Cancer prevention and control in Peru: The role of the National Institute of Neoplastic Disease (INEN)

Tatiana Vidaurre*, Co-ordinator, Master's Programme, Cayetano Heredia University, Peru; **Rodrigo Motta,** Medical Oncologist, National Institute of Neoplastic Diseases, Peru; **Luis Andre Salinas Agramonte,** Medical Oncologist, National University of San Agustín, Peru; **Guillermo Valencia Mesías,** Medical Oncologist, National Institute of Neoplastic Diseases, Peru; **Patricia Elizabeth Rioja Viera,** Medical Oncologist, National Institute of Neoplastic Diseases; Sandro Casavilca Zambrano, Director, National Tumour Bank, National Institute of National Endocrinology; **Stéphane Bertani,** co-Director, International Joint Laboratory of Molecular Anthropological Oncology and Oncogenic, National Tumour Bank Peru; **Luis Mas,** Medical Oncologist, National Institute of Neoplastic Diseases, Peru; **Mónica Calderón Anticona,** Clinical Oncologist Assistant, Department of Medical Oncology, National Institute of Neoplastic Diseases; **Silva Neciosup Delgado,** Medical Oncologist, Cayetano Heredia University, Peru; **José Luis Rojas,** Professor, Clinical Epidemiology Unit, Alberto Hurtado School of Medicine, Cayetano Heredia Peruvian University and Executive Director, Cancer Epidemiology and Statistics Department, National Institute of Neoplastic Diseases; **Kavita Sarwal,** Transformation Partner; **Victor Castro*,** Medical Oncologist and Researcher, National University of San Marcos, Peru; and **Simon B Sutcliffe***, President, Two Worlds Cancer Collaboration, Canada and Editor-in Chief, Cancer Control

** Co-senior authors*


TATIANA VIDAURRE


RODRIGO MOTTA


LUIS ANDRE SALINAS AGRAMONTE

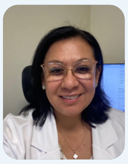

GUILLERMO VALENCIA MESÍAS


PATRICIA ELIZABETH RIOJA VIERA


SANDRO CASAVILCA ZAMBRANO


STÉPHANE BERTANI

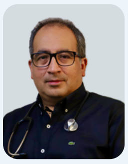

LUIS MAS


MÓNICA CALDERÓN ANTICONA


SILVA NECIOSUP DELGADO


JOSÉ LUIS ROJAS


KAVITA SARWAL


VICTOR CASTRO


SIMON B SUTCLIFFE

Peru has had a national strategy for cancer control since 2012, known as the "Plan Esperanza", which has been strengthened by subsequent recent legislation. This article describes how this strategy had lead to significant progress in reducing cancer-related morbidity and mortality in Peru and has brought in universal access to cancer care, wider education and research, as well as providing an integrated approach to population-based cancer control.

Latin America and the Caribbean have an estimated cancer incidence rate of 186.5/ 100,000 and a mortality rate of 86.6/100,000 cases *(1)*. Cancer incidence will grow from 1.5 million new cases to more than 2.4 million by 2040, a 65% increase projected to be most pronounced in Central America (70%) and South America (65%) *(1–3)*. The International Agency for Research on Cancer (IARC) estimated 69,869 new cases and 34,976 deaths from cancer in Peru in 2022, with a cumulative risk of 17.02% for developing cancer *(4)*, placing Peru among the countries with an intermediate level of cancer incidence *(2,4)*.

The Peruvian Death Information System (SINADEF) reports cancer mortality increasing by up to 26% in the last five years, from a ratio of 14.5 deaths per 100,000 people in the first half of 2019 to a ratio of 18.3 in the same period in 2024, reflecting failure of early detection, timely access to quality health services, and shortage of drugs for cancer treatment *(5)*. Cancer represents a growing problem for public health in Peru, with breast and cervical cancer control being a national priority *(4)*. Accordingly, public policies advancing population-based cancer control in Peru remain a health priority.

