American Health & Medical
Supply International Corp.

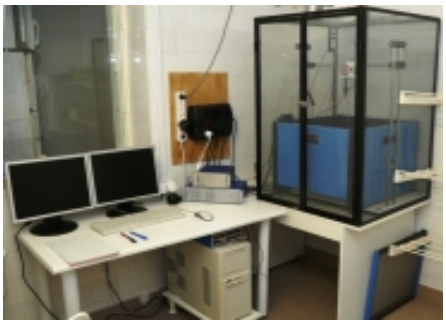
10 Timber Crest Dr., Danbury, CT 06811. U.S.A.

NEU-12-CON+ Continuous EEG on Awake Rat

清醒大鼠脑电图实时监测仪

The system was designed for continuous monitoring of EEG signals of conscious rat and mouse. The set-up can be expanded from one to eight channels. Swivels keep the continuous electrical contact between the amplifiers and sensors. The EEG signals are measured by Experimetria Ltd.'s high quality **CRS-EEG** amplifier and recorded, stored and analyzed by our **S.P.E.L Advanced Neurosys EEG** data acquisition system. The computer system can be adjusted so that it switches on inly in a case when a significant change occurs in the EEG signal.

The system can be equipped with stimulatiors. For the different stimulation methods Experimetria provides the appropriate electronics. Various stimulation possibilities are:



- light
- voice
- electrical

For electrical stimulation our first class ground free programmable stimulator is available.

Optional infrared camera with picture processing computer system for continuous monitoring is available.

The advantage of this system lays in its flexibility. Parallel with the EEG monitoring, as the primary function, the system can be expanded to a complete behavior monitoring system. Several different investigation set-ups can be constructed with the variation of the available accessories:

- **NEU-08-CON** Conducta examination box and 8 channel software
- **NEU-08-CON-01** Digital video recorder 8 channel software module
- **NEU-08-CON-02** Digital video recorder camera and computer card with console
- **NEU-08-CON-03** Stimulation grid for electric stimulation
- **NEU-08-CON-04** "Mouse option" for rat examination box that enabling the rat box to use it mouse too
- **AMP-04-EXT** Extra- and intracellular signal amplifier with head stage (2 channel)
- **SOFT-05-02-NEUR** S.P.E.L. Advanced Neurosys EEG software for data acquisition and analysis
- **Swivel**
- **Stative**

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- **Crown** (EEG cranium sensor) (10 pcs/ package)
- **FAR-01-01** Faraday cage

The modern and newly developed plexi glass cage has been designed on such a way that the animal may be housed in it for weeks. Additional advantage of the design is that the lower tray and grating are independently and easily accessible for cleaning.

References:

Year	Title	Journal	Authors
2004	Comparison of the effect of subacute organophosphate exposure on the cortical and peripheral evoked activity in rats	Pesticide Biochemistry and Physiology 79 (2004) 94–100	András Papp, László Pecze, Tünde Vezér
2009	Subacute intratracheal exposure of rats to manganese nanoparticles_ behavoiral electrophysiological and general toxicological effects	Inhalation Toxicology,2009;21(S1):83-91	Leila Sárközi, Endre Horváth, Zoltán Kónya, Imre Kiricsi, Brigitta Szalay, Tünde Vezér, András Papp
2009	Functional neurotoxicity of Mn-containing nanoparticles in rats	Ecotoxicol.Environ. Saf. (2010),doi:10.1016/j.ecoenv.2010.09.002	Gábor Oszlanczia, Tünde Vezér, Leila Sarkozia, Endre Horvath, Zoltán Konyab, András Papp
2010	Metal deposition and functional neurotoxicity in rats after 3-6 weeks nasal exposure by two physicochemical forms of manganese	Environmental Toxicology and Pharmacology 30 (2010) 121–126	Gábor Oszlánczia, Tünde Vezéra, Leila Sárközia, Edina Horváth, Andrea Szabó, Endre Horváth, Zoltán Kónyab, András Papp
2012	General and Electrophysiological Toxic Effects of Manganese in Rats following Subacute Administration in Dissolved and Nanoparticle Form	Scientific World Journal. 2012; 2012: 520632.	Edina Horváth, Zsuzsanna Máté, Szabolcs Takács, Péter Pusztai, András Sápi, Zoltán Kónya, László Nagymajtényi, András Papp
2014	In vitro intrinsic optical imaging can be used for source determination in cortical slices	EUROPEAN JOURNAL OF NEUROSCIENCE Volume 39, Issue 1, January 2014, Pages: 72–82	Sándor Borbély, Csaba Körössy, Zoltán Somogyvári, Ildikó Világi
2014	In vitro intrinsic optical imaging can be used for source determination in cortical slices	European Journal of Neuroscience, Vol.39, pp.72–82, 2014	Sándor Borb, Csaba Korossy, Zsolt Somogyvári, Ildikó Világi

