

Session Title:

## EEG - A Microphone In A Crowd!



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Switzerland 

## 30 Years Of Microprocessor Evolution

### Mainframes of the 90's



16 Bit Processor - 24GB Disk Storage



32 Bit Processor - 44GB Disk Storage

The new pocket mainframe!



64 Bit Processor - 128GB Flash Storage

## 60 Years Of EEG Equipment Evolution

### Early EEG Devices



### EEG Devices Today



Have they changed much?

At NeuroPro We See A Great Opportunity  
To Introduce A New Generation Of Brain  
Signal Analysis Tools.

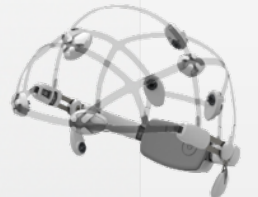


## A New Product Line Of Wearable EEG Headsets

### 1 to 8 Channel Ambulatory EEG Headset



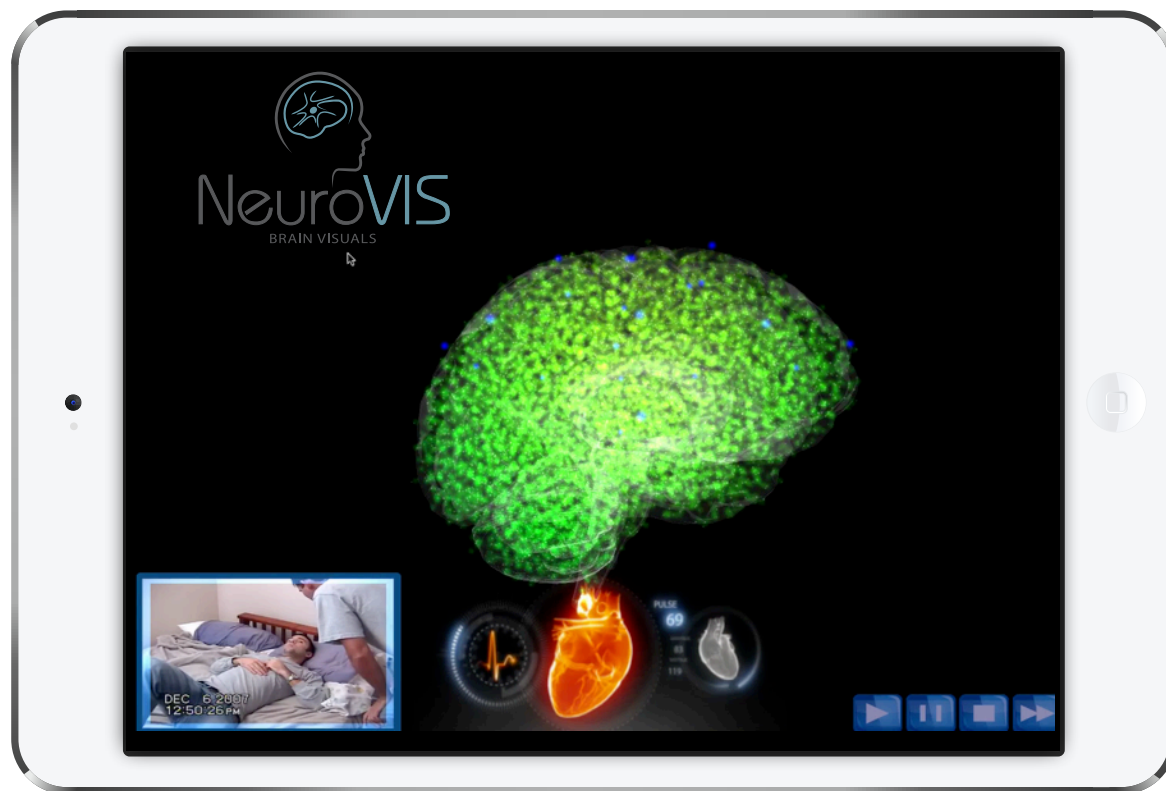
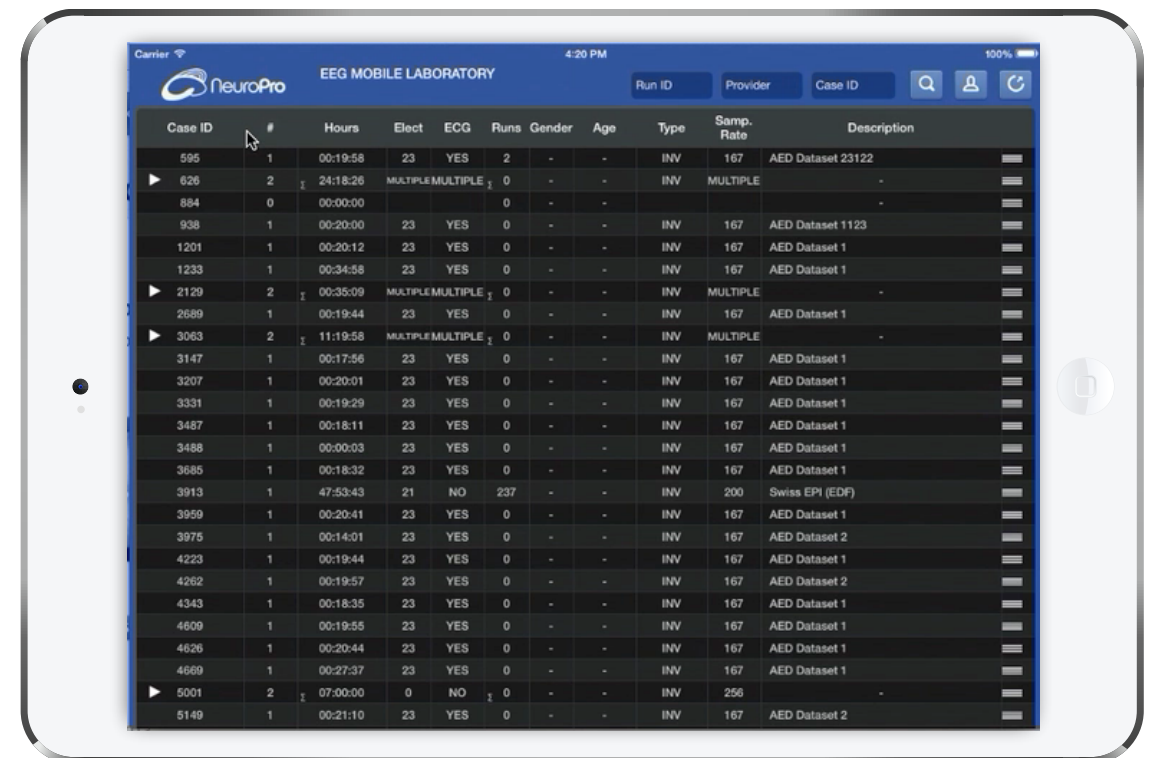
**NeuroTrail**