Public policies for cancer control

Established in 1939, the National Institute of Neoplastic Diseases (INEN), a decentralized public agency, has participated in various regulations for cancer control in Peru (Figure 1) *(6)*, becoming the leading institution for cancer prevention and control in Peru in 2006 *(7)*. Two regional centres have been established – in northern Peru in Trujillo, the Instituto Regional de Enfermedades Neoplásicas Norte (IREN Norte), and in Arequipa (Southern Peru), the Instituto Regional de Enfermedades Neoplásicas Sur (IREN Sur) *(8)*. In 2007, the "National Plan to Strengthen Cancer Prevention and Control in Peru" to reduce cancer incidence, morbidity, and mortality was published *(8)*.

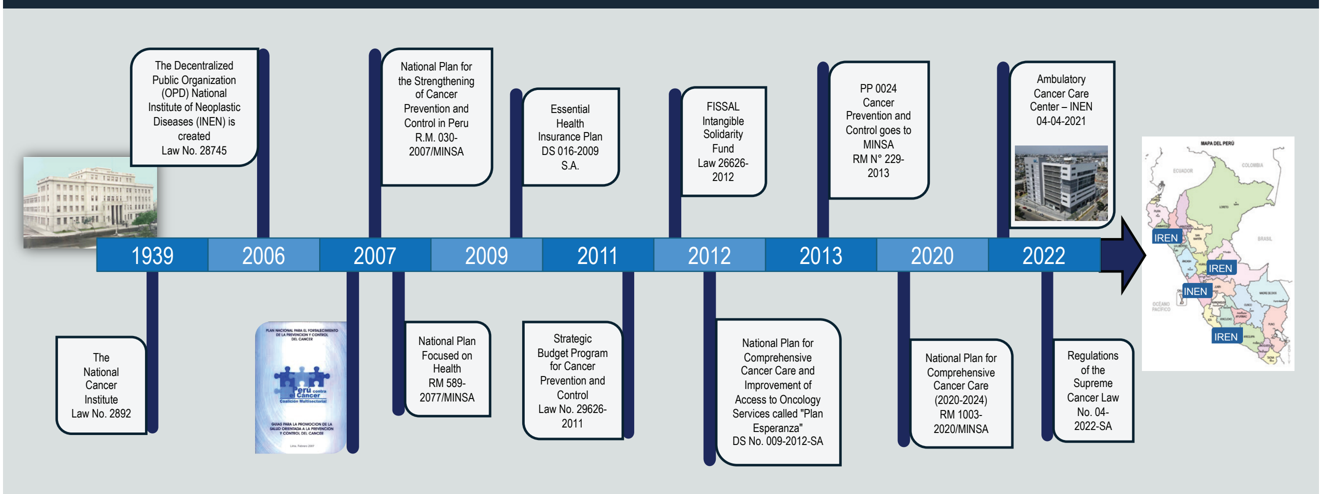
In 2012, the government approved "Plan Esperanza", a National Plan for Comprehensive Cancer Care and Improvement of Access to Oncology Services in Peru, to expand and improve access to oncology services throughout the country *(6)*. Plan Esperanza focused on promoting healthy lifestyles, cancer prevention, early detection, comprehensive care and treatment, and the decentralization of medical care for cancer patients through optimizing cancer care in all regions of Peru *(6)*. Between 2011 and 2012, the National Institute of National Endowment for National Health, with technical support from INEN, >7,000 health facilities were able to budget and allocate resources for cancer prevention, health promotion, and early detection of the five most common cancers – stomach, breast, cervical, prostate, and lung cancer – in 25 regions of Peru *(10)*. Publicly funded through Comprehensive Health Insurance (SIS), Plan Esperanza enabled equitable access to comprehensive health services, providing free basic and specialized prevention for the general population, particularly those living in poverty *(10)*. Overall, between 2009 and 2015, the total budget for cancer control increased more than sixfold, from 152 million soles to 936 million soles, an average annual growth of 35.4% *(10)*, with a total budget of 1.2 billion soles *(1)* for the fight against cancer by 2025 *(11)*.

