

# GENOMIC MEDICINE IN THE SCHOOLS OF MEDICINE OF PERU

MEDICINA GENÓMICA EN LAS ESCUELAS DE MEDICINA DEL PERÚ

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## Mr. Editor

Genomic medicine today plays an important role in promoting the health of populations, this is defined as the use of genomic information and technologies to determine the risk, predisposition, diagnosis and prognosis of diseases, with a personalized approach to therapeutic options. Ultimately, it is the use of a patient's genotypic information for the benefit of clinical care<sup>(1, 2)</sup>.

In Peru, few institutions are adequately equipped and implemented to develop both genetic and genomic activities applied to medical practice, the efforts being carried out are focused on specific topics and are not very sustainable. These topics include neurological diseases, hereditary cancer, pharmacogenetics, and some pediatric topics. Likewise, Peruvian research in these areas is emerging at a slow pace, with representative institutions that are profiled in this area, among which we can mention: Research Center for Genetics and Molecular Biology of the University of San Martín de Porres, The Laboratories of Research and Development of Science and Technology of the Cayetano Heredia University, The Research Institute in Biomedical Sciences of the Ricardo Palma University, also as part of the health care sector highlight the work of the National Institute of Neoplastic Diseases, The National Institute of Child Health and The National Institute of Health. However, joint efforts are needed to articulate and/or coordinate between institutions in order to carry out research on a larger scale<sup>(3)</sup>.

It is evident that in our country genomic medicine is still neglected, and efforts to promote it are fractionated, weak, and with little perceptible planning in Peruvian health policies. In addition, medical genetics and genomics require the synchronous and symbiotic interaction of scientific and healthcare activities<sup>(4)</sup>. And in terms of funding, the majority of projects of this nature have obtained grants from CONCYTEC (The National Council of Science, Technology and Innovation) and FINCYT (Fund for Innovation, Science and Technology), institutions that financially support and encourage progress in genomics through isolated initiatives for the time being, hoping that in the near future other areas of the health sciences will be covered<sup>(5)</sup>.

Consequently, with what has been described above, we believe that one element to be taken into account in the complex problematic to institutionalize this discipline in our environment is to begin to review and analyze the curriculum of the careers of the biomedical sciences, since it is urgent to train a diversity of critical professionals who have to do with the entire process of genomic medicine, including the conception of the problem to be solved in this area. The implementation and/or standardization of the most suitable protocols for the resolution of which was raised, as well as the analysis of data through bioinformatics for proper interpretation, as well as the correlation and application with health problems at both individual and social levels especially the most prevalent diseases, However, a preliminary analysis carried out on the proportion of all subjects included in the curricula of the main medical schools in our country calls our attention, subjects whose focus is to strengthen and provide the necessary elements for

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a proper internalization of competence in genomics that the future medical professional should embody in their professional practice, finding that the number of subjects that would have a direct and indirect relationship with the contents of genomics, does not exceed 6% of the total academic credits offered in most of the schools analyzed, as shown in table 01, This information should be corroborated with the professional skills of future doctors in Peru, in order to apply the scientific and technological advances of functional genomics, since there is complementarity between genomic medicine and the improvement of the doctor-patient relationship, because it links

basic sciences with clinical disciplines, For this reason the teaching and updating in genomic sciences should be considered a priority since the conception in medical treatment is changing from curative medicine (diagnosis and treatment), preventive medicine (intervention to prevent or delay the onset of the disease) to predictive medicine (identification of the genetic profile for personalized treatment), Thus providing the most accurate disease support to clinical researchers to identify new relevant disease hypotheses for the benefit of patients' health and therefore public health<sup>(6)</sup>.

**Table 1.** Credits of the subjects related to genomic medicine in the curriculum of the main medical schools in Peru.

University	System	Total Credit	Credits related to genomic medicine	Courses of study	%
Catholic University of Santo Toribio de Mogrovejo	Private	329	15	Cell and Molecular Biology Biochemistry Medical Genetics	4.5
Cesar Vallejo University	Private	322	15	Cell and Hereditary Biology I, II and III	4.6
Cayetano Heredia University	Private	302	12	Cell Biology Molecular Biology Genetics and embryology	3.9
The National University of San Marcos	Public	343	10	Biochemistry Immunology and Genetics	2.9
José Faustino Sánchez Carrión National University	Public	308	16	Cell and Molecular Biology Biochemistry Genetics and embryology	5.1
Federico Villareal National University	Public	308	16	Cell and Molecular Biology Human Genetics Biochemistry	5.1
Ricardo Palma University	Private	324	15	Cell and Molecular Biology Embryology and Genetics Biochemistry	4.6
University of San Martín de Porres	Private	336	17	Cell and Molecular Biology Embryology and Genetics Biochemistry Medical Oncology	5
San Antonio Abad National University	Public	318	13	Cell biology Human Genetics Biochemistry	4
Catholic University of Santa María	Private	304	16	Biochemistry Cell and Molecular biology Medical biochemistry Biology and Genetics	5.2
San Luis Gonzaga University	Public	306	10	Biology Embryology and Genetics Biochemistry	3.2
Pedro Ruiz Gallo National University	Public	306	11	Cell biology Biochemistry Genetics	3.5
San Agustín National University	Public	322	16	Biochemistry Molecular biology Cell Biology and Genetics	4.9

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## BIBLIOGRAPHIC REFERENCES

1. Doble B, Schofield D, Roscioli T, Mattick J. Prioritising the application of genomic medicine. *npj Genomic Medicine* [Internet]. 2017 [Citado 02 de Octubre de 2019]; 2(35). Disponible en: <https://www.nature.com/articles/s41525-017-0037-0.pdf>
2. Manolio T, Chisholm R, Ozenberger B, Roden D. Implementing genomic medicine in the clinic: the future is here. *Genetics in Medicine* [Internet]. 2013 April [citado 02 de Octubre de 2019]; 15(4): 258–267. Disponible en: <file:///C:/Users/user/Downloads/gim2012157a.pdf>
3. Poterico J, Purisaca-Rosillo N, Taype-Rondan A. Genética y Genómica médica en el Perú. *Carta al editor. Acta Med. Perú* 2017; 34(2): 152-3.
4. Moran-Barrios J. Un nuevo profesional para una nueva sociedad. Respuestas desde la educación médica: la formación basada en competencias. *Rev. Asoc. Esp. Neuropsiq.*, 2013; 33 (118), 385-405 doi: 10.4321/S0211-57352013000200011
5. Giono Luciana E. CRISPR/Cas9 y la terapia génica. *Medicina (B. Aires)* [Internet]. 2017 Oct [citado 2018 Ago 13]; 77(5): 405-409. Disponible en: [http://www.scielo.org.ar/scielo.php?script=sci\\_arttext&pid=S0025-76802017000500009&lng=es](http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S0025-76802017000500009&lng=es)
6. Guio H. Hacia la medicina personalizada: implicancias de las ciencias básicas y las ómicas en la práctica clínica. *Rev. perú. med. exp. salud pública* [Internet]. 2015 [citado 21 Oct 2019]; 32(4): 629-632. Disponible en: [http://www.scielo.org.pe/scielo.php?script=sci\\_arttext&pid=S172646342015000400001](http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S172646342015000400001)

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