## ♦ EEG Mobile Laboratory ♦

A New Generation Of EEG Signal Visualisation And Cloud Storage And Analysis Tools

# VML<sup>PRO</sup><sub>EEG</sub>

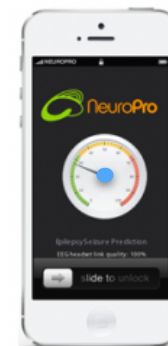



Case ID	#	Hours	Elect	ECG	Runs	Gender	Age	Type	Samp. Rate	Description
595	1	00:19:58	23	YES	2	-	-	INV	167	AED Dataset 23122
626	2	24:18:26	MULTIPLE	MULTIPLE	0	-	-	INV	MULTIPLE	-
884	0	00:00:00			0	-	-			
938	1	00:20:00	23	YES	0	-	-	INV	167	AED Dataset 1123
1201	1	00:20:12	23	YES	0	-	-	INV	167	AED Dataset 1
1233	1	00:34:58	23	YES	0	-	-	INV	167	AED Dataset 1
2129	2	00:35:09	MULTIPLE	MULTIPLE	0	-	-	INV	MULTIPLE	-
2689	1	00:19:44	23	YES	0	-	-	INV	167	AED Dataset 1
3063	2	11:19:58	MULTIPLE	MULTIPLE	0	-	-	INV	MULTIPLE	-
3147	1	00:17:56	23	YES	0	-	-	INV	167	AED Dataset 1
3207	1	00:20:01	23	YES	0	-	-	INV	167	AED Dataset 1
3331	1	00:19:29	23	YES	0	-	-	INV	167	AED Dataset 1
3487	1	00:18:11	23	YES	0	-	-	INV	167	AED Dataset 1
3488	1	00:00:03	23	YES	0	-	-	INV	167	AED Dataset 1
3685	1	00:18:32	23	YES	0	-	-	INV	167	AED Dataset 1
3913	1	47:53:43	21	NO	237	-	-	INV	200	Swiss EPI (EDF)
3959	1	00:20:41	23	YES	0	-	-	INV	167	AED Dataset 1
3975	1	00:14:01	23	YES	0	-	-	INV	167	AED Dataset 2
4223	1	00:19:44	23	YES	0	-	-	INV	167	AED Dataset 1
4262	1	00:19:57	23	YES	0	-	-	INV	167	AED Dataset 2
4343	1	00:18:35	23	YES	0	-	-	INV	167	AED Dataset 1
4609	1	00:19:55	23	YES	0	-	-	INV	167	AED Dataset 1
4626	1	00:20:44	23	YES	0	-	-	INV	167	AED Dataset 1
4669	1	00:27:37	23	YES	0	-	-	INV	167	AED Dataset 1
5001	2	07:00:00	0	NO	0	-	-	INV	256	-
5149	1	00:21:10	23	YES	0	-	-	INV	167	AED Dataset 2

The Virtual Mobile Laboratory (VMLproEEG) is the first cloud EEG mobile laboratory that offers storage management and analysis, using a new generation of hardware and software tools. This platform allows for remote diagnoses alongside the total management of a patient's EEG and meta data.



## Monitoring And Prediction Of Neurological Episodes



WiNAM

♦ Epilepsy Prediction ♦

Patent EP2464285B1

## A New Generation of EEG Solutions







## *What is WiNAM?*

WiNAM is a proprietary set of algorithms, developed at Neuropro, that analyses EEG signals using binary techniques.

WiNAM uses multi layered neural binary pattern matching algorithms to monitor, predict and detect, in realtime, neurological episodes.

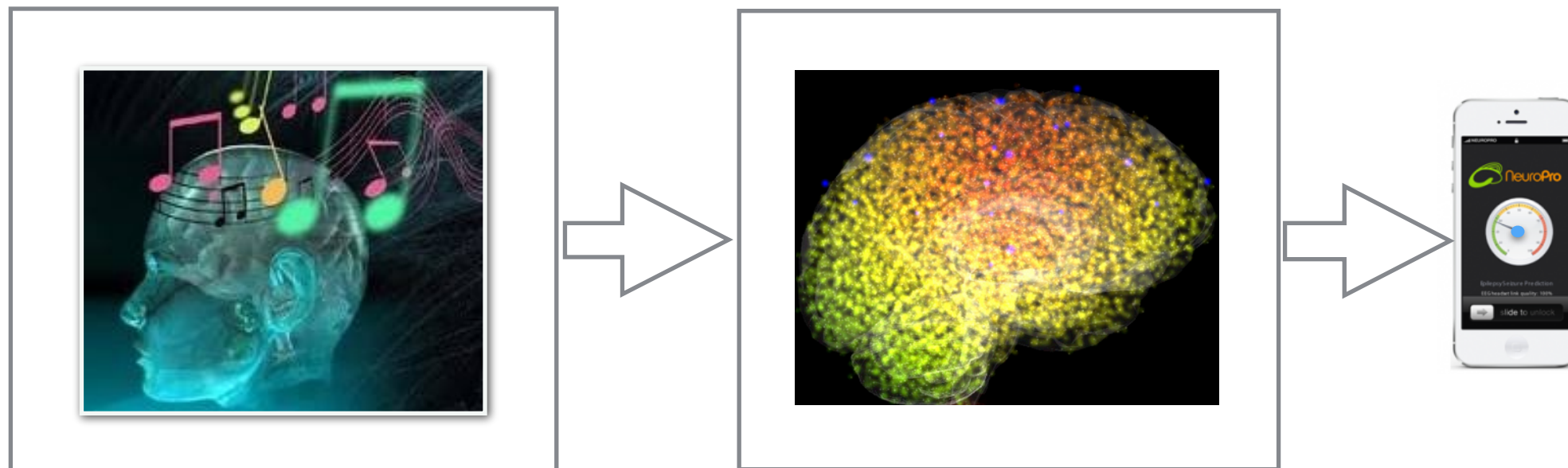


We are currently targeting epilepsy.

