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Editorial

Dynamic Pulse Reaction – Update 2020

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Abstract

The Nogier reflex or reflex auriculo-cardiac (RAC) or the dynamic pulse reaction is a physiological phenomenon that is not generally accepted in conventional medicine. Therefore, evidence-based research in this sub-area is important for auricular medicine as it provides appropriate scientific evidence for better acceptance. In this editorial, a RAC measurement based on a modified smartphone registration and analysis is presented. The contribution is intended to stimulate researchers to continue working in this interesting area.

Keywords

Nogier reflex; reflex auriculo-cardiac (RAC); dynamic pulse reaction; auricular medicine; basic research; integrative and complementary medicine

1. Introduction

The importance of the Nogier reflex or reflex auriculo-cardiac (RAC) or the dynamic pulse reaction as a physiological variable that has so far been almost unknown in conventional medicine

can be regarded as considerable [1]. It is a dynamic change [1]. Usually, we feel the RAC while micro-stimuli are acting on the patient, which is not a static process. We usually only feel it with a fingertip. There is only one ideal pulse sampling point (in an anatomically predetermined position). The RAC palpation provides reproducible results in double-blind tests [1].

In a (2019/2020) multinational research project of the TCM (Traditional Chinese Medicine) Research Center at the Medical University of Graz funded by IMON (Initiative for Medicine without Side Effects), efforts were made to break new ground, primarily providing quantifiable evidence for the changes in dynamic pulse recording with optical methods and artificial intelligence. The results were registered for the first time using an adapted smartphone and can be used for further research by other groups.

Detailed technical descriptions can be found in a report that was already presented to a broad interest group [2].

2. Information Technology-Based Dynamic 'Pulse Sensing' Using an Adapted Smartphone

The 'dynamic pulse phenomenon' described by Bahr [1] was first described by Paul Nogier in the 1970s [3-5]. Based on the assumption that most of the cells of an organism react to stimuli from the autonomic nervous system, Nogier looked for a method with which the body's reaction to acupuncture-induced measures could be represented. He discovered that mechanical pressure on certain points on the auricle caused a cardiovascular reaction. He called this reaction 'reflexe auriculo cardiaque', later it was also abbreviated as RAC or, as Bahr preferred, called 'dynamic pulse reaction' (to differentiate it from Chinese static pulse sensing) [1]. In the research of Bahr et al., the RAC served for its practical application in the field of auriculomedicine both as an instrument for diagnosis and therapy [6]. The use of the RAC signal enabled the development of interference field acupuncture as well as the therapeutic so-called 'controlled acupuncture', in which the acupuncture needle is positioned under dynamic pulse control and not, as in the classical Chinese tradition, based on 'cun' and other units of measurement [6]. Litscher et al. [7] published an original article in Integrative Medicine International in 2014 together with German and Chinese researchers. A new high-resolution imaging technique for registering pulsating surface changes could make it possible to quantify the RAC reproducibly for the first time even without statistical analysis. This method combines an innovative microscope system, video analysis software, and special image processing software (from the Beijing University of Science and Technology). Even small, pulse-dependent changes in the skin surface could be made visible [7]. Moser et al. [8], also from the Medical University of Graz in Austria, reported in 2017 that the RAC follows the physiological laws quite well. The study, based on an earlier set of tests on measurements and analyses of heart rate variability, showed various reproducible changes in physiological parameters. A total of seven parameters and various external non-invasive stimuli were recorded under a defined setup and test course. The authors assumed that the RAC is a manifestation of a cardiac reaction of the autonomic nervous system, which then triggers a pulse wave. They concluded that the use of subtle stimuli near the limit of perception should be appropriate to allow for repeatable testing of immediate vagal and delayed sympathetic response.

The application presented in this editorial is based, for the first time, on a modified smartphone registration of pulse activity and can be applied to both static and dynamic pulse reactions.

The hardware architecture of the innovative system is divided into three parts, the sensors, the smartphone per se, and the cloud server section. The sensors first register GSR (galvanic skin response) and PPG (photoplethysmography) signals from the patient and transfer them to the smartphone. The mobile unit then transmits the data wirelessly to the cloud server. The RAC is predicted with the help of artificial neural networks [9].

