Research and innovation based on the genetic diversity of the Brazilian population.

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With the advancement of DNA sequencing technologies, several countries have created population genomics programs, building large platforms with health and genomic data from hundreds of thousands of individuals (deCode in Iceland; Finngen in Finland, UK Biobank in the United Kingdom, and All of Us, in the USA). In Brazil, the *Projeto DNA do Brasil*, the population arm of the Ministry of Health's Brazil Genomes Program, sequenced and analyzed the genomes of 4,000 Brazilians from different regions of the country. In these first genomes, large fractions of genomes of non-European ancestries, underrepresented in global databases, were captured and millions of previously unpublished genomic variants were identified.

While Brazil's DNA results will contribute to increasing the accuracy of genetic diagnoses in our population, they have also revealed the great potential of Brazilian genomes to foster innovation in the pharmaceutical and biotechnology industries. It has already been demonstrated that the use of genomic data at different stages of the new drug development pipeline leads to a reduction in development time and an increase in the probability of success. An emblematic example is the association between mutations in the PCSK9 gene and low LDL levels and protection against heart disease, which led to the development of evolocumab for the treatment of high cholesterol. Thus, large pharma/biotechs seek to access this data by financing population genomics projects, and entering into commercial agreements or acquiring companies that hold them.

However, one of the major limitations of the area is the lack of diversity in available genomic data, which are predominantly from populations of European and Asian ancestry. In addition to limiting the application of precision medicine to individuals of other ancestries, the lack of diversity in genomic banks leads to the loss of opportunities to make unprecedented findings present in non-European genomes that could lead to innovation in the area of health. For example, in a recent study, the company Regeneron identified variants in the GPR75 gene associated with protection against obesity present predominantly in Mexican individuals, without which the association signal would not have been detected. Now the company is developing molecules that inhibit the GPR75 protein for the treatment of obesity.

With 216 million individuals, the Brazilian population is unique due to the presence of three parental groups - indigenous, European and sub-Saharan Africans (from East and West Africa), resulting in a highly genetically heterogeneous population. Brazil has the largest black

population outside of Africa and is genetically different from African Americans in the USA. Furthermore, the Brazilian indigenous component is still practically unknown, and fragments of genomes of indigenous ancestry can be recovered from living mixed-race Brazilians.

For the advancement of the health complex in Brazil, it is essential to build an optimized genomic and health data platform to promote the inclusion of the Brazilian population in Precision Health, and research and innovation (P&I) in the health industry from the genomic diversity of our population. This research platform will be used to accelerate innovation in the pharmaceutical and biotech industry, and will catalyze the inclusion of the Brazilian population in Precision Health, improving management and reducing healthcare costs.