An imPACT Review commissioned by the Ministry of Health (MINSA) in 2014 approved and validated the Plan Esperanza cancer control strategy and guidelines, recognizing the comprehensive, interdisciplinary, and cross-sectoral approach to cancer control in Peru; the importance of capacity expansion through decentralization, facility expansion, modernization and renovation of equipment, and training of health professionals; the focus on safety, quality, and standards of practice and care; and the value of social participation *(12)*. The review highlighted the need for effective leadership in cancer management (government, nongovernmental organizations, institutions, INEN, civil society), and emphasized the need for stable secure governance and financing as fundamental elements for implementation of an effective population-based cancer control strategy *(6)*.

National Plan for Comprehensive Cancer Care (2020–2024)

In 2020, MINSA, with INEN and other entities, approved the continuation of Plan Esperanza as a National Plan for Comprehensive Cancer Care (2020–2024) *(12)*. Based on 18 indicators of risk, mortality, and health services response determinants, MINSA conducted a territorial vulnerability analysis, identifying the most vulnerable regions for cancer prevention and control responses – Huánuco, Pasco, Ayacucho, Amazonas, Cajamarca, Loreto, and San Martín *(12)*. Short-term priority interventions were authorized to strengthen cancer prevention and control interventions *(12)*. The burden of leukaemia, represented by the number of years of healthy life lost (YHLL), exceeded that of cancers with higher incidence rates, e.g., stomach cancer, making treatment of leukaemia a priority in children and adolescents. According to the number of YHLL, cervical and breast cancer were third and

Figure 1: Public cancer control policies



fourth. Other cancer priorities included hepatocellular, lung, colorectal cancers, and lymphomas *(12)*.

The National Plan for Comprehensive Cancer Care recognizes the need to strengthen the decentralization of oncology services in Peru, allowing provision of oncology care in seventeen of the twenty-five regions, including the decentralization of oncology care in Metropolitan Lima itself, where oncology care is provided in 11 hospitals, in addition to INEN *(12)*. Centralization of human resources is reflected by 73% of the 204 medical or clinical oncology specialists, 67.9% of the 221 pathology specialists, and 82.6% of the 69 radiation oncologists registered nationwide being based in Lima and Callao. Per million inhabitants, the ratio of specialists in clinical oncology, surgical oncology, radiation oncology, and pathology is 1 per 6.4, 5.6, 2.2, and 6.9 *(12)*.

The redesign of the "Cancer Prevention and Control" budget 2024 seeks to strengthen strategic interventions in promotion, prevention, screening, and management of premalignant lesions, which have demonstrated a positive impact on cancer control with Plan Esperanza. The budget is also directed to cancer diagnosis and treatment (care for cervical, breast, stomach, prostate, leukaemia, lymphoma, lung, skin, liver, and colorectal cancers), with the incorporation of 0.5% of the total budget for palliative care *(13)*.

Integrated Network of Oncology Services

The National Integrated Network of Oncology Services, led by INEN, provides nationwide coverage for early detection, definitive diagnosis, staging, and treatment of cancer. Decentralization has been achieved through creation of the regional institutes in Huancayo/Junín (IREN Centro) and Iquitos/Loreto (IREN Oriente), supported directly through public investment. The National Oncology Network (RON) has established oncology units in each region of the country to promote the implementation of specialized comprehensive cancer care centres for adequate and timely care of cancer patients from different parts of the country, with the goal of decentralizing cancer treatment and follow-up [19]. Additionally, the Network ensures a referral and counter-referral system whereby cancer cases entering the health system through primary care can be referred to the nearest secondary-level hospitals, and then to the Regional Institutes of Neoplastic Diseases (IRENES). For highly complex cancer cases, referral is made to INEN.

