cancer history is based on the humoral theory of disease articulated by Hippocrates. It postulated that the disease was due to an excess of black bile. However the modern era of cancer research started in the 19th century and was led by Rudolf Virchow and his colleague, who stated that cancer is a disease of the cells. This assumption was later confirmed by Theodor Boveri, who in 1914 postulated that the chromosomes were carriers of hereditary information and that cancer was due to defects in the chromosomes (6).

The exciting progresses in cancer research during the past century has tended parallel to the advances in fundamental biology and biomedical research. Thus, in the late 19th century and early 20th century, the emphasis in cancer research was on cytology and genetics. Those investigations were followed by genetic studies in mice and humans that continue to play a major role in cancer research nowadays. These led to studies in the field of biochemistry and metabolism, which were promoted in the 20th century by **Dr. Severo Ochoa,** and were then followed by investigations focused on DNA and pathways of signal transduction.

During the last decade, the research efforts have been focused on the studies on gene transcription, epigenetic control of gene expression, genomics and systems biology, resulting in the identification of markers that allow an early diagnosis of the disease, as well as a correct classification and prognosis. In 2002 the FDA approved the first drug directed towards a genetic alteration unique of the tumoral cells, Imatinib. The finding of this molecule with ability to block the tumorigenic capabilities of the cell led to a new era in the field of cancer research towards the identification of new therapies with the capacity of interfering with proteins involved in cancer initiation and progression. During the last years, many target directed drugs have been approved for specific cancer treatment, such as, trastuzumab, erlotinib, lapatinib, bortezomib, and have improved the overall survival rate of the disease and the quality of life of cancer patients (7).

RESEARCH MILESTONES

Research is a long-distance run where, through a collaborative effort of researchers from diverse fields, work together towards a common aim: to defeat cancer.

It is estimated that it takes approximately 15 to 20 years to take a promising result obtained in the laboratory to patients. It is necessary to provide stability to cancer research towards the discovery of a definitive cure for cancer or transforming the disease into a chronic illness with a high survival rate.

Identification of the changes responsible for the uncontrolled growth of the tumor cells has promoted the development of target directed drugs specifically designed to beat changes, reduce cell growth rate and the spread of those tumor cells to the organism. There is a number of approved drugs that exemplify the importance of research to defeat cancer, such as:

- **VACCINE AGAINST THE HUMAN PAPILLOMAVIRUS:** Human papillomavirus is responsible for over 50% of cervical cancers and 20% of head and neck cancers, being considered the most common sexually transmitted infection (8). Thus, in those countries lacking cervical cancer screening campaigns, this disease has become the second most common gynecological cancer an the second cause of death related to cancer.

  In 2006 the FDA approved he first targeted vaccine capable of preventing the infection by the most predominant strains of the papillomavirus that are associated with cancer. The discovery and development of this vaccine has been a major breakthrough in the fight against these types of cancers, reducing in a 50% the incidence of cervical cancer among women (9).

  Unfortunately, the majority of women in low- and middle- income countries, do not have access to care that can prevent the onset of cervical cancer or detect it early enough for a cure. As a result, many women are diagnosed too late to benefit from lifesaving treatments. Moreover, in those countries cervical cancer account for over 10% of the global economic cost of cancer (2). Thus, it is necessary to join forces to be able to globally implant research improvements.

- **IMATINIB DISCOVERY:** This specific inhibitor directed toward an aberrant protein fusion, bcr-abl, responsible for the initiation of the chronic myeloid leukemia cells was the initiator of a revolution in the discovery of target directed drugs. Treatment with Imatinib managed to turn a fatal disease into chronic one, resulting in a huge impact on the survival of patients (10). Subsequent investigations showed that other could benefit from a similar positive effects of treatment.

- **TRASTUZUMAB:** A detailed study of the most aggressive breast cancer cells led to the identification of a surface protein, Her2, responsible for its malignancy. The discovery of this protein, expressed in 20% of breast tumors, allowed the development of a drug, Trastuzumab, which is specifically targeted against it. Trastuzumab is able to slow down or even stop the growth of tumor cells (11). Thus, this drug has caused a revolution in the treatment of breast cancer patients, significantly increasing the survival of women with Her2 and the improving the clinical outcome.

- **FECAL IMMUNOCHEMICAL TESTING:** The design of a test that allows a population based screening for colorectal cancer by the determination of specific proteins in feces and blood (12). This screening tool, through non-invasive and low cost method, allow the identification of colon cancer in early stages of the disease and improve significantly the cure rates.