Patent EP2464285B1

## The WiNAM Philosophy

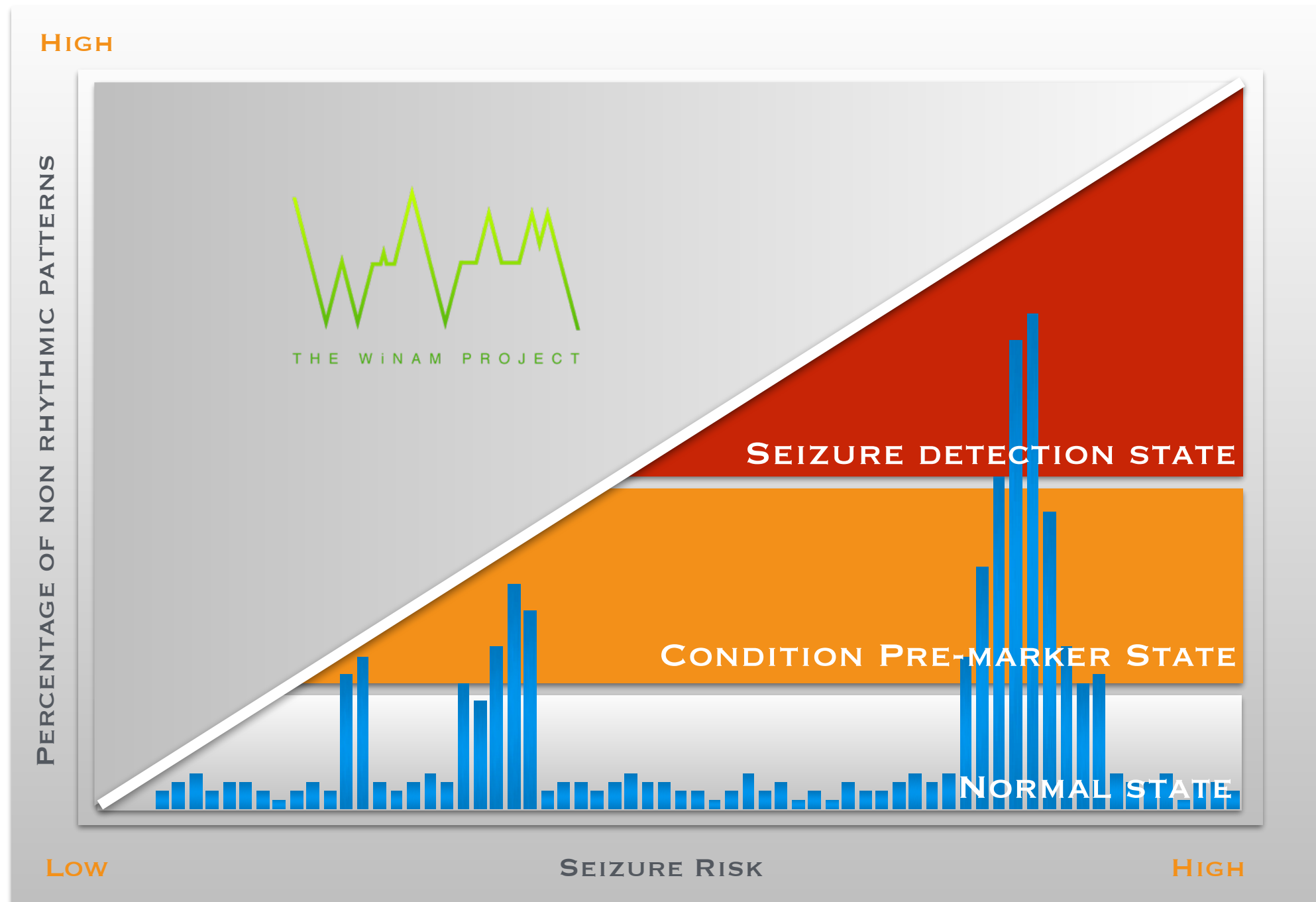
The brain is a musical orchestra. EEG recordings capture the rhythm in the music and not the tunes!



WiNAM unravels the non-rhythmic 'off-beats' and links them to a neurological episode.

