CORTICAL ACTIVITY INDEX

BrainU

THE DEPTH OF ANESTHESIA MONITORING

BrainU

Keep Your Brain in Shape

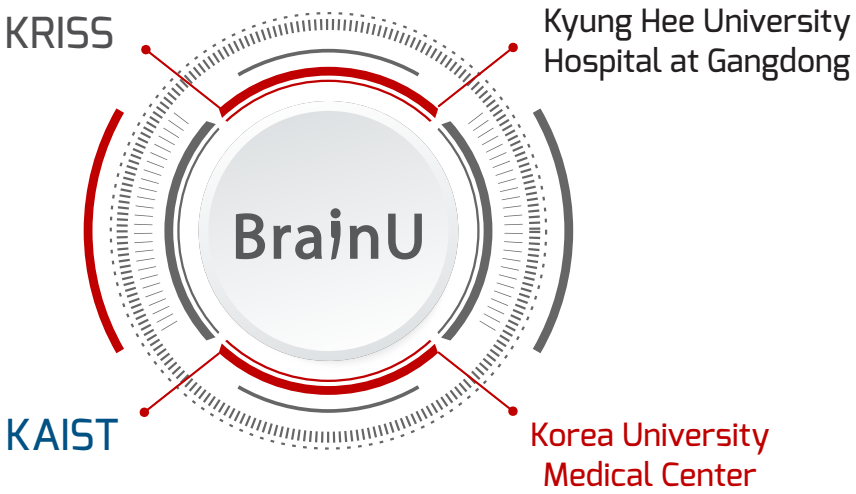
BrainU is a company that develops medical devices related to brain waves and bio-signal.

Based on the signal and data processing technology, BrainU has strengths in 4th industry related technology (artificial intelligence and big data).

With these expertise, we are developing medical devices that require precision such as EEG analysis.

We developed the depth of anesthesia monitoring system(called 'CAI') to measure the anesthetic state of the patient during the operation and received approval from the Korean Ministry of Food and Drug Safety.(MFDS)

Currently, we are also developing healthcare products based on bio signal analysis such as sleeping and concentration.



PRODUCT DESCRIPTIONS

CAIs Sensor

- Collecting frontal lobe EEG waves
- 4 electrodes hydrogel - attached sensor
- Low skin irritation
- Compact sized design for patient comfort

CAIx Amplifier

- Compact & Light-weight
- Easy to mount
- Bluetooth 3.0 supported
- Built-in Battery (over 24H)

CAIv Monitor & Application

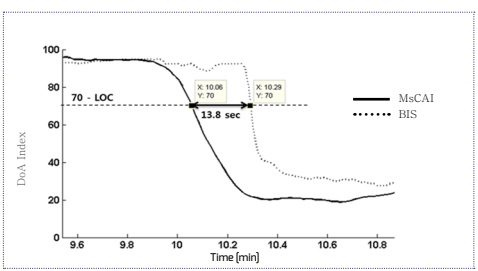
- Alarm, warning and error messages
- Easy to move & mount
- User - configurable displays
- Easy to manage Patients' data

CAI displays the following information on the screen

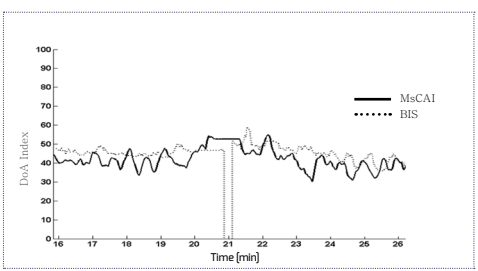
- CAI index value
- SQI Signal Quality Index
- EMG Electromyography
- EEG Electroencephalogram wave form display
- BSR Burst Suppression ratio
- Waning and Alarm Messages

ADVANCED

The system quickly processes the brain's electrical activity based on original signal processing technology. Newly adopted Bluetooth wireless module guarantees high quality of signals. You can safely monitor the live depth of anesthesia anywhere and anytime in an operation room.



FAST RESPONSE vs BIS™



IMPROVED STABILITY vs BIS™

ALGORITHM FEATURES

- Analysis of frontal lobe brain activity
- Approx. 14 secs faster signal processing vs BIS™
- Real Time Cortical Activity Index and Electro-myography Index
- Burst Suppression Ratio & Raw EEG Data

EXTENDED

User-friendly designed UI/UX displays important patient information in a concise way. Touch actions control the main functions of the app during monitoring of the patients. Simple design of the system focuses the essential function and provides the environments for the user friendly. Wireless system to improve space efficiency in the operation room. Configuration and display of user customized EEG information.

EASY UI / UX

DEVICE FEATURES

- User friendly designed UI/UX
- Concise patient information display
- Wireless communication (Bluetooth 3.0)
- Alarm / Warning / Error Message
- Low skin irritation sensor design

PAPER

33rd Annual International Conference of the IEEE EMBS

Boston, Massachusetts USA, August 30 - September 3, 2011

Monitoring the Depth of Anesthesia from Rat EEG using Modified Shannon Entropy Analysis

Young-Gyu Yoon, Tae-Ho Kim, Dae-Woong Jeong, and Sang-Hyun Park

Abstract—In this paper, an entropy based method for quantifying the depth of anesthesia from rat EEG is presented. The proposed index for the depth of anesthesia called modified Shannon entropy (MShEn) is based on Shannon entropy (ShEn) and spectral entropy (SpEn) which are widely used for analyzing non-stationary signals. Discrimination power (DP), as a performance indicator for indexes, is defined and used to derive the final index for the depth of anesthesia. For experiment, EEG from anesthetized rats are measured and analyzed by using MShEn. MShEn shows both high stability and high correlation with other indexes for depth of anesthesia.

