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Advancing Cancer Research Capability in Peru Through the Integration of Registries With Biobanks

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This article highlights Peru's experience in establishing a national tumor bank network, serving as a model for low- and middle-income countries. Launched in 2005 at the National Institute of Neoplastic Diseases, efforts accelerated under the 2021 National Cancer Act, which formalized the National Tumor Bank and its integration with the National Oncology Network. This initiative connects tumor banks across regional cancer institutes, enabling systematic biological sample collection, particularly from underrepresented populations, such as those with high Amerindian ancestry. Ethical oversight, technical standards, and specialized management software ensure efficient data sharing and genomic research. The network supports cancer research through integration with the Population Cancer Registry, providing unique insights into cancer incidence and outcomes. To date, 5992 cases have been documented. Through international collaboration with Latin American countries, Peru provides a framework for inclusive cancer research, enriching global genomic datasets and strengthening research capacity in diverse and vulnerable populations.

Keywords: national tumor bank network, population-based cancer registry, cancer research infrastructure, biobanking in low- and middle-income countries (LMICs), genomic diversity in cancer, indigenous ancestry in cancer research

Introduction

Tumor biobanks (or cancer biobanks) within pathology departments are essential for cancer translational research and epidemiological monitoring.¹ In Peru, the

National Cancer Act (Law No. 31336) of 2021², amended in 2023,³ established a legal framework for tumor biobanking, enhancing cancer research and public health surveillance. Central to these efforts is the National Oncology Network, led by the National Tumor Biobank

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This network integrates biobank data with cancer registries, creating comprehensive datasets to study cancer epidemiology, risk factors, and treatment outcomes.^{4,5} By addressing critical gaps in global cancer research, particularly in low- and middle-income countries (LMICs), the network leverages Peru's unique demographic profile, where approximately the population has 80% of Indigenous American ancestry. By incorporating omics data from this underrepresented group, the network provides unique insights into cancers affecting diverse populations.^{6,7}

Background to the National Tumor Biobank

In 2014, a French-Peruvian capacity-building project on biobanking and cancer epidemiological surveillance was launched. This initiative aimed to advance cancer research in Peru, with a focus on women's cancers, cancers affecting vulnerable populations and minorities, and infection-associated cancers. Indeed, infection-related cancers account for up to 40% of cases in LMICs, posing a significant public health challenge.^{1,4} The National Tumor Biobank of Peru was established in 2022 to improve the collection of biological, clinical, and sociodemographic data from cancer patients in compliance with local laws and international treaties.⁸ However, Peru's cancer registry system relies on manual hospital-based data collection, limiting data currency and efficiency. Developing an interoperability platform that links together cancer registry data with the management of biological samples is critical for improving data retrieval, analysis, and exchange.^{1,9}

The 2023 strategic plan aims to expand biobanking capabilities across the country by integrating provincial biobanks into the National Oncology Network, an initiative also supported by the Solidarity Fund for Innovative Projects (FSPI) under French official development assistance. The National Cancer Act adopted by Peru establishes a strategic plan to strengthen biobanking capabilities by integrating provincial biobanks into the National Oncology Network. This plan emphasizes standardization, governance, and ethical compliance to advance cancer research nationwide. Academic activities conducted both virtually and in-person in collaboration with scientific agencies, universities, and the Latin American and Caribbean Biobank Network (REBLAC) play a key role in supporting these efforts. Established in 2008, REBLAC encompasses 25 biobanks across 13 countries, providing technical and regulatory support to strengthen biobanking infrastructure in the region.¹⁰ This initiative is also supported by the FSPI through French official development assistance.

These continuous efforts led the National Tumor Bank to host an International Biobank Congress in Lima in 2024, in collaboration with the International Agency for Research on Cancer/World Health Organization. This congress underscored the critical role of tumor biobanks in cancer research among Latin American and Caribbean populations and mobilized Peru's scientific community to advance collaborative efforts in cancer biomedical research.

Initial Integration and Data Management

In the initial phase, our goal was to integrate patient data from cancer registries with biological samples stored in tumor

biobanks since 2006, covering 5992 cases across various cancer types. This integration was enabled by specialized biobank management software, creating a transformative opportunity for a real-time virtual epidemiological registry that accurately reflects Peru's oncological landscape. The establishment of the National Tumor Biobank Network, led by the National Tumor Biobank, incorporates biobanks from the Regional Cancer Institutes in the Northern (La Libertad), Central (Junín), and Southern (Arequipa) regions, as well as the tumor biobank of the San Borja Children's Hospital, which was already operational (Fig. 1). The structure of the National Tumor Biobank Network within the National Oncology Network is shown in Figure 2 and Supplementary Table S1.