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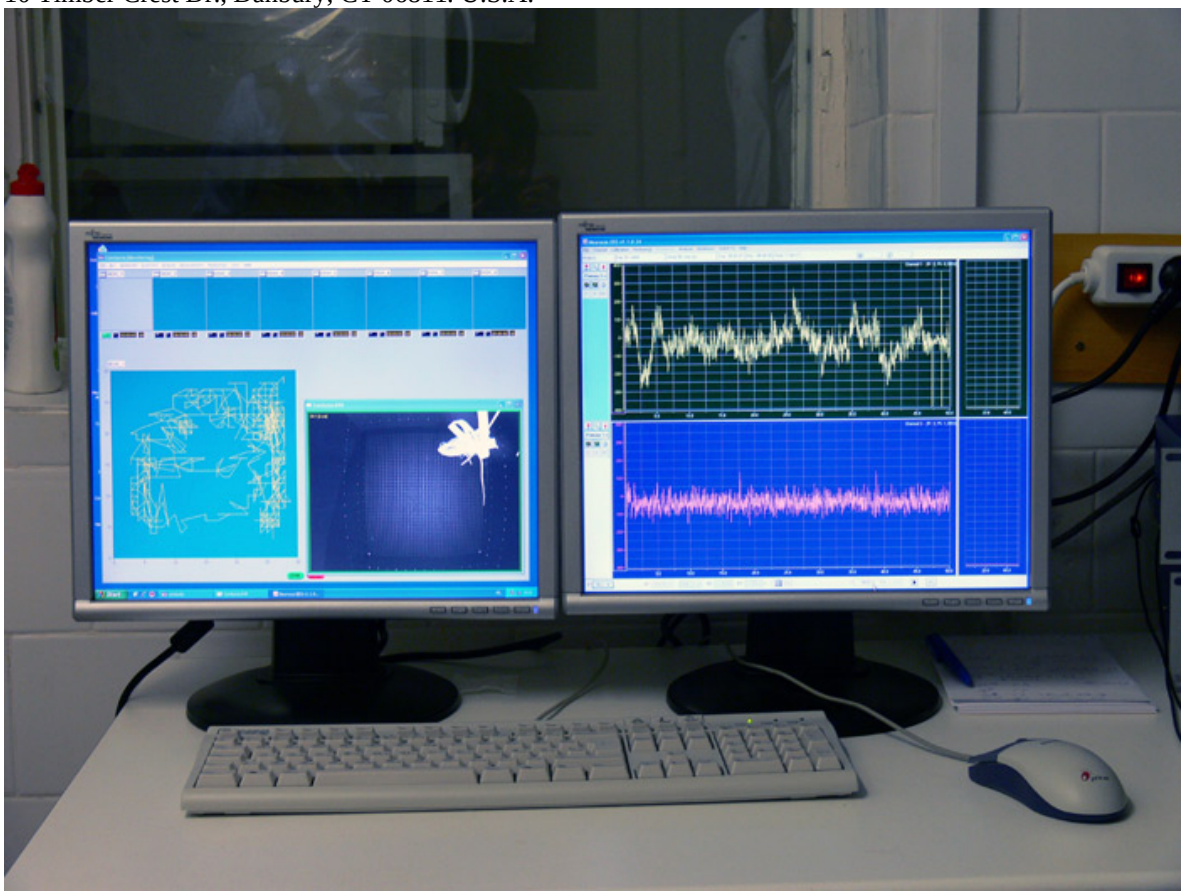


SEN-14-EEG Implantable EEG sensor (fixed on skull)

SEN-14 is part of the continuous EEG measurement on awake rat system (NEU-12). Placed on rats' skull and connected to the pre-amplifier through a commutator unit.