The Childhood Cancer Law

Published studies reveal that 30% to 80% of paediatric patients suspend or abandon cancer treatment due to late diagnosis, drug toxicity, and difficulty accessing various treatments *(14,15,16)*. In 2019, Peru was chosen as an index country to combat the high dropout rate reported in the country (~50%) by the World Health Organization Global Initiative against Childhood Cancer *(17)*. In September 2020, the Law on Medical Emergencies for the Timely Detection and Comprehensive Care of Childhood and Adolescent Cancer was approved, ensuring universal coverage and referral to a tertiary care hospital within 72 hours for children and adolescents (<18 years of age) *(18)*. Social benefits are provided for parents of children with cancer, such as unpaid leave for up to one year from their workplaces, allowing for ongoing support and greater adherence to treatment.

The National Cancer Law

The National Cancer Law, based on the Plan Esperanza model, is promoted by the Peruvian Cancerology Society and INEN Medical Association and guarantees universal, free, and priority health services, ensuring equitable, accessible, comprehensive cancer services and coverage for cancer patients, and allowing immediate enrolment in Comprehensive Health Insurance (SIS) for patients without Social Health Insurance (EsSalud), private insurance, or insufficient health coverage *(19)*.

The law is implemented and financed through institutions that administer public or private health insurance funds, in addition to other public financing mechanisms, and guided by results-based budgeting for cancer prevention and control, among other related programmes. The Ministry of Health uses differentiated acquisition mechanisms (DAMs) for pharmaceutical products, medical devices, and health services necessary for the treatment of cancer, according to evidence supporting clinical effectiveness and safety compared to available conventional care *(19)*. The Executive Branch approves the acquisition of new technologies through the National Center for the Supply of Strategic Health Resources (CENARES) *(19)*.

Access to cancer medicines

The Pan American Health Organization (PAHO) has prioritized access to essential cancer medicines. The survival rate for paediatric cancer is over 80% in high-income countries, but does not exceed 30% in low- and middle-income countries, the difference being primarily due to the lack of access to cancer medicines.

In Peru (a middle-income country), cancer treatment is very expensive and practically unaffordable as an "out-of-pocket" cost. Furthermore, the Peruvian healthcare system is fragmented: each type of insurance has its own financing, budget, and independence. A Ministerial Resolution has allowed level III-2 health facilities to purchase and/or use medicines not approved in the National Single Request for Essential Medicines (PNUME), as long as they meet two conditions: they must have prior approval from their institutional Pharmacotherapeutic Committee (CFT), and they must be contained in a Clinical Practice Guide (GPC) and/or regulatory document *(21)*. Since 2019, INEN has used this resolution for the approval of more than 50 oncological medicines validated by the CFT, and the development and/or updating of approximately 30 regulatory documents (CPGs) for various cancers, as well as for conditions or complications related to medical cancer treatment, thereby achieving access to innovative and more effective technologies *(22)*.

High-cost medicines for cancer treatment will be supplied for the first time in the hospitals of the MINSA networks in 2024 *(23)*.

Cancer Law Pathway: Health Technology Assessment (HTA)

Since 2012, with Plan Esperanza, the goal has been reducing out-of-pocket expenses related to access to oncology medications, ensuring that patients receive the necessary and effective innovative treatments through accessible, universal coverage for cancer treatment in Peru, especially those in vulnerable and impoverished situations; increasing the availability of evidence-based oncology medications and their use according to clinical practice guidelines nationwide; and achieving affordability, including coverage under the Public Insurance (Comprehensive Health Insurance – SIS). Additionally, a monitoring and evaluation system for the use of oncology medications managed by INEN has enabled unprecedented progress, with a focus on personalized and precision oncology transforming cancer treatment through personalized therapies based on the genetic characteristics of tumours – improving response and survival rates while optimizing the use of healthcare resources by reducing unnecessary treatments.

To further embed evidence-based decision-making and the adoption of HTA methodologies used in the country, the National Health Technology Network (RENETSA) was established in 2020 to conduct HTAs and economic evaluations. Up to 14 August 2024, RENETSA, using multicriteria evaluation (HTA-MCE) for pharmaceutical products for cancer, received 174 applications for 70 high-cost cancer medications with 38 opinions (18 in favour), and a list of HTAs of the rare and orphan diseases (ROD) with nine opinions. Guidelines for a standardized methodology leading to recommendations for the use of high-cost ETS have been published by the National Institute of Health (INS) *(25)*. Of 61 HTAs evaluated during the period 2022–2024, 33% of opinions were positive *(26)*.

