NEONATAL GENETIC SCREENING AS A TOOL IN THE EARLY DIAGNOSIS OF SPINAL MUSCULAR ATROPHY

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Introduction. SMA is a life-threatening autosomal recessive, neuromuscular disorder that affects the nerve cells controlling the muscles. SMA is caused by mutations in the SMN1 gene and results in neuronal degeneration and muscular atrophy Early detection of SMA through newborn screening (NBS) is essential for preventing irreversible damage by selecting appropriate treatment and ensuring adequate follow-up. **Aim**: to implement genetic screening for spinal muscular atrophy (SMA) as a tool in the early diagnosis of spinal amyotrophy. **Materials and methods.** In the Human Molecular Genetics Laboratory at the Mother and Child Institute (IM&C), an algorithm has been implemented for genetic screening of SMA-associated mutations. This includes the collection of blood samples on filter paper cards from newborns and their analysis using molecular genetic methods such as real-time PCR and MLPA. **Results.** In order to implement the proposed algorithm, the necessary molecular genetic methods were employed, including real-time PCR method, for which specific probes and matrices were designed. The analysis set was validated using 10 samples with SMN1 exon 7 deletion and 10 samples without SMN1 exon 7 deletion.

Furthermore, the MLPA method was implemented with the aim of confirming and assessing the copy number of SMN1/SMN2 genes. After obtaining approval for the research design and protocol for this initiative, informed consent and acceptance forms were developed to confirm the participants' willingness to participate in the study, which were approved by the Research Ethics Committee of the USMF "N.Testemițanu". The minimum number of study participants was calculated using the EpiInfo 7.2.2.6 program, specifically the "StatCalc- Sample Size and Power" module, with a minimum sample size

calculated to be 172 participants. Subsequently, 250 blood spot samples were collected from newborns, with 75 samples already undergoing genetic screening. Following the analysis of the results, no sample was declared to have a suspected SMA status. **Conclusions.** The implemented algorithm for newborn screening for SMA detects newborns affected by SMA caused by a homozygous deletion of SMN1 exon 7. SMA due to compound heterozygous mutations (approximately 5% of SMA individuals) is not detected by this test. Newborn screening can identify patients affected by SMA before the onset of symptoms and provides an opportunity for early therapeutic intervention. The implementation of genetic screening for SMA within Institute of Mother and Child offers the chance to assess its feasibility as an early diagnostic tool for SMA and its benefits for the healthcare system of the Republic of Moldova.

Keywords*:* spinal muscular atrophy, newborn, screening, algorithm, DBS, qPCR, MLPA, feasibility, implementation.