EXPERIMETRIA LTD.

Brochure

EXPERIMETRIA *IN VIVO* RESEARCH STATION

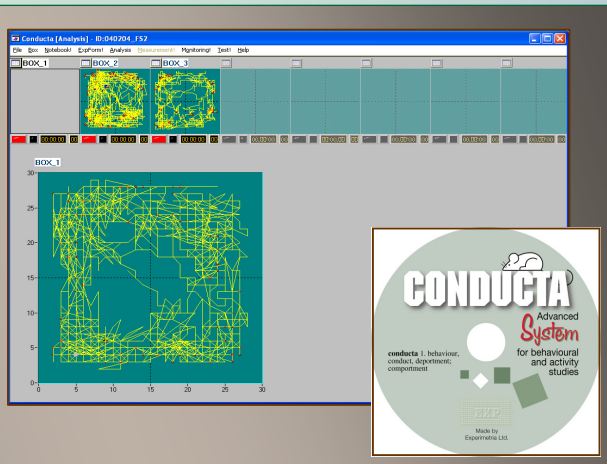
Complete solution of paralel *in vivo* investigation of

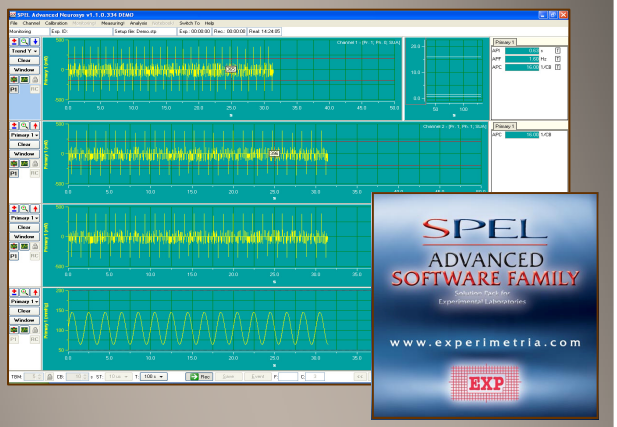
behaviour

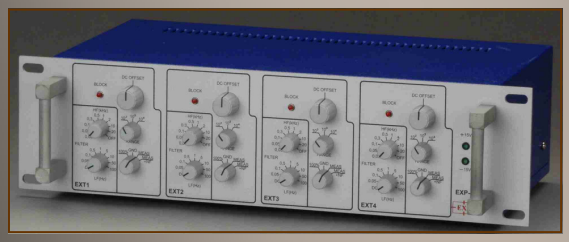
motility

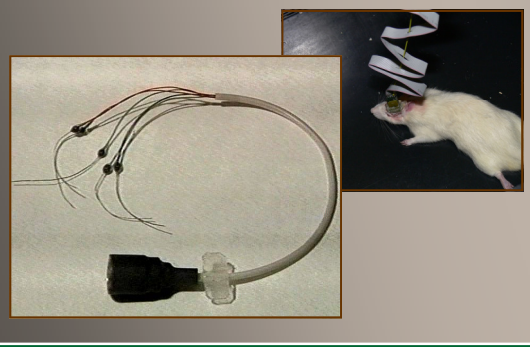
EEG

visceral activity









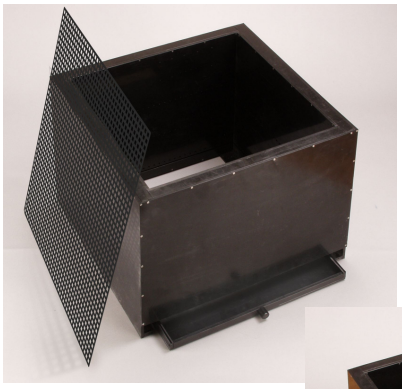
Overview

Experimetria Ltd. offers a new, smart technique, which allows paralel investigation of animal behaviour, motility and EEG. Furthermore physiological or pathological motility of gastrointestinal or urogenital organs can be also *in vivo* monitored with their all nervous, circulatory and hormonal connections during one experimental session from the same animal.

