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## Retinal vessel analysis for acute neurovascular diseases: Timely realization of a wearable prototype by unorthodox means

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**Objective:** Retinal vessel analysis (RVA) is an innovative approach to assess dimensional and functional aspect of the retinal vasculature non-invasively. Progression of systemic diseases can be anticipated by RVA, implying considerable diagnostic potential. Recent data suggests its applicability also in acute neurovascular diseases such as stroke and subarachnoid hemorrhage, but is hampered by the limited maneuverability of the required, large-scale funduscope. A wearable device with comparable diagnostic features may greatly facilitate its use in ICU.

**Methods:** Realization of a wearable device for RVA requires miniaturization of the optic apparatus, digitalization of the information and integration into an automated software platform in a very condensed space. Technical details and milestones were developed and submitted to an expert committee. Following a rigorous selection process out of 10.000 applicants, a multidisciplinary team supported the author to construct a functional prototype.

**Results:** In the course of 3 months and with the support of a professional engineering and design team, the author was able to construct a smart, wearable device in a dimension comparable to commercially available virtual reality headsets. The device incorporates a miniaturized optic apparatus with multi-color filtering and light-excitation, digital recording of the retina and its vasculature in combination with remote control, automated storage and analysis via WIFI on a portable device.

**Conclusion:** RVA holds great diagnostic potential for both chronic systemic and acute neurovascular diseases, but its application is limited by currently available, bulky funduscopes. To overcome this limitation, a wearable device for automated retinal vessel analysis was developed. A functional and validated prototype was procured in an unorthodox, but rapid fashion via successful participation in a popular edutainment format.

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