

Epione, 'Epione' And Pain – A New Approach

G Matis, O Chrysou, T Birbilis, D Silva, A Bernardo, P Stieg, I Asouhidou

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Abstract

Editor,

'Who, except the gods, can live time through forever without any pain?'

Aeschylus BC 525–456

Each year 25 million Americans experience acute pain due to surgery or injury and another 50 million suffer chronic pain. But how could one define pain? According to the International Association for the Study of Pain (IASP) pain is an "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Several treatment options exist; pharmacologic, psychological, physical rehabilitative, even surgical ones. However, there is an accumulating body of evidence suggesting that it is actually undertreated, especially in the group of patients with severe pain. Poorly controlled pain has many well-described physiological, quality of life and financial implications. That is the reason why physicians dealing with pain are in a constant quest of new tools to add to their armamentarium.¹

Pain is an old 'friend' of mankind. In ancient Greece, Epione (Greek: ??????) was the wife of Asclepius and she was considered to be the goddess of soothing, of healing the pain.² Nowadays, a new 'Epione' was born (<http://www.projectepione.com/>); it's the 'Epione project' brought to life by a team of young researchers of the Signal Processing & Biomedical Technology Unit of Aristotle University (Thessaloniki, Greece) (<http://psyche.ee.auth.gr/>) under the inspirational mentorship of a multi-talented Associate Professor, namely Dr. Leontios Hadjileontiadis.^{3,4}

So, what's so great about this Project? 'Epione' is a brand new pain management system addressing all types of pain (acute, chronic, phantom limb, physical, psychological), integrating the demands of all health-care stakeholders

(patients, physicians, hospitals), and eventually leading to improvement of quality of life, thus enhancing quality of personalized health-care.³

After installing the necessary software in a personal computer and creating a new account, patients are asked to provide some information (personal details, preferences, social network profiles, tolerance to pain thresholds). Essentially, this system aims at minimising patients' pain by adapting to their personalised pain behaviour. This is achieved in general terms by incorporating analysis of facial muscles' movement and electroencephalogram (EEG). The collected data are employed in the pain measurement process and accordingly, wireless biofeedback and Augmented Reality-based distraction scenarios are activated. This is the basic philosophy behind this attempt.^{3,4}

In a more step-by-step fashion, 'Epione' adopts biosignal (EEG) and image (webcam) processing techniques so that it may recognise various patterns of pain. Then, the system dynamically interacts with the patient in individualised ways, namely initiating biofeedback (such as TENS), manipulating a virtual reality 3D environment ('Epione Vault'), experientially interacting (with family members, friends, colleagues, supporting groups), and low-frequency (1-8 Hz) music utilizing. The ultimate goal is patients' destruction. 'Epione' not only allows the attending physician to check the users' status and provide the necessary counseling, but it also boosts the patients' ability to share the perceived pain with others taking advantage of several social networks (Facebook, Skype, Twitter). All pain attacks and all 'Epione'-patients' interactions are archived. Access to these data is allowed to both patients (self-monitoring) and physicians (patient-monitoring).³

Furthermore, the issue of phantom limb pain in amputees is addressed. EEG is utilized to allow patients move simulated virtual limbs with the aid of Augmented-Reality techniques.

The amputees eventually 'feel' and 'control' the missing limb, hence minimising phantom limb pain and supporting the reconstruction of the pragmatic body image.⁴

As Aeschylus pointed out more than 2,500 years ago, pain is inevitable. Physicians actively involved in pain management (anaesthesiologists, neurologists, neurosurgeons, oncologists, general practitioners) should always be searching for the best treatment options for their patients. In doing so, keeping track of recent developments in the biomedical arena is absolutely imperative as this a rapidly evolving field.⁵ Under this prism, 'Epione' is thought to be truly promising and definitely deserving the attention of the medical community. The dynamic nature of this platform tailored to each patient's needs render it revolutionary attractive. Dr Hadjileontiadis and his enthusiastic team are to be congratulated for this effort.

The clinical evaluation of this technology in more and more patients (with emphasis on cancer patients) will unequivocally demonstrate its applicability and will certainly add to its refinement. After all, the patients are the best judges.

Sincerely,

Georgios K. Matis,
Danilo Silva,

Irene Asouhidou,
Olga I. Chrysou,
Theodossios A. Birbilis, Antonio Bernardo,
Philip E. Stieg

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Author Information

Georgios K. Matis

Department of Neurosurgery, Democritus University of Thrace Medical School, University Hospital of Alexandroupolis

Olga I. Chrysou

Department of Neurosurgery, Democritus University of Thrace Medical School, University Hospital of Alexandroupolis

Theodossios A Birbilis

Department of Neurosurgery, Democritus University of Thrace Medical School, University Hospital of Alexandroupolis

Danilo Silva

Department of Neurosurgery, Weill Cornell Medical College, NewYork-Presbyterian Hospital

Antonio Bernardo

Department of Neurosurgery, Weill Cornell Medical College, NewYork-Presbyterian Hospital

Philip E. Stieg

Department of Neurosurgery, Weill Cornell Medical College, NewYork-Presbyterian Hospital

Irene Asouhidou

Second Department of Anaesthesiology, General Hospital “G. Papanikolaou”