Investigation of behaviour and motility is a fundamental method in basic and applied research as well. Changes in animal behaviour reflect neurophysiological and neurochemical alterations occured in the central or peripheral nervous system. The activity of the experimental animals, however, might be changed not only in response to neuroactive drugs, but simply because of the motility changes in the visceral organs. The following parameters can be continuously monitored and recorded in the brand new *in vivo* research station:

- Experimetria Ltd. realized the need for a complex solution that allows the paralel, *in vivo* investigation of behaviour, motility, EEG and visceral activity.
- Behaviour (exploratory activity or effects of psychoactive drugs)
- Motility (even after gastrointestinal surgery or during delivery)
- EEG (epileptic seizures and responses to light or sound stimuli, in real-time)
- Gastrointestinal activity (muscular activity and time of passage)
- Urogenital activity (activity of uterus during pregnancy and delivery)

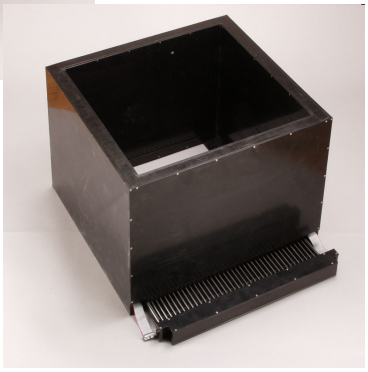
Technology



The complete in vivo research station includes

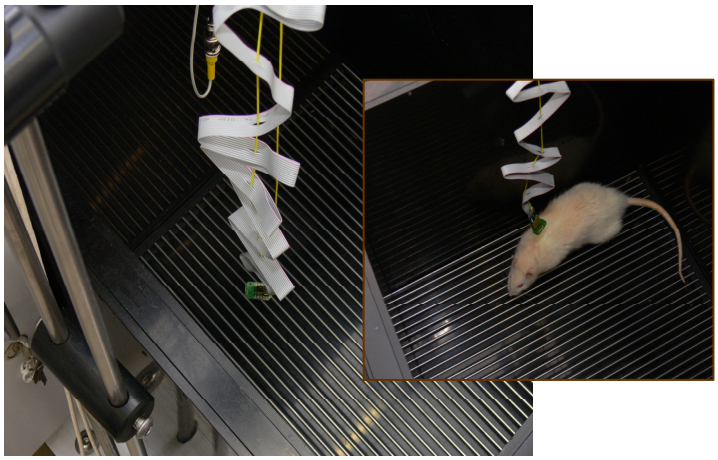
- a shuttle box
- a wire set
- a video camera
- light and sound stimulators

data aquisition system (hardware and software)

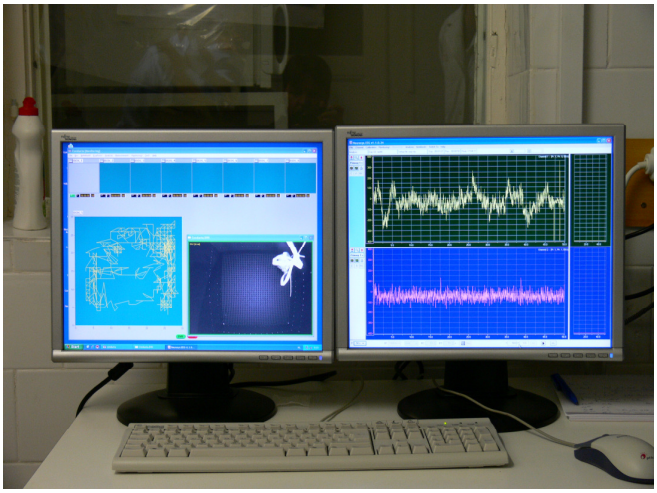


The shuttle box houses the animal, consists the infra-red transmitting and receiving sensors to monitor animal position. The light is invisible to the animal. The removable grid allows the electrical stimulation (foot shock) of the animals.

The wire set secures the cable, which connects the EEG electrodes to the analogue-digital interface. Animals display a normal exploratory behaviour when they are placed in a new environment or enormous activity due to many neuroactive drugs. The wire set ensures that the cable is always in flat position even during rapid movements.