This initiative will also generate crucial omics data from a population that is significantly underrepresented in global cancer genome studies—a demographic that has been largely neglected in genome-wide association studies (GWAS).

By supporting research that enhances the health and well-being of the Peruvian population, the National Tumor Biobank Network strengthens cancer research capacity in Peru. The National Tumor Biobank currently supports 97 scientific research projects, of which 22 focus on translational cancer research within Peruvian populations, while the remaining are clinical trials involving biological samples (Table 1).

Future Perspective

The National Tumor Bank Network points to the establishment of the Peruvian Cancer Genomic Bank, which houses genomic information from Peruvian cancer patients with legal, ethical, and quality standards, marks a significant advance in genomic research, addressing the underrepresentation of

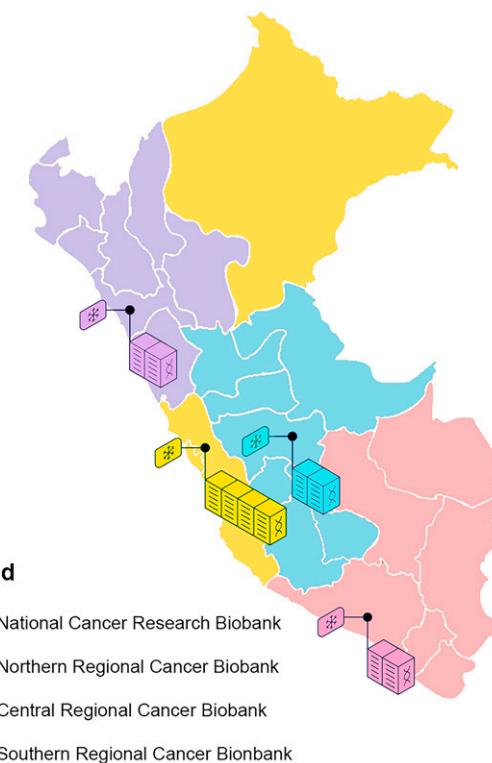


FIG. 1. An influence zone network for the National Tumor Biobank Network in each region of the country.