Cancer prevention and health promotion: Ethnic and geographic diversity

In 2019, Peru recorded a loss of 518,176 years of healthy life (YYL) due to cancer *(27)*. Approximately 27% of the Peruvian population is Indigenous and faces lower cancer survival rates, attributable to late diagnosis and limited or no access to cancer treatments *(27)*, thereby highlighting the need for improved early detection strategies and equity in the provision of cancer care among the different populations of Peru.

Prostate, breast, stomach, colorectal, and cervical cancer represent 45% of cancers in Peru *(19)*. Currently, life expectancy in the Peruvian population is 74.6 years (72.0 in men and 77.3 in women), with an expectation that life expectancy will increase to 79 years by 2050, thereby increasing the cancer incidence rate *(27)*. The State encourages and promotes the equitable implementation of national health promotion, cancer prevention, and cancer control interventions *(21)*. Breast cancer is the most common cancer in women in Peru *(27)*. In 2022, 12.8% of women aged 30–59 years reported a clinical breast examination in the prior 12 months, 15% from the coastal, 9.2% from the mountains, and 9.1% from the jungle region *(27)*. For 40–59-year-old women, 8.9% had at least one mammogram in the past 24 months, 10.3% in urban and 2.4% in rural regions *(27)*. Cervical cancer is the second most common cancer in women in Peru: 10.6% of women aged 30–49 years have undergone human papillomavirus (HPV) molecular testing in the last three years, 11.2% in urban and 8.1% in rural areas *(27)*, with 9.6% knowing their results *(27)*. The goal for screening with HPV molecular tests for women between 30 and 49 years by 2030 is 70% *(27)*. Nationally, 47.5% of women aged 30–59 years have undergone Pap tests in the last three years, 49.6% in the coastal region compared to 44% in mountains and 43.7% in the jungle *(24)*. The highest rates for visual inspection with acetic acid (VIA), are in mountainous regions (Huánuco and Cerro de Pasco) and some districts in the jungle (Madre de Dios and San Martin) *(27)*. Laws directed to the control of consumption of tobacco products, nicotine, or substitutes exist to prevent the development of new generations of abusers and reduce morbidity and mortality secondary to their use *(27, 28)*.

Telemedicine

The National Cancer Law establishes the need for care and monitoring through telemedicine services for patients diagnosed with cancer, with special emphasis on older adults and those in vulnerable situations *(29)*. A significant barrier to accessing cancer care in Peru is the country's complex geography *(15)*. Nearly 50% of patients travel long distances for care in Lima at INEN; >75% of cases referred to Lima have advanced cancer requiring systemic treatment, usually chemotherapy *(16)*. A Peruvian retrospective study evaluating patients with hormone receptor (HR)-positive/HER2-negative advanced breast cancer (n=143) treated at INEN showed that almost 30% presented de novo disease at diagnosis, and

>50% of patients met "aggressive disease" criteria (including the following definitions from the RIGHT Choice trial: rapid disease progression, symptomatic visceral disease, markedly symptomatic non-visceral disease) and received first-line chemotherapy *(30)*. A satellite telechemotherapy centre was implemented in a second-level health facility in Lamas (jungle region), 1,100 km from the capital, from November 2015 to March 2018: 56 patients were treated remotely through telemedicine and telechemotherapy, the majority with breast cancer (73.2%), for a total of 232 chemotherapy courses (82% intravenous, 13% oral, and 5% hormone therapy), providing an effective treatment mitigating the geographical barriers hindering access to cancer care *(15)*.