Continuous monitoring and recording the EEG, video, motility and even visceral activity needs highly sophisticated hardware and software. The data aquisition card is designed specially for this purpose and fits IBM compatible PC. The software is Windows Vista compatible. Light or sound stimuli can be applied to the animal via a programmable stimulator. Animal responses can be characteristic especially when they are treated with neuroactive substrates. This option provides the opportunity of the investigation of psychostimulants (PCP, amphetamine) or anxiolytic agents.



Animal activity is monitored via a video camera, data is recorded on a computer hard disk after analogue-digital conversion. There are characteristic changes in animal behavior due to epileptic seizures or psychoactive drugs. These situations can be easily found by replaying the recorded video and the appropriate time signal will indicate where the data period starts and stops. This helps to recognize changes in EEG activity, to find epileptic seizures in seconds, for example.

Application areas:

- Behavior studies
- Fundamental research
- Drug development
- Safety pharmacology

First of all, like a ***basic application***, animal behaviour can be monitored and recorded. Although the brand new *in vivo* research station is an extraordinarily complex system, one can start with a simple behaviour method, which can be developed further. The *in vivo* research station allows the users to run diverse experimental techniques with different difficulty levels, therefore technicians, PhD students, postdocs and senior scientists can euqally use it.
The new *in vivo* research station is extremely useful for ***academic research institutes***, because scientific journals favour multi-parameter studies. The cost of ownership is low due to the modular design. Since the modules of the *in vivo* research station can be used independently one research station can be used in different experimental paradigms.

The research station considerably reduces the number of experiments and sacrificed animals. These are key questions in the ***pharmaceutical industry*** nowadays. Preclinical studies of new chemical entities require several different *in vivo* tests. Since all the investigated parameters are recorded from the same animal during one experimental session in the *in vivo* research station there is no correlation question. It is an outstanding possibility for drug research companies to test new pharmacons like spasmolytic agents, anti-inflammatory drugs, pain-reliefs and digestion helpers and monitoring the effect of these new drugs on animal behaviour and visceral activity paralel, *in vivo*.