FACING CHALLENGES

Modern cancer research faces great challenges that could shorten the time needed for research to defeat cancer.

Current great challenges of oncological research include:

- Developing effective prevention and early detection strategies. **Improve screening methods to identify the various types of cancers at early stages, thus enabling improved diagnosis, treatment and especially in the survival of patients .**
- Improving diagnostic procedures. **Develop new diagnostic precision tools that allow identification, evaluation and monitoring of the disease, and improving the patient quality of life.**
- Developing treatments that save lives at a lower cost. **Implement new effective treatments in the clinical practice that effectively attack the disease , improving the survival of patients.**
- Spreading international collaborating networks. **Create international research networks that will address cancer research globally and with different perspectives to accelerate the achievement of results.**
- Establishing sustainable funding models. **Reaching the society and governments to visualize the importance of cancer research in global perspective and establish a worldwide strategy on research to stabilize cancer research funding.**
- Increasing research training opportunities. **Promote training of scientific talent within each country to be part and contribute to the global progress of cancer research.**
- Creating the infrastructure to allow a fast implementation of the research findings, within countries, to control cancer. **Establish a research structure that allows countries to be at the forefront of progress and lets to a rapid implementation of the latest achievements (facilities dedicated to research, cancer registries, active involvement of the academia, policies that promote research).**

CALL TO ACTION

It is necessary to make a call to action to join efforts of the society, organizations, institutions and leaders of different areas to promote research and continue to improve survival rates and quality of life of cancer patients.

The proposed goals for 2025 to promote cancer research worldwide, with the final aim of defeating cancer and improving the quality of life of cancer patients are:

- Increase social awareness and knowledge about the value and impact of cancer research efforts by establishing September 24th as the **World Cancer Research Day.**
- **Enhance sustainable financial sources for cancer research** in each country by involving individuals, companies and institutions.
- **Promote international collaboration.**
- **Provide training in cancer research.**
- Encourage the development of **infrastructures for cancer research** in each country.

WORLD CANCER RESEARCH DAY

The World Cancer Research Day aims to create and consolidate a yearly momentum to raise awareness and commitment for research on cancer in order to increase survival of cancer patients, to facilitate access to scientific advances worldwide and to reduce the global burden of cancer.

We propose September 24th in commemoration of Dr. Severo Ochoa's birth, Spanish Nobel Prize in Physiology and Medicine.

Severo Ochoa is one of the most important Spanish researchers. Born in September 24th 1905, in Luarca, Asturias, Dr. Ochoa was a leader and promoter of modern molecular biology with his findings on cellular metabolism and the genetic code (13).

During the molecular biology revolution, Dr. Ochoa became interested in the genetic code. In 1953 with the discovery of the structure of the DNA by Dr. James Watson and Dr. Francis Crick new questions arose in order to understand its function. Dr. Ochoa addressed the identification of the mechanism that allowed the translation of a 4 letter-based language characteristic of DNA and RNA to a 20 word vocabulary of the amino acid, which are the units responsible to form the proteins.

In 1959 Dr. Severo Ochoa was awarded with the Nobel Prize in Physiology or Medicine, shared with his disciple Dr. Arthur Kornberg, for his findings on the biological synthesis mechanisms of the ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). Their discoveries led to deciphering the genetic code and the replicative ability of the nucleic acids, the molecules responsible for the hereditary information.

The results obtained by Dr. Severo Ochoa have set the grounds for major improvements in molecular biology and genetic code research that have helped to develop tools and key knowledge to deciphering the cancer.

PROMOTING ORGANIZATIONS

The Spanish Association Against Cancer, AECC, is a private nonprofit organization which has been working since 1953 to fight cancer. The AECC is integrated by patients, families, volunteers and professionals who work together to prevent, raise awareness, accompany cancer patients and their families and fund cancer research projects that will enable better diagnosis and treatment of cancer.

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- Fundación Española para Ciencia y la Tecnología
- Fundación para la Excelencia y la Calidad de la Oncología
- Sociedad Española de Anatomía Patológica
- Sociedad Española de Cuidados Paleativos
- Sociedad Española de Hematología y Hemoterapia
- Sociedad Española de Hematología y Oncología Pediatrica
- Sociedad Española de Neumología y Cirugía Torácica
- Sociedad Española de Senología y Patología Mamaria
- BreastCancerResearch Group
- Sociedad Española de Oncología Médica
- Sociedad Española de Oncología Radioterápica
- Tratamiento de Tumores Digestivos

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