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EDITORIAL

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Ethics and knowledge: a debate that never ends

Ética y conocimiento: un debate que nunca termina

Alfredo L. Marín[1,2]*, Mario A. García[3,4]

[1]*Faculty of Health Sciences, Technical University of Manabí, Portoviejo, Ecuador.*
[2]*Chair of the Human Research Ethics Committee, Technical University of Manabí, Portoviejo, Ecuador.*
[3]*Editor-in-Chief, Revista Gregoriana de Ciencias de la Salud, San Gregorio de Portoviejo University, Manabí, Ecuador.*
[4]*School of Medicine, San Gregorio de Portoviejo University, Manabí, Ecuador.*

**Corresponding author*

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Dear readers and authors:

Today, we live in a world where science and technology are advancing at a rapid pace, transforming our way of life and how we research, make decisions, and interact with knowledge. Artificial intelligence (AI) is already being used to diagnose diseases with increasing precision, while genetic editing promises to eradicate hereditary disorders. The algorithms at the heart of these technologies process data in seconds that would have previously taken years to analyze. For example, AI systems are being used in the early detection of cancer, analyzing medical images more quickly and accurately than human radiologists (Derevianko et al., 2023). Similarly, in agriculture (Oliveira et al., 2023), algorithms now enable the prediction of crop yield and the optimization of resource use, such as water. However, in this world of constant innovation, an inevitable question arises: Are we advancing at the same pace in our ethical reflection?

Each discovery opens doors to knowledge, but it also raises dilemmas that do not always have immediate answers. Is it right to alter human DNA to prevent disease, or are we crossing a dangerous line that we do not know how to turn back? Are we willing to tinker with the essence of who we are just because we can? Can an AI replace a doctor's or teacher's decision without compromising the humanity of the process? In a world where AI can diagnose disease, can the fundamental human connection to healthcare be lost? Who takes responsibility when a technology fails or affects those not involved in its development? Should we continue progressing with technological advances, even if we are not entirely sure of their consequences?

These dilemmas are not new. The history of science is replete with instances where the need to move forward has clashed with fundamental ethical principles (Rathjen & Stähelin, 2022). One of the most emblematic cases is that of Louis Pasteur and the development of the rabies vaccine. In 1885, Pasteur made a decision that would change medicine: he administered his experimental vaccine for the first time to Joseph Meister, a nine-year-old boy whom a rabid dog had bitten (Rappuoli, 2014). The treatment worked and saved the boy's life, but today, we ask ourselves: Was it ethical to inoculate a minor with a substance not yet tested on humans? Was it an act of desperation justified by urgency or an experiment without consent? Decades later, in the 20th century, medical research continued to face controversy. The syphilis study at Tuskegee (USA, 1932-1972) is a reminder of how science can go astray when ethics are ignored (Thomas & Quinn, 1991). For forty years, hundreds of African-American men were tricked into participating in a syphilis study without receiving treatment, even after penicillin was established as a cure. Another example is the controversial figure of James Marion Sims (Mendoza et al., 2024), known as the "father of modern gynecology", and the ethical implications of his experiments on enslaved women without anesthesia, which reflect the constant tension between scientific progress and the moral boundaries that regulate it. How many medical advances have been born from practices that we now consider unacceptable?

Today, dilemmas persist with new faces. Clinical trials in developing countries, where vulnerable populations often participate without fully understanding the risks (Sappor & Chakraborty, 2025) and the use of AI in medical diagnosis (Goktas & Grzybowski, 2025), which can reproduce racial and gender biases in decision-making, are just a few examples. Human Research Ethics Committees (CEISHs) have emerged as necessary. Their job is to ensure that scientific research adheres to fundamental principles, such as autonomy, justice, and beneficence. However, their work is neither simple nor absolute. Are current regulations sufficient to regulate technological advances? To what extent can regulations slow down innovation or, on the contrary, prevent progress from being diverted toward particular interests?

Ecuador, as part of the global scientific community, faces particular challenges. Consolidating CEISHs in universities and research centers represents a step forward in building an ethical culture in academia. However, is it a valid ethical awareness being promoted among

researchers, or are formal requirements being met? Is ethics understood as a set of rules to follow or an intrinsic responsibility of those who generate knowledge?

In this context, I would like to reflect on a fundamental topic in Ecuador's academic and scientific fields: the processes of engagement with society, student research, and the important role of the CEISHs concerning Knowledge Integration Projects (PIS). These programs, whose main objective is to improve the teaching-learning process and connect students with scientific research in their future professional practice, play an essential role in training professionals committed to ethics and social well-being.

The PIS, implemented at various universities nationwide, enables students to conduct applied research that addresses real and current community problems. Although conceived for academic and pedagogical purposes, these projects integrate theoretical learning with the analysis and resolution of problems that directly affect society. When involved in these processes, students must develop research skills and a deep ethical awareness of the procedures involved, particularly regarding the participation of individuals in their research. CEISHs should be consulted, and their approval obtained, when student research, despite having academic objectives, involves direct interventions with individuals, such as surveys, interviews, or any other type of data collection that may affect participants. Although these interventions may seem simple, it is essential to ensure that the rights and privacy of individuals are respected and that the ethical guidelines established for scientific research are followed. CEISHs in Ecuador play a vital role in ensuring that scientific research is conducted within a rigorous ethical framework, protecting participants, and ensuring that researchers respect fundamental principles such as informed consent, confidentiality, and the general well-being of those involved. This ethical framework should not be a formality but rather an integrative process that accompanies students at all stages of their research projects.

As PIS continues developing in Ecuadorian universities, students and faculty must understand the importance of CEISHs in this process. Student training must include awareness of the need to subject their research to appropriate ethical evaluation, even if the research has an academic focus that initially does not entail risks. This commitment to ethics from the training stage is crucial in ensuring that future health professionals and those in other fields conduct their research with responsibility and respect for their subjects. I urge universities and those responsible for academic training to strengthen the integration of PIS with the ethical processes established by

the CEISHs, ensuring that all research projects involving individuals are subject to their review and approval. This will enable us to train professionals with integrity, ethical responsibility, and a commitment to the well-being of society.

Beyond regulations and committees, ethics in science and technology are a personal and collective commitment. It is up to all of us—academics, scientists, professionals, and citizens—to continually ask ourselves where we want to direct the knowledge we are building. Perhaps the most important question is not how far science can take us, but how far we are willing to go as a society.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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