4 years of DNA based newborn screening (cystinosis, SMA, SCID und sickle cell disease) in a Munich laboratory: methods and possibilities

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In January 2018 a DNA based newborn screening for cystinosis and spinal muscular atrophy (SMA) was started. For this pilot project a method for fast and cost efficient nucleic acid extraction and multiplex PCR for detection of three mutations in the cystinosin (CTNS) gene and for an exon 7 deletion in the survival motor neuron 1 (SMN1) gene had to be developed. Heterozygous carriers of a mutation in the CTNS gene were included in an amplicon based next generation sequencing assay to screen for further mutations.
300.000 newborns were screened for cystinosis and three affected babies were found and could be treated. In August 2019 cystinosis screening was replaced by severe combined immunodeficiency (SCID) screening. Finally, screening for sickle cell disease was added to the protocol in October 2021. Until January 2022 a total of 622,000, 407,000 and 43,000 newborns were screened for SMA, SCID and sickle cell disease, respectively. 82, 9, 8 newborns with SMA, SCID and sickle cell disease, respectively, were detected.
A flexible DNA screening protocol is presented, which can be easily adapted or expanded to new parameters and even be combined with next generation sequencing.