National Biobank Network

Established in 2022 within INEN and supported by French-Peruvian cooperation (Institut de Recherche pour le Développement, IRD), a National Tumour Bank Network, overseen by INS in coordination with INEN, has been declared a public necessity *(29)*. The Biobank collects biological, clinical, and sociodemographic data on patients diagnosed with cancer, standardizing the procedures nationwide to provide biological samples for research under ethically and technically optimal conditions. Cancer registry data and biological samples are integrated, covering 5,992 cases of various types of neoplasia, providing a real-time platform linking regional and national tumour banks, updated data on cancer at the national level, and ensuring long-term preservation of samples to support cancer research to improve research and molecular oncology for cancer control and reduce genomic health inequalities through harmonized policies and governance *(31)*.

Research and the National Population-Based Cancer Registry

Clinical trial participation is low in Latin America, with Peru ranking sixth with 6.33% of all clinical studies conducted in the region. The National Cancer Law stipulates that the State promotes biomedical scientific research and education in cancer control at all three levels of government, as well as in all different entities of the National Health System, with the support of public and private universities, cancer patient organizations, and international technical cooperation *(16)*. The national benchmark for oncology research is INEN, supported by national and international technical and scientific institutions. Clinical data regarding etiology, risk factors, research, health planning, surveillance, and outcomes can be linked to the National Biobank Network.

Conclusions

Peru is a middle-income country in South America, comprising 34 million people, a nominal GDP per capita of US$ 8,500 per year, a Human Development Index of 0.762 (high), and a GINI coefficient of 40.2. Established in 1939, INEN formalized the intent towards population-based cancer control, pursuing public policies, social protections, and clinical practice advances to achieve equitable and affordable access to effective interventions to control cancer.

The Plan Esperanza, a national strategy for cancer control, was endorsed by the Peruvian government in 2012. It is now expanded and strengthened as the National Cancer Law (2021), providing prevention and comprehensive cancer care nationwide, guaranteeing universal access and coverage for cancer prevention, diagnosis, treatment, palliative care, and complementary support. In addition, the law promotes cancer education and research towards personalized and precision oncology, requiring specialized implementation and regulation by nationally competent institutions. The Childhood Cancer Law (2020) is directed to timely detection and comprehensive care for children and adolescents with cancer. Comprehensive Social Insurance (SIS) and Social Health Insurance (EsSalud) enable care provision and support without denial for financial reasons.

The Integrated Network of Oncology Services (INEN, IRENES, and oncology services in general hospitals) provides decentralized care through linked regional institutes and oncology services. INEN promotes enabling entities to support equitable, accessible, and affordable care, e.g., evidence-based clinical practice guidelines: developing and/or updating institutional regulatory documents; health technology assessment, including new drug evaluation and access to cancer medications; telemedicine and telechemotherapy services; and national cancer registration and linkage of registry with the National Biobank Network, providing optimal preservation of biological samples and supporting research. INEN is a benchmark for scientific research and cancer clinical trials, providing ongoing training and technical support to IRENES and RON.

Significant progress in reducing cancer-related morbidity and mortality in Peru has been achieved through system-wide collaboration: integrated care networks between home, community, secondary, and tertiary facilities; forums for patient and public input, opinion and guidance; and a system for population-based cancer control based on cooperation and collaboration between all levels of government, the Ministry of Health, social health insurance, publicly-funded institutions, academia, nongovernmental organizations, the private sector, patients, and the public. ■

Professor Tatiana Vidaurre, MD, PhDHC, MSc, MPH is a Medical Oncologist, Professor and Researcher at the National Institute

of Neoplastic Diseases (INEN) and Cayetano Heredia University (UPCH), Peru. She is the Co-ordinator of the Master's Programme on Teaching and Research in Oncology at the Cancer Research Unit at UPCH. She has an Honorary Doctorate from Toulouse III – Paul Sabatier University, France and is a Past President of the Cancerology Peruvian Society. She has developed and implemented the National Plan for Comprehensive Cancer Care and the Improve Access to Oncology Services in Peru – "Plan Esperanza", an important public policy that significantly improved access and universal coverage for cancer prevention and comprehensive oncology care. Founder of the INEN Breast Club, the main organization of oncology patients and their families for women cancer control and promoting comprehensive support for cancer patients.