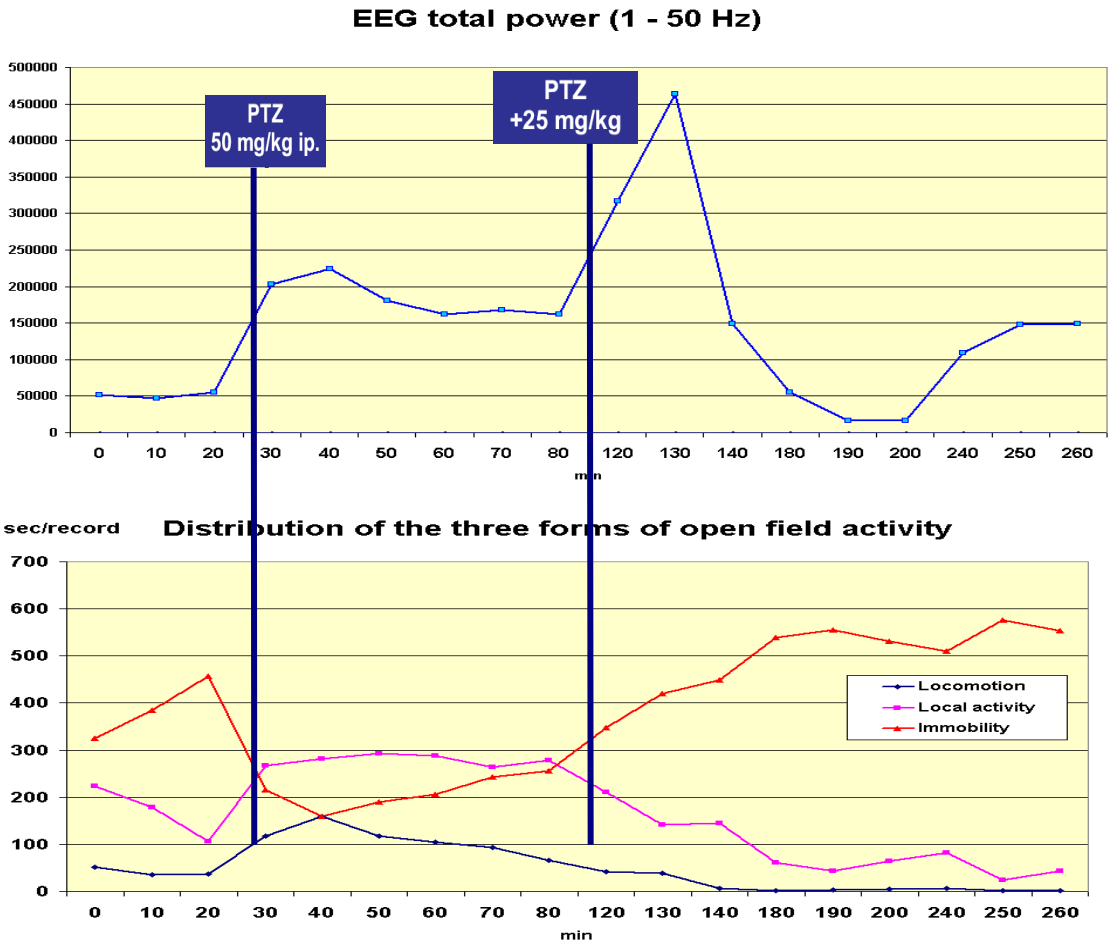
Species

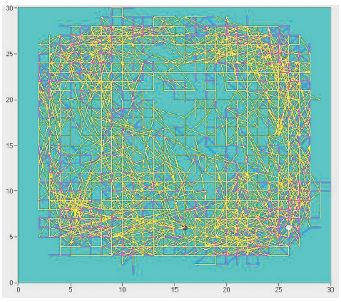
Although the in vivo research station was developed for rats basically, it can be used with other species. Animals, however, should have enough free space in the box, therefore the limitation factor is the size of the animal.
To demonstrate the capabilities of the *in vivo* research station, we present some results here were recorded in different experiments.

Epileptic activity after pentylenetetrazol treatment

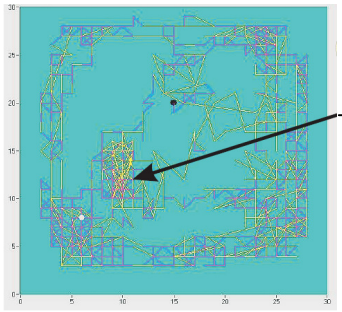
The motor activity enhanced after 50 mg/kg pentylenetetrazol treatment, the power of EEG increased. Headshakes and muscular twiching were captured on the video. Tipical grand mal seizures were developed after additional 25 mg/kg pentylenetetrazol treatment

(A. Papp, Dept. Of Public Health, Univ. Of Szeged)



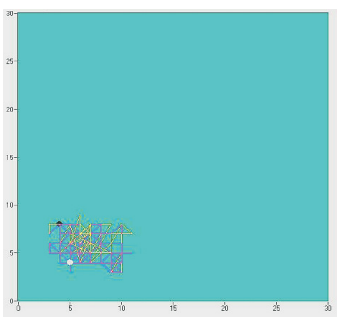


OF activity
30—60 min



OF activity
120—150 min

Grand mal



OF activity
240—270 min

Animal behaviour was monitored via the video system, motility was recorded paralel with EEG and it is shown here as open field activity.

EEG POTENCIALS GI

PARALEL, *IN VIVO* INVESTIGATION OF GASTROINTESTINAL OR UROGENITAL MOTILITY AND THEIR EFFECTS ON THE EEG AND ANIMAL BEHAVIOUR

