

# Review of EPI papers on medicine and psychophysiology published in 2008-2018

## Abstract

**Objectives:** The objective of this study was to evaluate the scale and scope of implementing Electrophotonic Imaging (EPI) analysis based on gas discharge visualization (GDV) technique in diverse medical applications and psychophysiology; to identify the range of applications in medicine; and to show in which areas the procedure can be useful to health professionals.

**Design:** The design of the study is a systematic review.

**Methods:** The database included articles published in peer-reviewed journals and proceedings of the international scientific congresses. Search restrictions were human subjects, English or Russian language, and publication date from 2008 to 2018. All studies were evaluated using Scottish Intercollegiate Guidelines Network.

**Results:** The search yielded 74 articles addressing medical and psychophysiological applications of EPC/GDV technology. Among them were 13 SRR, 19 RCT, 23 cohort studies and 19 case reports or case series.

**Conclusions:** The EPI/GDV software and equipment is a convenient and easy-to-use, which allows examination of patients with various pathologies and, therefore, offers a wide range of applications. The investigations showed that the GDV method delivers valuable diagnostic information on the functional state of patients, allows their state to be monitored, and constitutes a convenient and easy method for conducting preventive examinations of individuals and control in various areas of application. No negative or undesirable characteristics identified for the EPI/GDV method in all reviewed articles was found. Also, there were no contraindications to application of the EPI/GDV technique.

**Keywords:** electrophotonic imaging, gas discharge visualization, medicine, psychophysiology, clinical study, review

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## Introduction

The Electrophotonic Imaging or Gas Discharge Visualization technology (EPI/GDV) is based on computer image analysis of photons, emitted by a subject in strong impulse electromagnetic field. Several companies in different countries produce various types of devices based on GDV technology, the latest being Bio-Well camera ([www.bio-well.com](http://www.bio-well.com)). This instrument is being used in a wide range of scientific and practical applications in more than 65 countries. Bio-Well camera has CE, EU and FDA certifications. In 2010 we published review of papers on application of GDV/EPI technology in medicine and psychophysiology published before 2007.<sup>1</sup>

EPI/GDV technique have found a wide range of applications first of all in medical practice, both conventional and complementary; in analyzing sport activity; research on water and materials; etc.<sup>2,3</sup> More than 2000 professionals are using EPI/GDV instruments on 65 countries. A lot of books in different languages may be found at [www.amazon.com](http://www.amazon.com). In this paper we review articles dedicated to clinical and psychophysiological studies published in 2008-2018.

## Methods

### Article selection

The literature search yielded 98 papers published in peer-reviewed journals, and proceedings of scientific conferences. In all these papers GDV technique was being used in clinical and psychophysiological

investigations. Some papers were presented at the international conference called “Science, Information, Spirit,” held in Saint-Petersburg, Russia, under the guidance of the International Union of Medical and Applied Bioelectrography (IUMAB). Applying the exclusion criteria listed below reduced this amount to 74 papers. 11847 people participated in the research.

Search restrictions were human subjects and articles presenting original data or an analysis of original data related to medicine and psychophysiology.

### Evaluation procedures

Papers have been classified as follows:<sup>4</sup>

- Randomized controlled trial (RCT): studies using random assignment to treatment group and making between-group comparisons of an intervention or treatment. This class includes studies using comparison of placebo and experimental groups as well as those using comparisons of different treatments.
- Systematic research report (SRR): papers with statistical analysis of the results of research over a long period of time by one group.
- Cohort studies (CO): small studies for the explicit purpose of developing protocols or feasibility; or studies that were defined by their authors as “pilot studies”. Single group interventions: pre-experimental studies performed under controlled conditions;

- d. Case series (CS): articles reporting more than 2 cases observed in clinical practice.
- e. Case reports (CR): articles describing interesting clinical cases.

### Quality rating

RCT and SRR articles were evaluated for quality using the Scottish Intercollegiate Guidelines Network (SIGN) which allows quite precise expert evaluation of published paper based on strict criteria (Table 1). All papers evaluated as low were excluded from this review.

**Table 1** SIGN Check list

1.1 Study addresses appropriate, clearly focused question.
1.2 Treatment group assignment is randomized.
1.3 Adequate concealment method is used.
1.4 Subjects and investigators are kept “blind” about treatment allocation.
1.5 Treatment and control groups are similar at the start of the trial.
1.6 Only difference between groups is the treatment under investigation.
1.7 Outcomes are measured in a standard, valid, and reliable way.
1.8 What percentage of subjects in each treatment arm dropped out before the study was completed?
1.9 How well was the study done to minimize bias? How valid is the study?

### Results

Tables 2 summarize classification of papers presented in this review. Tables 3 & 4 give the outline these articles with the number of patients involved in each study.

**Table 2** Summary of papers published in 2008-2018

Field of study and reference	Type of paper					Total
	RCT	SRR	CO	CS	CR	
Clinical studies <sup>6-49</sup>	16	12	12	4		44
Psychophysiology <sup>50-78</sup>	3	1	11	5	10	30
Total	19	13	23	9	10	74

### Discussion

It is interesting, that the amount and types of papers published in the last 10 years was practically the same as published in previous period (Table 2) (Table 5), while the amount of GDV/EPI instruments being in use increased threefold. This may be explained by the fact, that most of GDV/EPI users are doctors and practitioners, who are using instruments in their everyday practice and have no time for research. Research projects with published results, be it clinical studies or psychophysiological studies are conducted in research institutions or universities. This creates limitation to this study. We attempted to avoid the bias in evaluating the studies by using evaluation of all papers by several experts.<sup>5</sup>

**Table 5** Summary of Papers published in 2008-2018

Field of study and reference	Type of paper					Total
	RCT	SRR	CO	CS	CR	
Clinical studies	15	13	10	7	4	49
Psychophysiology	4	13	3	2	1	23
Total	19	26	13	9	5	72

### Conclusion

Based on the presented data we can make several conclusions:

- a. There is constant interest between researchers in testing possible areas for EPI/GDV technique application in medicine and psychophysiology.
- b. Results of these research allowed creating several new algorithms of data processing, implemented in the cloud-based Bio-Well software complex.
- c. We pay attention to several papers on comparing groups of oncological patients with control groups published by different research teams. In all these papers significant statistical difference of EPI/GDV parameters between groups was found. It opens up interesting perspectives for further implementation of the EPI/GDV technology in clinical practice.
- d. Psycho physiological studies revealed a lot of correlations between EPI/GDV indexes and psychological features of people evaluated by conventional methods. Based on these results, as well as data published in previous periods, we may conclude that EPI/GDV method is one of the few objective evaluations of the personality dimensions.
- e. Important area of the EPI/GDV method application is the evaluation of the influence of different interventions or treatment. This allows making quantitative analysis of the individual response of the patient’s organism both to conventional and complementary methods of treatment and psychophysiological corrections.
- f. The overall conclusion is that EPI/GDV technology is non-invasive, easy to use, quick method for evaluation psycho physiological condition of people and their response to interventions both in clinical practice and under the influence of different environmental factors.
- g. We did not find published papers with negative results of EPI/GDV technology application or contraindications for using this method.

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### Conflict of interests

Author declares that there is no conflict of interest.

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