Dr Rodrigo Motta is a Medical Oncologist and Researcher at the National Institute of Neoplastic Diseases (INEN) specializing in gastrointestinal and lung cancer. He holds a Master's degree in Digestive Oncology (CEU Cardenal Herrera University) and has expertise in cancer health technology assessment. He is the author and co-author of scientific manuscripts on lung and gastrointestinal cancer.

Dr Luis André Salinas Agramonte is a Medical Oncologist specializing in breast cancer from the National University of San Agustín, Peru, the National Institute of Neoplastic Diseases (INEN), and has an advanced specialization in breast oncology from the National Cancer Institute of Mexico (UNAM). He is currently serving as a clinical oncologist at the Department of Medical Oncology, INEN, Peru, where he leads patient care, translational research, and breast cancer projects. He is the author of international publications including the multicentre COLUMBUS Consortium study) and is an active member of Peruvian oncology societies.

Dr Guillermo Valencia Mesías, MD, MSc is a Medical Oncologist at the Breast Cancer, Melanoma and Genitourinary Tumours Unit, Instituto Nacional de Enfermedades Neoplásicas (INEN), Lima, Peru and a Medical Oncologist at the Breast Cancer and Melanoma Unit, Oncosalud-AUNA, Lima, Peru. He has a Certificate of Competence in Breast Cancer (from the Postgraduate Programme, Ulm University, Germany, and Master's degree in medical oncology from the Universidad Peruana Cayetano Heredia (UPCH), Lima, Peru. He is also an Investigator for RENACYT (Registro Nacional Científico, Tecnológico y de Innovación Tecnológica) in Peru.

Dr Patricia Elizabeth Rioja Viera, MD, MSc is a Medical Oncologist, Breast Cancer Unit, Melanoma and Genitourinary Tumors, Instituto Nacional de Enfermedades Neoplásicas (INEN), Lima, Peru. She has an International Diploma in molecular biology from the University Hospital of Liege (CHU DE LIEGE) and the Belgian Society of Medical Oncology.

She is a Fellow of the Clinical Visit Unit at the 12 de Octubre University Hospital, and a Master of "Medicine n mention" at the Universidad Peruana Cayetano Heredia, 2024. She has a Certificate of Advanced Studies in Prostate Cancer from the Università Della Svizzera Italiana, as well as receiving an International Development and Education Award (IDEA) from the American Society of Clinical Oncology in 2025.

Dr Sandro Casavilca Zambrano, MPh, PhD holds a PhD in neuroscience from the National University of Mexico (UNMSM) and a Master's degree in medicine with a specialization in oncologic pathology (UPCH). He holds a medical degree from the Autonomous University of Guadalajara, with a residency in pathology and clinical laboratory medicine, and a subspecialty in oncologic pathology (UPCH-INEN). He currently directs the National Tumour Bank at the National Institute of National Endocrinology (INEN) and has experience in cancer epidemiology and healthcare management. He is a Level I Researcher at RENACYT, Co-director of the international research laboratory LOAM, and Secretary General of the Peruvian Cancer Society. His expertise is in central nervous system tumours and has been supported by fellowships at the Barnes Jewish Hospital (WUSTL), the University of San Luis Potosí (UCSF), and La Pitié-Salpêtrière (France).

Dr Stéphane Bertani, PhD is co-Director of the International Joint Laboratory of Molecular Anthropological Oncology and Oncogenic Viruses at the National Tumour Bank of Peru (INEN). He obtained his PhD. in biochemistry and molecular biology from the University of Paris 6 in 2006 and completed a postdoctoral fellowship in the United States. In 2011, he joined the French National Research Institute for Sustainable Development (IRD), where he established a strategic research focus on cancer in low- and middle-income countries. His work explores the clinical, molecular, and environmental determinants of cancer, particularly among Indigenous populations.

Dr Luis Mas, MD is a Medical Oncologist at the Lung Cancer and Gynecologycal Cancer Unit of the Instituto Nacional de Enfermedades Neoplásicas (INEN), Lima, Peru. He has an International Diploma in molecular biology from the University Hospital of Liege (CHU DE LIEGE) and the Belgian Society of Medical Oncology.

