The Mexican scientific dream: medical and scientific development in the country from the perspective of Arturo Rosenblueth

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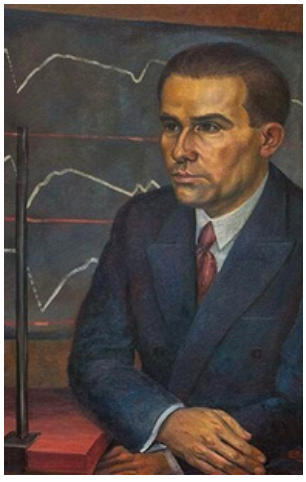
It is impossible to overlook the evident institutional, economic, and political gap surrounding scientific reforms when comparing Mexico with its northern neighbor. This gap does not trigger a war, but it does generate an educational dependency, expressed in the country's universities' inability to achieve top-tier research with solid federal support. As a result, professionals leave the country in search of opportunities they cannot find at home, due to the lack of sufficient institutional backing, as illustrated in the case described. In addition, statistical data will be presented to demonstrate the urgent need for a stronger higher education system, one in which science and technology advance autonomously, supported by high-quality international collaboration rather than dependence. This has repercussions not only on the country's social development, but also on the training of the Mexican physician as a scientist-humanist, particularly in the context of declining public investment in education and research, as discussed throughout the text.



C.15.1. Emilio Rosenblueth. Portrait of Arturo Rosenblueth, 1937. Oil on masonite. Collection: El Colegio Nacional. Photograph: J Hinojosa

Beginning with a historical example, in 1968, when the capital's atmosphere hung heavy with humidity and tension fueled by constant student protests, and a government eager to present a favorable international image during the Olympic Games—Dr. Arturo Rosenblueth Stearns, one of the most important scientific figures in the country's history, witnessed how his seven-year project to establish what would later become the CIEA and eventually CINVESTAV was blocked by the administration of President Gustavo Díaz Ordaz (1). Despite Mexico having established the world's first hospital dedicated to medical specialties, the Ignacio Chávez National Institute of Cardiology, the country has historically shown clear difficulties in daily medical practice, problems in medical training, and an evident collapse of the public health system, which has shown no significant improvement.

Rosenblueth faced obstacles in the past that differed from those currently experienced in a country that barely allocates enough budget to ensure the survival of scientific and technological advancement, compounded by a decline in investment in higher education and research. This directly affects all physicians in training nationwide, particularly considering that Mexico does not even reach the 3.7 physicians per 1,000 inhabitants recommended by the OECD.

Furthermore, Buendía's analysis (2) explains that in 2019 federal spending on higher education was 0.54% of GDP, the lowest level in twenty years, while spending on higher education, science, and technology stood at 0.74%, the same level as in 2001. Regarding investment in research and development, according to the World Scorecard (3), after reaching 0.47% of GDP in 2010, funding declined markedly in subsequent years, reaching only 0.27% in 2023.

When observing this statistical landscape, achieving the 1% of GDP demanded by various national researchers (4) appears to be little more than an administrative illusion, a futile dream. Remaining near 0.3% of GDP condemns national science to mere survival. Even more alarming, according to UNESCO data, Mexico's expenditure on Research and Experimental Development is primarily executed by universities, which accounted for 50.6% in 2018. This indicates that nearly half of the country's research is financed by public universities, while only the other half receives private funding. This sharply contrasts with the United States, where universities account for only 12.8% of such expenditure, and which in 2023 allocated 3.4% of its GDP to science and technology (5).

Although comparing Mexico with global powers may seem disproportionate, this is not a matter of simple statistical comparison, but rather a real economic gap that drags the nation down like ballast. From a medical perspective, this issue is not limited to technology-driven economic development, but also directly affects the quality of healthcare services and, consequently, university medical education.

It is well known that physicians in training in Mexico require not only access to high-quality information generated abroad, but also, urgently, a solid scientific and clinical education that enables them to practice evidence-based medicine, accompanied by an inherent humanistic approach.

The data presented here are not intended as a direct critique of current budgets, but rather serve as numerical support to promote improvement efforts within educational institutions, which are fundamental pillars in the training of the physician-scientist. While the health program initiated by President Claudia Sheinbaum represents progress, through the hiring of thousands of physicians and nurses and the opening of new hospitals and health centers, without a solid educational foundation to support these professionals, without science and humanity cultivated during the university stage, there is a risk of promoting mass medicine rather than quality medicine. Indeed, poorly applied medicine causes greater harm than medicine that is never practiced at all.

