Pilot study of neonatal genetic screening in the Ogliastro population (Neogenia).


The "Pilot study of neonatal genetic screening in the population of Ogliastro" is a preventive health newborn project in which infant are tested for up 650 K specific DNA variants to identify genetic diseases with onset in early childhood and in subsequent periods of life, led to increased therapeutic treatment capable of improving quality of life of affected children. Genetic characterization of infants is performed through Illumina Bead-Based Microarray Technology. Additionally, if screening results is positive, diagnostic DNA testing will be done with alternative technologies validated for the detection of specific target conditions. The study involves the genetic characterization of about 1000 infants born at "Nostra Signora della Mercede" hospital in Lanusei -Sardinia- using Infinium global screening array-24 v3.0 (GSA), a new genotyping product that combines multi-ethnic genome-wide content and clinical research variants, making it a valuable genomic tool for clinical research applications. Newborns are screened within the first 3-4 day of life using pediatric DNA saliva sample collection kit, specifically designed for young donors (Orangene OC-175 Kit). OC-175 is a painless and easy to use saliva DNA collection kit with a minority impact on the workload management on nursing assisting staff as well as DNA stability at ambient temperature simplifying sample transport and laboratory logistics. Once collected, saliva samples are stabilized and DNA isolate following ethanol precipitation protocol. In the first instance an effort was made to identify the experimental design of the project to address the screenable disorders and the microarray technology to be used to carry out the genetic characterization of the newborns under study. The disease-causing variant included in the GSA “add on custom content” identify a large group of Sardinian-specific variants of greater clinical relevance like hemoglobinopathies and thalassemias, APECED and Wilson's disease. Another highly complex aspect was the definition of preventable or curable diseases with early intervention. In total, in the design of the add-on custom content we have included 30,470 variants of which: 28,358 coding variants,1,489 variants involved in the regulation of the immune response and for immune system disorders, 210 variants selected for their relevance in Mendelian diseases, 312 variants for monogenic cardiovascular diseases and 101 variants related to mitochondrial DNA variability. During the past three years have been finalized a framework for addressing ethical, legal, and social issues in order to guarantee bioethical and legal solidarity accommodating clinical and ethical standards to the project. Furthermore, a database has been implemented for the management of genetic and clinical information in compliance with the highest safety standards in accordance with the General European Regulation on the protection of personal data in force since 25 May 2018. The collection of biological material to be analyzed is strongly linked to the annual number of births which for the province of Ogliastro is estimated at around 180 births per year. Since June 2020, we have collected 70 salivary samples. Newborn screening is one of the most important programs of public preventive medicine address to identify inherited diseases before the onset of symptoms to prevent important and permanent clinical damage. Our pilot study, starting from a non-invasive salivary sample collection combined to a total of GSA 696,078 variants will allow us to give an answer appropriate to some of the major requirements for the execution of the screening with the aim to the inclusion of our neonatal genetic screening, for the group of pathologies examined by the study, among the services provided by the Health Service of the Sardinia Region.
References:


Keywords: screening, variants, genotyping.

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