Mg Monica Calderon Anticona is a Clinical Oncologist Assistant in the Department of Medical Oncology at the National Institute of Neoplastic Diseases. She has a Master's degree in applied oncology research and has received a scholarship at the 12 de Octubre University Hospital, Madrid, Spain from the Carolina Foundation. She is also a teacher in the Master's programme in cancer research at Cayetano Heredia University.

Dr Silva Neciosup Delgado is a Medical Oncologist at Cayetano Heredia University (UPCH), Peru.

Professor Jose Luis Rojas is a Medical Epidemiologist, Professor, and Researcher at the Clinical Epidemiology Unit, Alberto Hurtado School of Medicine, Faculty of Medicine Cayetano Heredia Peruvian University (UPCH) and Executive Director of Cancer Epidemiology and Statistics Department at the National Institute of Neoplastic Diseases (INEN). He also leads the Metropolitan Lima Cancer Registry in Peru. He has a Master's degree in Clinical Epidemiology at UPCH. He holds a Diploma in Biomedical Informatics with a specialization in global health and a Diploma in Occupational and Environmental Medicine from the Cayetano Heredia Peruvian University. He also trained in panoramic epidemiology at the Mario Gulich Institute of Advanced Space Studies in Córdoba, Argentina. He graduated in General Human Medicine at UPCH. He has expertise in health information management and the use of technologies applied to health and education.

Dr Kavita Sarwal, PhD, CHE, CCMP is a Transformation Partner who uses over two decades of experience in national and international health management to transform the provision of healthcare through effective planning, operation, and evaluation of health services. She has been partnering with senior leaders across health authorities to shape solutions, translate ideas to action to achieve better health- and people-related outcomes. A certified Canadian health executive (CHE 2008), and one of the first 500 in the world to earn her certified change management professional designation (CCMP 2017). She was on the board of directors of the Association of Change Management Professionals.

Dr Victor Castro is a Medical Oncologist and Researcher, and graduate of the National University of San Marcos (UNMSM), with specialist training at the National Institute of Neoplastic Diseases (INEN). He has a Master's degree in musculoskeletal tumours, European University of Madrid, Spain. He is the General Director of the INEN Medicine Directorate with medical oncologist expertise in gastrointestinal tumours, sarcomas, neuroendocrine tumours, and brain tumors at INEN Medical Oncology Department. He is Principal Investigator for the SELNET Cooperative Group (Sarcoma European and Latin American Network) at INEN, Peru, as well as for multiple clinical trials on gastrointestinal tumours. He is also a member of the Peruvian Society of Medical Oncology, the Peruvian Cancerology Society and ESMO (European Society for Medical Oncology).

Dr Simon Sutcliffe, BSc, MD, FRCP, FRCPC, FRCR is a clinical oncologist with past practice in academic clinical medicine and executive leadership of cancer institutions and provincial cancer control programmes. He is the President of Two Worlds Cancer Collaboration, an NGO focussing on compassionate care, palliative care and cancer control in lesser-resourced countries. He is Editor-in-Chief of Cancer Control.

Sandro Casavilca Zambrano, MPh, PhD., holds a PhD in Neuroscience from the National University of Mexico (UNMSM) and a Master's degree in medicine with a specialization in oncologic pathology (UPCH). He holds a medical degree from the Autonomous University of Guadalajara, with a residency in pathology and clinical laboratory medicine, and a subspecialty in oncologic pathology (UPCH-INEN). He currently directs the National Tumour Bank of the National Institute of National Endocrinology (INEN) and has experience in cancer epidemiology and healthcare management. He is a Level I Researcher at RENACYT, co-director of the international research laboratory LOAM, and Secretary General of the Peruvian Cancer Society. His expertise in central nervous system tumours has been supported by fellowships at the Barnes Jewish Hospital (WUSTL), the University of San Luis Potosí (UCSF), and La Pitié-Salpêtrière (France).

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