Today more than ever, women and men are needed who understand, out of necessity and hope, the importance of building a robust medical education; individuals capable of moving beyond political obstacles and forming teams committed to the collective development of medical excellence.

C.15.2. Arturo Rosenblueth and Norbert Wiener, considered the father of cybernetics, with whom he collaborated. Image taken in Mexico City.

It is within this context that the central figure of this text emerges: the archetype of the physician-researcher who served as a bridge for national scientific advancement—Dr. Arturo Rosenblueth, a Mexican neurophysiologist born on October 2, 1900, in Ciudad Guerrero, Chihuahua. His father, Julio Rosenblueth Gutmann, of Hungarian origin and Jewish faith, immigrated to Mexico, where he met María Augusta Stearns (1).

Initially, Rosenblueth aspired to pursue mathematics; however, his father's insistence, motivated by the limited employment opportunities of the time, led him to enroll in medical school at the National Autonomous University of Mexico (UNAM). At one point, he was forced to suspend his studies due to a lack of financial resources, but he was able to continue thanks to institutional support, even obtaining a scholarship to study at the University of Berlin in 1923, and later completing his education at the Sorbonne in Paris. With a deep interest in neuropsychiatry, the field in which he specialized, he later practiced medicine in Mexico. He also earned a doctorate in Medicine from the University of Paris.

This period in France was decisive in his training, as he studied under figures such as Joseph Babinski, credited with the clinical sign that bears his name, and Charles Richet, who was awarded the 1913 Nobel Prize for his research on anaphylaxis.

In 1930, together with mathematician Alfonso Nápoles, Rosenblueth became one of the first Latin Americans to receive a Guggenheim Fellowship, aimed at promoting studies in physiology and mathematics.

He later joined Harvard University, where he worked with physiologist Walter B. Cannon, renowned for his contributions to medicine, including the concept of homeostasis and the development of the milieu intérieur postulate. He also conducted research on the fight-or-flight response. Due to unfavorable working conditions, the refusal to grant him a permanent position, and documented antisemitic attitudes reflected in correspondence, Rosenblueth returned to Mexico. He had the proposal to establish a physiology laboratory at the then newly founded National Institute of Cardiology.

Ruth Guzik cites physician and historian José Joaquín Izquierdo, who notes that this stage represented a key turning point in Rosenblueth's life, as he became the country's first full-time researcher.

By the late 1950s, he assumed leadership of a new postgraduate project at the National Polytechnic Institute, which he named the Center for Research and Advanced Studies. In 1970, following its institutional consolidation, it adopted the name by which it is known today: CINVESTAV (1).

This research center became a national benchmark and continues to lead, alongside UNAM, a significant portion of the country's scientific output. However, during its early years it faced multiple difficulties, with initial support during the López Mateos administration followed by the withdrawal of funding under Daz Ordaz. Then Secretary of Finance Antonio Ortiz Mena suspended public resources after classifying it as a private institution. Fortunately, this decision was later reversed, allowing the survival of what was then the CIEA.

Mexico has made internationally recognized artistic contributions; however, in the scientific arena it has historically been relegated to a marginal role, with a low contribution to global development, despite having figures who represent genuine national brilliance, such as Dr. Rosenblueth (1). To conclude, the following excerpt is cited from the speech delivered during the ceremony for the National Science Award in 1966, in the presence of President Gustavo Díaz Ordaz, to whom Rosenblueth's criticisms were implicitly directed:

"The intellectual capacity of Mexicans is not inferior to that of any human group. If web manage to prepare a sufficient number of teachers and researchers in the various scientific disciplines, if we create positions that allow them to live with dignity without having to seek additional income, and if we provide them with the necessary means to carry out their research, I am absolutely certain that our country will also gain international recognition in this field."

Unfortunately, this speech continues to resonate in the scientific and medical life of the country, sustaining the persistent hope for an intellectual awakening for which Rosenblueth worked for decades.

C.15.3. Photograph of the inauguration of the CIEA in 1961. President Adolfo López Mateos and Arturo Rosenblueth.