In Autism, Brain's Orchestra Plays Out of Sync - Sue McGreevy  
*Harvard Medical School; January 17, 2013*

## WiNAM Hypothesis



We classify the neurological activity, on a time interval basis, into three distinct states; Normal state, Abnormal state and pre-marker state.

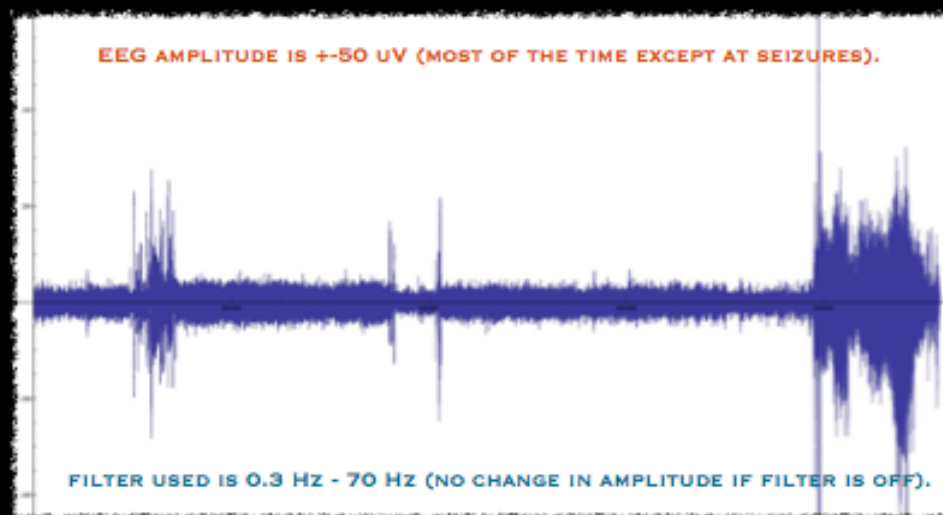
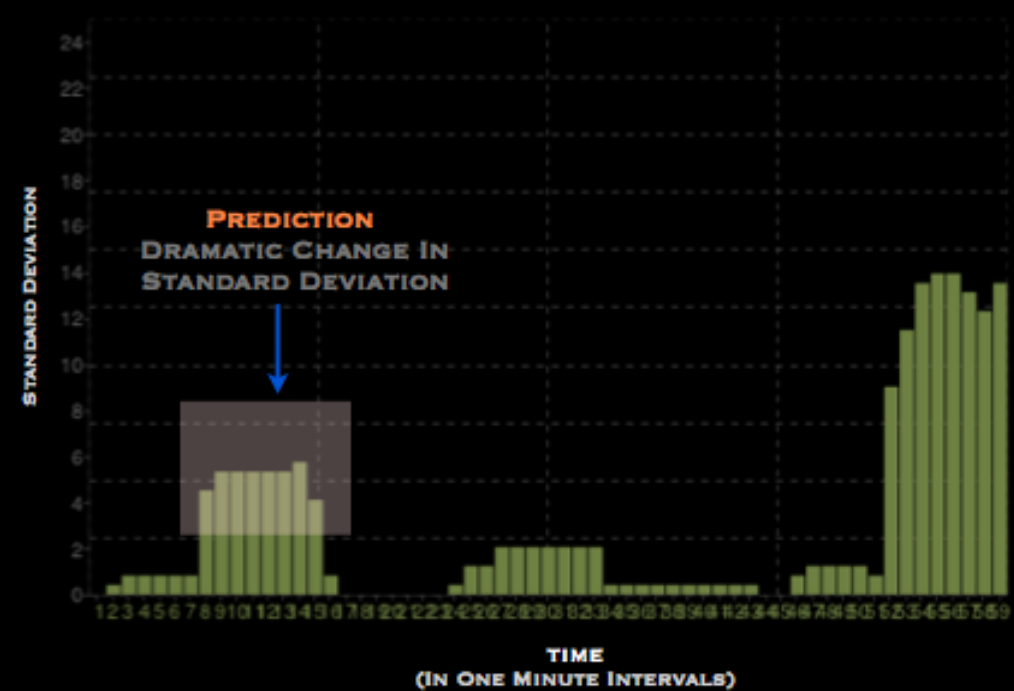
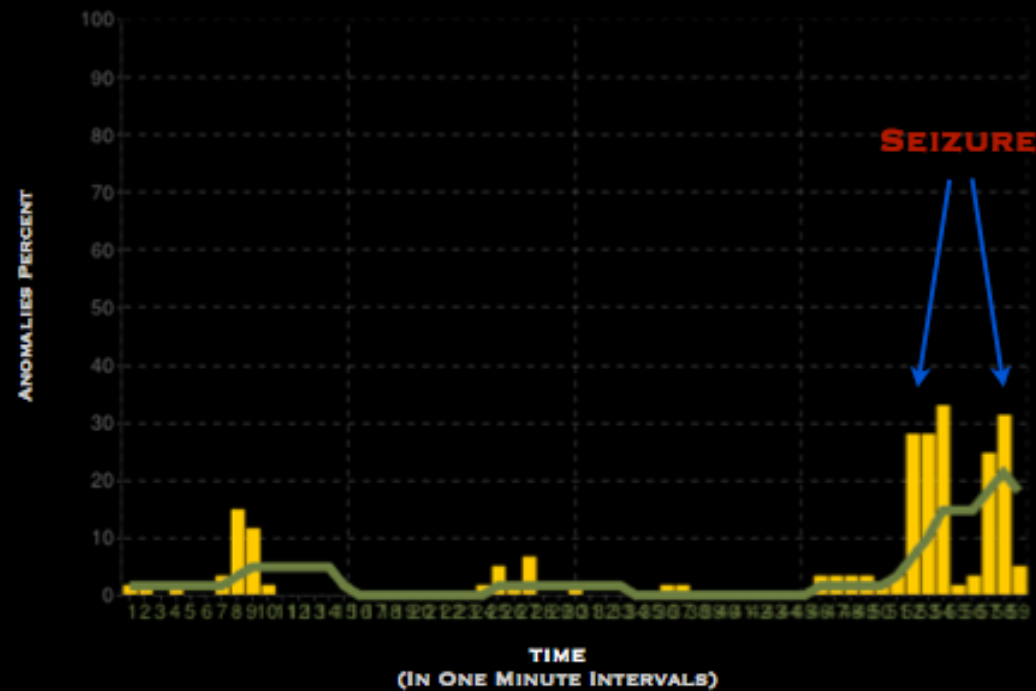