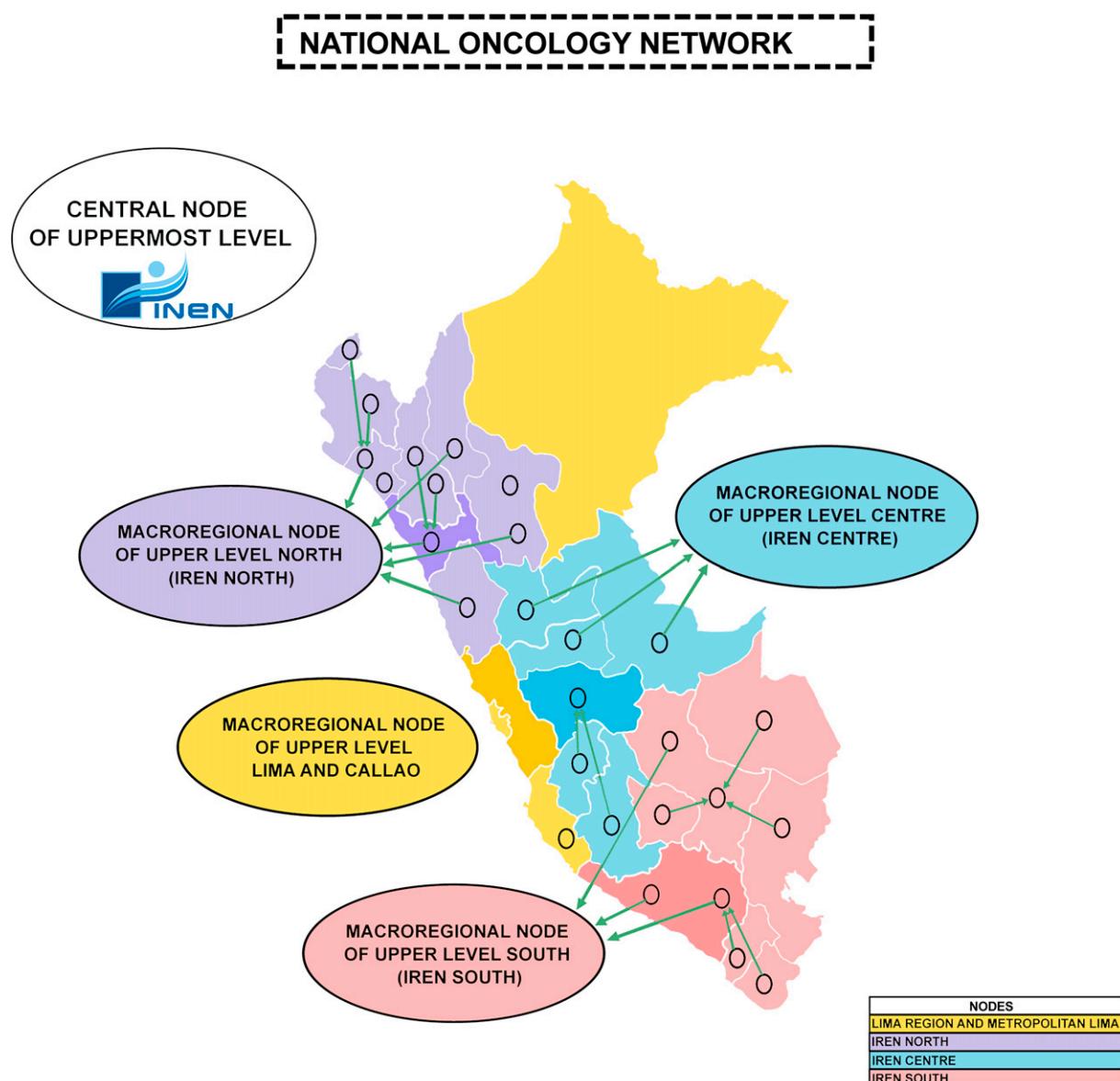


FIG. 2. Health care Centers of the National Oncology Network.

Indigenous populations in global studies. Recent GWAS studies focusing on Latin American populations have begun to close this gap, uncovering polymorphisms linked to Indigenous American ancestry associated with breast, liver, gallbladder, lung cancers, and other malignancies.

Integrating population-based cancer registries with biobank-stored biological samples represents a valuable resource for advancing cancer research in the region. This linkage not only supports the development of personalized treatments tailored to the genetic makeup of local populations but also reduces the underrepresentation of Indigenous American populations in global cancer genomics. These efforts are critical to creating more inclusive and accurate cancer data to support regional and global studies.

Conclusion

The National Tumor Bank Network represents a transformative opportunity for cancer research in Peru, enabling the

preservation of relevant clinical data and biological samples from populations with Indigenous American ancestry. The network will also improve the understanding of cancer in Latin America. This initiative will contribute to a comprehensive cancer genomic map, support more equitable health care outcomes, and advance cancer genomics globally.

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TABLE 1. ONGOING CANCER RESEARCH PROJECTS IN THE BNT OF INEN, CLASSIFIED BY TUMOR SITE ACCORDING TO ICD-10

Project type	n	%	ICD-10 CODE	Localization
Research projects (nonpharmaceutical industry)				
	1	1.03	C16	Stomach
	1	1.03	C18	Colon
	1	1.03	C20	Rectum
	2	2.06	C22	Liver and intrahepatic bile ducts ^a
	2	2.06	C24	Other and unspecified parts of biliary tract
	1	1.03	C43	Malignant melanoma of skin
	1	1.03	C44	Skin
	1	1.03	C49	Connective, subcutaneous, and other soft tissues
	1	1.03	C50	Breast ^a
	2	2.06	C53	Cervix uteri
	1	1.03	C61	Prostate gland
	1	1.03	C67	Bladder
	3	3.09	C71	Brain
	2	2.06	C85	Other and unspecified types of non—Hodgkin lymphoma
	1	1.03	NA	Rare tumors
	1	1.03	NA	Virus and cancer (various types of organs)
Total research project	22	22.68		
Clinical trials (pharmaceutical industry)	75	77.32	NA	Various types of organs
Total	97	100.00		

NA: Not applicable.

^aIncludes Indigenous American patients.

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Authors' Contributions

S.C.Z.: Conceptualization, methodology, investigation, writing—original draft. J.C.-M.: Writing—review and editing, visualization. D.C.: Writing—review and editing. A.C.: Writing—review and editing. J.H.: Data curation, formal analysis. M.T.G.: Writing—review and editing. M.A.-L.: Writing—review and editing. M.L.: Writing—review and editing. T.V.: Writing—review and editing. D.T.: Writing—review and editing. G.S.: Writing—review and editing. F.B.: Writing—review and editing. E.C.: Writing—review and editing. Z.K.: Writing—review and editing. S.B.: Conceptualization, writing—review and editing, visualization.

Author Disclosure Statement

The authors declare no conflict of interest. Where authors are identified as personnel of the International Agency for Research on Cancer/WHO, the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy or views of the International Agency for Research on Cancer/WHO.

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Supplementary Material

Supplementary Table S1

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