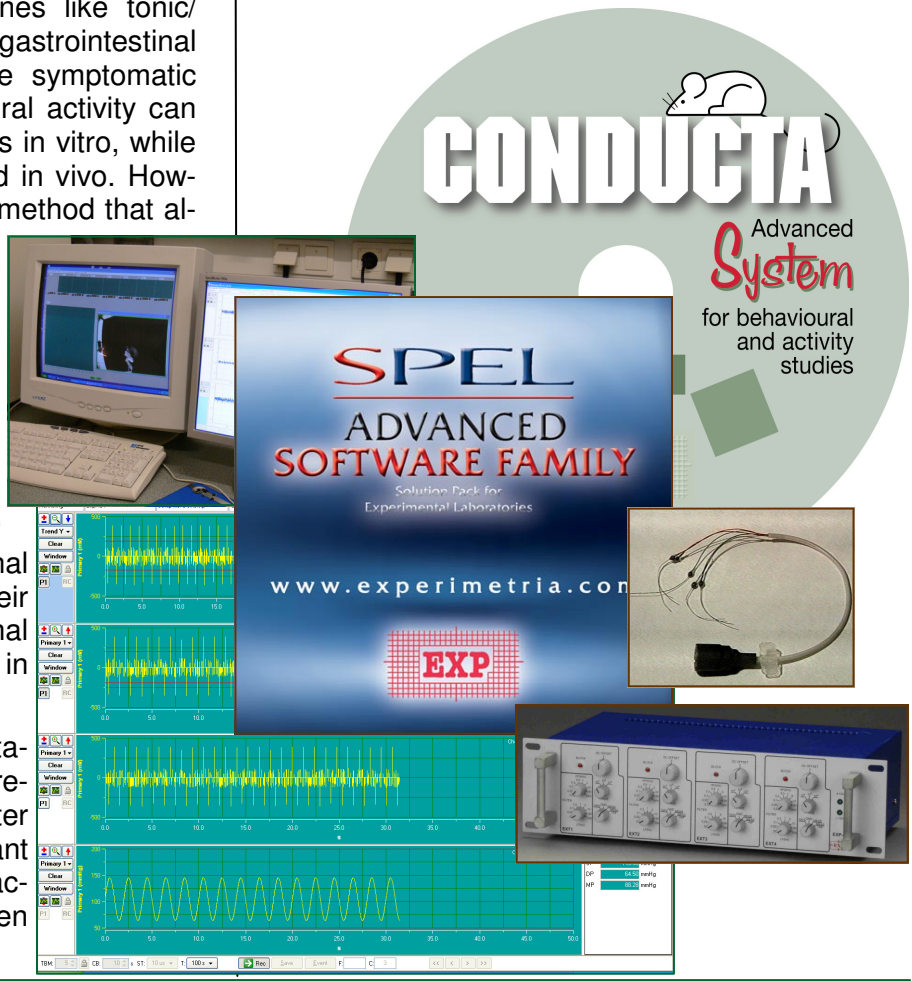
Shortly some potential applications:

- **physiological (digestive) or pathological motility of gastrointestinal tract**
- **motility changes after surgery (resections) in the gastrointestinal tract**
- **detection of uterus contractility during delivery**
- **recording of EEG, even in response to light or sound stimuli**
- **continuous video recording of animal motility and behavior**
- **monitoring and recording all the mentioned parameters parallel in real-time**

Motility changes in the visceral organs, especially the painful ones like tonic/phasic spasms in the gastrointestinal tract or childbirth induce symptomatic changes in animal behaviour. Visceral activity can be investigated in myograph systems in vitro, while behaviour or EEG can be monitored in vivo. However, there is a need for a complex method that allows the paralel, in vivo investigation of behaviour, EEG and visceral motility changes because it is well-known that finding correlations between in vivo and in vitro results is often difficult.

Now, Experimetria Ltd. is introducing a new technique, which allows the investigation of physiological or pathological motility of gastrointestinal or urogenital organs in situ, with their all nervous, circulatory and hormonal connections and paralel changes in animal behaviour and EEG.

In the brand new in vivo research station there can be monitored and recorded the motility of the animal (after gastrointestinal surgery or pregnant ones), its behaviour, the muscular activity of the studied organs and even EEG in real-time. The research station considerably reduces the number of experiments and sacrificed animals and the cost, of course. Since all the investigated parameters are recorded from the same animal during one experimental session there is no correlation question. It is an outstanding possibility for drug research companies to test new pharmacons like spasmolytic agents, anti inflammatory drugs, pain-reliefs and digestion helpers in real-time conditions in vivo.



