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Fund “Nauka” Project № 22027 Resume – Competition-based Session 2022:

“Establishing a structure for screening, early diagnosis and timely treatment of retinopathy of premature”

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Retinopathy of prematurity (ROP) represents a significant clinical and social problem worldwide. Around 10 % of all infants are born prematurely each year (Lawn et al., 2013). Approximately 1 million children die each year due to complications of preterm birth (L. Liu et al., 2016). Therefore special care is required including exposing to supplemental oxygen inside an incubator which is artificial environment. Preterm birth may affect the central nervous system, visual and auditory system. One of these complications is pathological condition called Retinopathy of prematurity which is the main focus of this scientific research. This is multifactorial vasoproliferative disease due to abnormal retinal vascularization in the immature retina of the premature neonates. The most important role in the pathogenesis of ROP is the supplemental oxygen therapy which cause vaso-obliteration and ischemic retinal zones. This is signal for increased expression of vascular endothelial growth factors leading to neovascularization. Therefore this phase is target for initial treatment leading to better prognosis for the outcome of the disease.

Treatment of ROP is required when the disease progresses rapidly and is included in so called prethreshold stage. In 70-80 % of all cases the visual impairment is prevented. Thus accurate diagnosis and appropriate treatment is crucial for the management of the condition. The conventional method, which is also accepted as the gold standard, for ROP screening is the digital imaging with Retcam. This method allows photodocumentation of the fundus, receiving high-quality images for detailed diagnosis. New technological advances are now allowing for the incorporation of telemedicine and artificial intelligence in the management of ROP.

The first digital wide field fundus camera is presented in 1997 year and is called Retcam (Retcam II; Natus Medical Systems, Pleasanton, California). Nowadays this is the most used method for screening and long-term analyzing the effect of treatment. This imaging system is portable with software for fluorescein angiography.

Advantages of the RETCAM:

- Easy imaging of the fundus;
- Wide field image capture of each retinal quadrant;
- High resolution of the images;
- Method of telemedicine allowing remote interpretation from specialized ophthalmologists.

Retinopathy of prematurity leads to serious social and economic consequences in the whole world. The effective strategy for preventing this complication of preterm birth is providing high quality of neonatal care and highly precised screening for early diagnosis and treatment of the infants.

Performing effective screening is crucial for adequate management of ROP.

- Establishing the first “Eye health university center” in Bulgaria with equipment allowing innovative research worldwide;
- The apparatus mentioned in the project will become part of the Varna Medical University learning and diagnostic centers, where not only its students but also young prospects could further develop their knowledge;
- In the long term, the RetCam will serve for the creation of the so called digital libraries, with the purpose of issuing a national library for tracing and monitoring kids with retinopathy of premature.