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# EEG SIGNAL ANALYSIS EPIO2 STUDY TRIAL EPIW8L7

JAMIL EL-IMAD  
JUNE 2012

## SEIZURE HOUR THREE



Hour Three Raw Data Chart

### TRIAL DATA SUMMARY

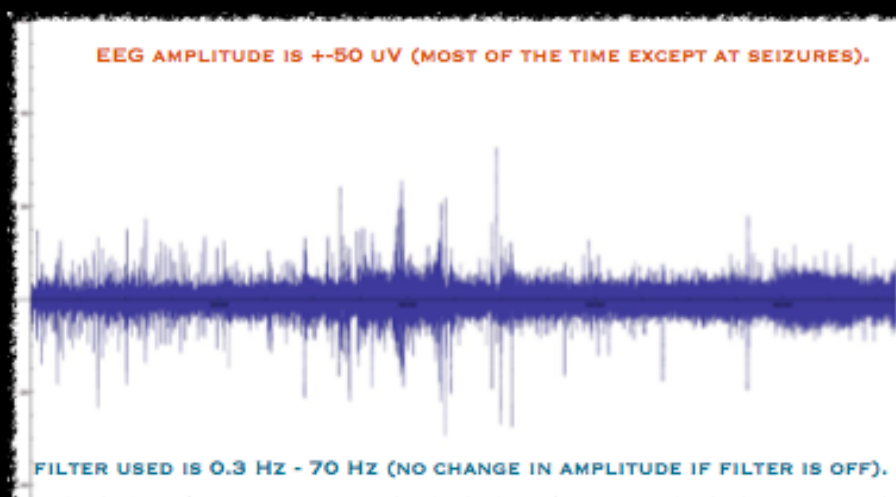
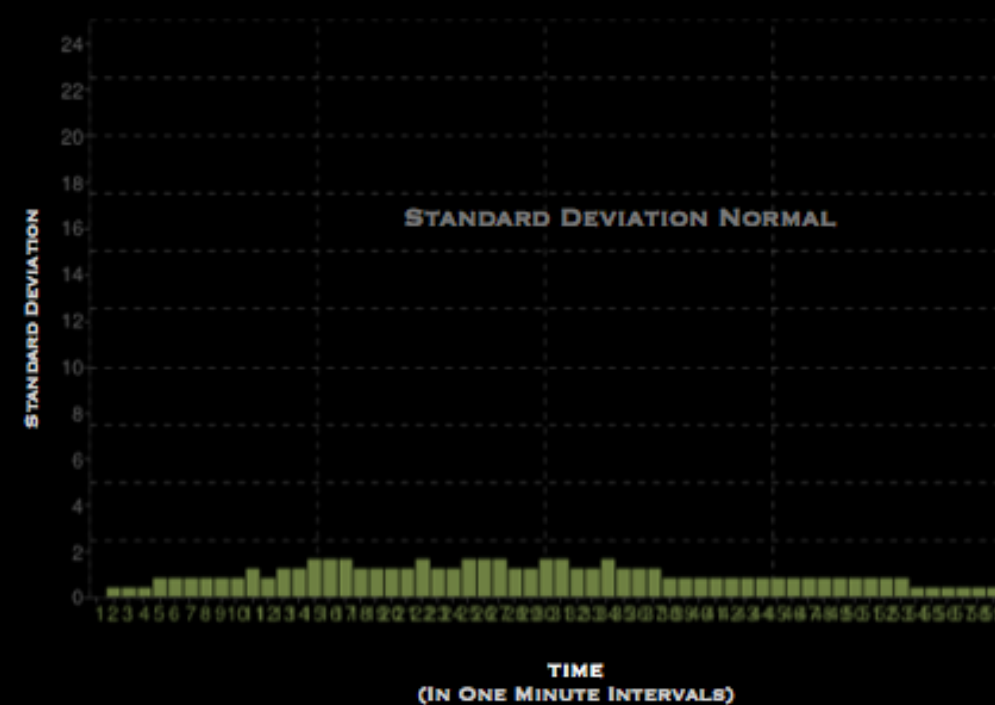
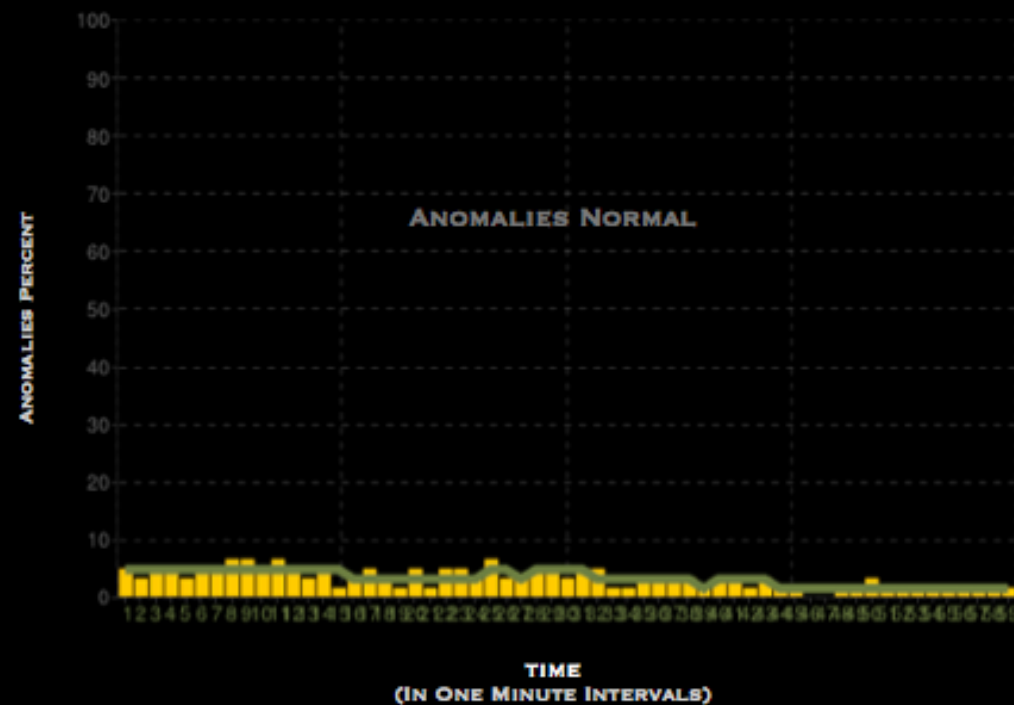
- ◆ FIVE HOURS OF SURFACE EEG OF A PATIENT THAT HAD A SECONDARY GENERALIZED TONIC-CLONIC SEIZURE AFTER A UNUSUALLY LONG FOCAL PHASE OF 5 MIN.
- ◆ THE DATA CONSISTS OF FIVE FILES EACH CONTAINING ONE HOUR OF EEG OF CHANNEL T4-T6.
- ◆ THE SAMPLING FREQUENCY IS 256 HZ.
- ◆ THE TIME OF THE BEGINNING OF EACH FILE IS 20:32:00, 21:32:00, 22:32:00, 23:32:00, AND 00:32:00 THE NEXT DAY.
- ◆ THE SEIZURE ONSET IS AT 23:23:30, THE CHANGE TO A GENERALIZED SEIZURE AT 23:28:30, AND THE END AT 23:31:00.
- ◆ THEREFORE THE FILES 1 AND 2 ARE PREICTAL, FILE 3 CONTAINS THE SEIZURE AT THE END, AND FILES 4 AND 5 ARE POSTICTAL.