Figure 1 shows the dynamic pulse response (RAC) after triggering by laser stimulation at the Shenmen ear point (810 nm, 150 mW). The changes in amplitude and frequency in the pulse signal of the radial artery can be seen.

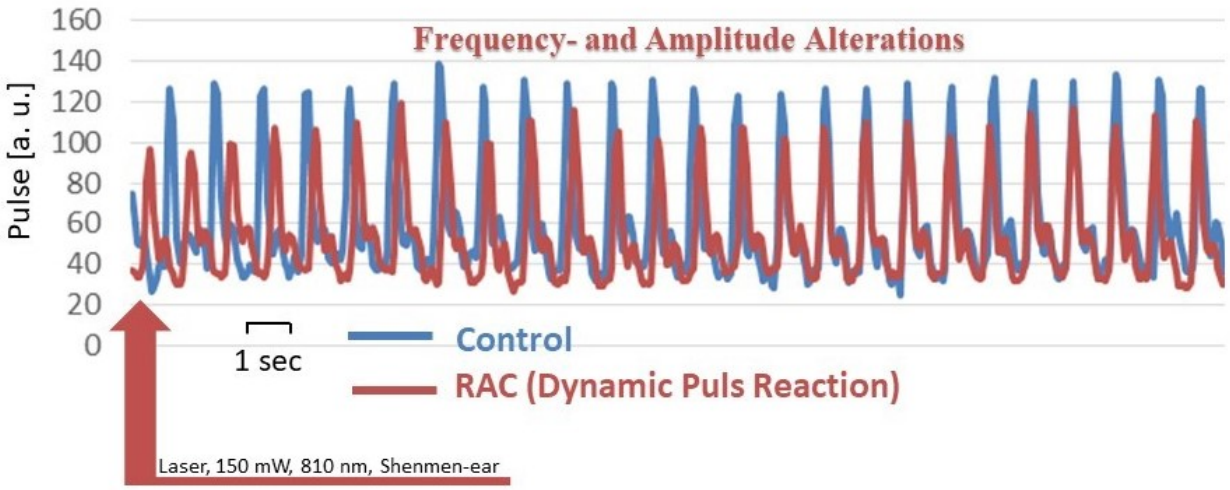

Figure 1 Dynamic pulse response (RAC) triggered by laser stimulation at the Shenmen ear point (modified with permission from Lan KC, Tainan).

3. Future Aspects

RAC research is entering a new phase in which modern information technology and artificial intelligence (AI) will play a major role. The RAC could be quantified and documented in the future using adapted smartphones with integrated sensors and analysis methods of AI (neural networks).

In theory, AI will help in making better medical decisions by registering, storing, and analyzing RAC data. However, in practice, it is often difficult to convert the changes in heart rate into usable information. The requirements of medical professionals are different, and the influencing factors too diverse.

Today, we are already taking the opposite step, and the human factor is again playing a bigger role. From the author's point of view, the greatest difficulty is to include human perception in the RAC analysis process. The solution to these questions can only be that AI and information technology processes in RAC research cannot and should not be a substitute for the human factor, but the basis for its data-supported decision-making.

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Author Contributions

Gerhard Litscher did all work.

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Competing Interests

The author does not declare any conflict of interest.

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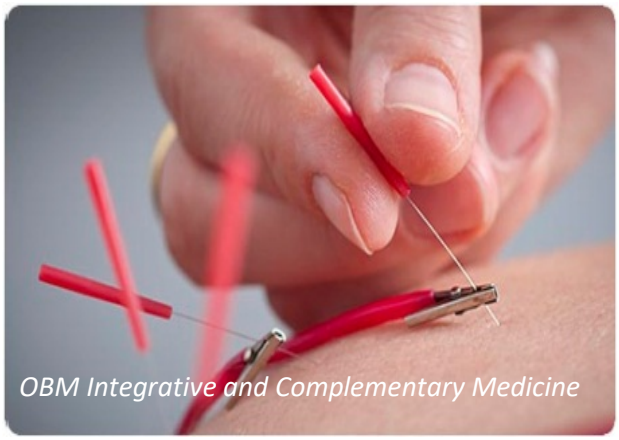

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