35th Annual International Conference of the IEEE EMBS

Osaka, Japan, 3 - 7 July, 2013

A Cepstral Analysis based Method for Quantifying the Depth of Anesthesia from Human EEG

Tae-Ho Kim, Young-Gyu Yoon, Jinu Uhm, Dae-Woong Jeong, Seung Zhoo Yoon and Sang-Hyun Park

Abstract— In this paper, a cepstral analysis based approach to measuring the depth of anesthesia (DoA) is presented. Cepstral analysis is a signal processing technique widely used especially for speech recognition in order to extract speech information regardless of vocal cord characteristics. The resulting index for the DoA is called index based on cepstral analysis (ICep). The Fisher criterion is engaged to evaluate the performance of indices. All analyses are based on a single-channel electroencephalogram (EEG) of 10 human subjects. To validate the proposed technique, ICep is compared with bispectral index (BIS), which is the most commonly used method to estimate the level of consciousness via EEG during general anesthesia. The results show that ICep has high correlation with BIS, and is outstanding in terms of the Fisher criterion and offers faster tracking than BIS in the transition from consciousness to unconsciousness.

2014
International Conference on Information and Communication Technology Convergence (ICTC)

Implementation of Real-time Depth of Anesthesia Monitoring System Using Wireless Data Transfer

Jihoon Park1, Junbeom Kim2, Seung-Kyun Hong3, Kwang Moo Kim3, Ho-Jong Chang2*
School of Electrical and Electronic Engineering, Yonsei University, Seoul, Republic of Korea1 / Biomedical Team, IT Convergence, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea2 / Charm Engineering Co., Ltd. Gyeong-gi, Republic of Korea3
polypark@yonsei.ac.kr1, hojoungc@itc.kaist.ac.kr*

Abstract— In this paper, wireless communication system for Depth of Anesthesia (DoA) monitor system, which is used as auxiliary device for operation, has been implemented. Conventional systems use wired data transfer for communication between sensor and the main system. Thus, the existing systems have constrained distance of data transfer. The proposed system resolves this problem to obtain convenience and portability. With clinical trials, high quality signal wireless transmission is verified.

2020
Medicine 2020

Quantifying the Depth of Anesthesia Based on Brain Activity Signal Modeling

Hyub Huh, Sang-Hyun Park, Joon Ho Yu, Jisu Hong, Mee Ju Lee, Jang Eun Cho, Choon Hak Lim, Hye Won Lee, Jun Beom Kim, Kyung-Sook Yang, Seung Zhoo Yoon

Abstract— Various methods of assessing the depth of anesthesia (DoA) and reducing intraoperative awareness during general anesthesia have been extensively studied in anesthesiology. However, most of the DoA monitors do not include brain activity signal modeling. Here,

we propose a new algorithm termed the cortical activity index (CAI) based on the brain activity signals. In this study, we enrolled 32 patients who underwent laparoscopic cholecystectomy. Raw electroencephalography (EEG) signals were acquired at a sampling rate of 128Hz using BIS-VISTATM with standard bispectral index (BIS) sensors. All data were stored on a computer for further analysis. The similarities and difference among spectral entropy, the BIS, and CAI were analyzed. Pearson correlation coefficient between the BIS and CAI was 0.825. The result of fitting the semiparametric regression models is the method CAI estimate (0.00995; P=.0341). It is the estimated difference in the mean of the dependent variable between method BIS and CAI. The CAI algorithm, a simple and intuitive algorithm based on brain activity signal modeling, suggests an intrinsic relationship between the DoA and the EEG waveform. We suggest that the CAI algorithm might be used to quantify the DoA.

PRODUCT SPECIFICATION

ISO 13485:2016

GMP Korea Food & Drug Administration

MSIP-CRM-CMd-CAI

	PARAMETER	SPECIFICATIONS
Sensor (CAIs®)	Dimensions / Weight	260 mm x 24 mm x 1.3 mm / App. 5 g
Amplifier (CAIx®)	Dimensions / Weight	111 mm x 60 mm x 57 mm / App. 160 g
	No. of Channel	2 (EEG) + 1 (EMG)
	Sensed Bio-Signal	EEG / EMG
	Battery	Max 40 hr / Rechargeble
	Communication	Wireless (BT 3.0)
Monitor & S/W (CAIv®)	Dimensions / Weight	211 mm x 124 mm x 8.2 mm / App. 316 g
	Battery	Max 4 hr / Rechargeble

Certification & Permission

CAI MONITORING SYSTEM

Classification : Electroencephalograph
Product License No. 16-4323

CAIs SENSOR

Classification : Electrode, electroencephalograph, scalp
Product License No. 15-586

Manufacturer(Registered No.) **:** 5203
Certificate of GMP : KTL-ADB-3266

BrainU

Address : SangSaeng Plaza #702, 253-1, Jukjeon-ro, Suji-gu, Yongin-si, Gyeonggi-do, 16876, KOREA
Tel : + 82-31-889-1788 e-Mail : support@brainu.co.kr