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# EEG SIGNAL ANALYSIS EPIO2 STUDY TRIAL EPIW8L7

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JUNE 2012

## POSTICTAL HOUR FOUR



Hour Four Raw Data Chart

### TRIAL DATA SUMMARY

- ◆ FIVE HOURS OF SURFACE EEG OF A PATIENT THAT HAD A SECONDARY GENERALIZED TONIC-CLONIC SEIZURE AFTER A UNUSUALLY LONG FOCAL PHASE OF 5 MIN.
- ◆ THE DATA CONSISTS OF FIVE FILES EACH CONTAINING ONE HOUR OF EEG OF CHANNEL T4-T6.
- ◆ THE SAMPLING FREQUENCY IS 256 HZ.
- ◆ THE TIME OF THE BEGINNING OF EACH FILE IS 20:32:00, 21:32:00, 22:32:00, 23:32:00, AND 00:32:00 THE NEXT DAY.
- ◆ THE SEIZURE ONSET IS AT 23:23:30, THE CHANGE TO A GENERALIZED SEIZURE AT 23:28:30, AND THE END AT 23:31:00.
- ◆ THEREFORE THE FILES 1 AND 2 ARE PREICTAL, FILE 3 CONTAINS THE SEIZURE AT THE END, AND FILES 4 AND 5 ARE POSTICTAL.

## The Team



Ms Asta

Ms Beretta

Mr Abbas

Mr Hormigo

Dr El-Imad

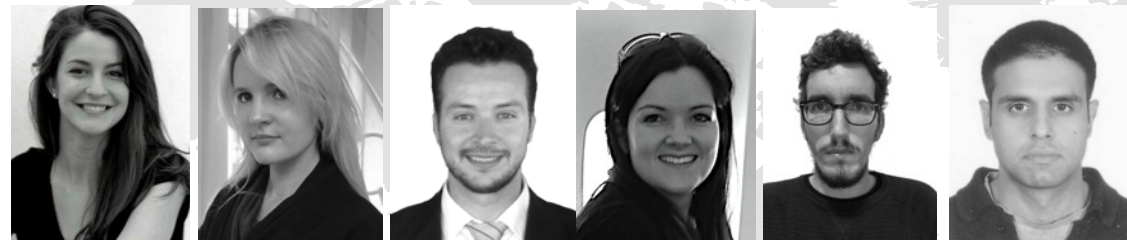
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Prof. Grunwald

Dr Hilfiker

Mr Mothersill



Ms Bürki

Ms Sjöström

Mr. Moreno

Ms Mann

Mr Villegas

Mr Vasudeva



Mr Van Hoof

Mr Mattelaer

Mr Grundlehner



Mr Aeschlimann

Mr Amgwerd

Mr Weiss

Mr Niederhauser



Prof. Toumazou

Dr Constandinou

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Dr Eftekhari

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Mr. Hoarton

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Thank You

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