Mechanisms

Origin of high slow-wave frequency in the dog colon. Fioramonti J; Bueno L; Sarna SK; Ruckebusch Y. Reprod Nutr Dev (FRANCE) *198020* (4A) p983-90

Neural control of canine small intestinal interdigestive myoelectric complexes. Heppell J; Kelly KA; Sarr MG. Am J Physiol (UNITED STATES) Jan 1983244 (1) pG95-l00

Propagation of the canine migrating myoelectric complex--a mathematical model. Scott RB; El-Sharkawy TY; Diamant NE Am J Physiol (UNITED STATES) Jan 1983 244 (1) pG13-9

Cyclic motor activity; migrating motor complex: 1985. Sarna SK Gastroenterology (UNITED STATES) Oct 1985 89 (4) p894-913

Origin and characterization of migrating myoelectric complex in rabbits. Ruckebusch Y; Pairet M; Becht JL Dig Dis Sci (UNITED STATES) Aug 1985 30 (8) p742-8

Electromyographic characteristics of small bowel motility in the rat. Wittmann T; Crenner F; Felder G; Pousse A; Grenier JF Eur SurgRes (SWITZERLAND) 1986 18 (5) p312-7

Development of digestive motor patterns during perinatal life: mechanism and significance. Ruckebusch Y J Pediatr Gastroenterol Nutr (UNITED STATES) Jul-Aug 19865 (4) p523-36

Comparison of the myoelectrical activity of the lateral and J-shaped ileal reservoirs. Stone MM; Mulvihill SJ; Snape WJ Jr; Fonkalsrud EW J Pediatr Surg (UNITED STATES) Jun 198621 (6) p500-5

Technics

Analogue automated analysis of small intestinal electromyogram. Crenner F; Lambert A; Angel F; Schang JC; Grenier JF Med Biol Eng Comput (ENGLAND) Mar 1982 20 (2) P 151-8

Computerized analysis of spike burst activity in the small intestine. Summers RW; Cramer J; Flatt AJ IEEE Trans Biomed Eng (UNITED STATES) May 1982 29 (5) p309-l4

Continuous electrical and mechanical activity recording in the gut of the conscious rat. Bueno L; Ferre JP; Ruckebusch M; Genton M; Pascaud X J Phannacol Methods (UNITED STATES) Sep 1981 6 (2) p129-36

Computer-aided analysis of gastrointestinal myoelectric activity. Latour A; Ferre JP J Biomed Eng (ENGLAND) Apr 19857 (2) p127-31

Quantitative analysis of intestinal electrical spike activity by a new computerized method. De Ponti F; Bonabello A; D'Angelo L; Frigo GM; Crema A Dipartimento di Medicina Interna e Terapia Medica, Universita di Pavia, Italy. Int J Biomed Comput (ENGLAND) Jan 1988 22 (1) p51-64

Frequency analysis of gut EMG. Reddy SN; Collins SM; Daniel EE Department of Neurosciences, McMaster University, Hamilton, Ontario, Canada. Crit Rev Biomed Eng (UNITED STATES) 1987 15(2) p95-116
Stability of myoelectric slow waves and contractions recorded from the distal colon. Enck P;

Whitehead WE; Shabsin H; Nikoomanesh P; Schuster MM Psychophysiology (UNITED STATES) Jan 198926 (1) p62-9

Hormones and transmitters

Somatostatin inhibits bombesin-induced effects on migrating myoelectric complexes in the small intestine of the rat. Al-Saffar A Regul Pept (NETHERLANDS) Sep 1984 9 (1-2) p11-9

Central control of intestinal motility by prostaglandins: a mediator of the actions of severalpeptides in rats and dogs. Bueno L; Fargeas MJ; Fioramonti J; Primi MP Gastroenterology (UNITED STATES) Jun 1985 88 (6) p1888-94

Central muscarinic control of the pattern of small intestinal motility in rats. Fargeas MJ; Fioramonti J; Bueno L Life Sci (ENGLAND) Apr 27 198740 (17) p1709-15

Central alpha 2-adrenergic control of the pattern of small intestinal motility in rats. Fargeas MJ; Fioramonti J; Bueno L Gastroenterology (UNITED STATES) Dec 198691 (6) p1470-5

Central and peripheral action of GABAA and GABAB agonists on small intestine motility in rats. Fargeas MJ; Fioramonti J; Bueno L Department of Pharmacology, INRA, Toulouse, France. Eur J Pharmacol (NETHERLANDS) May 20 1988 150 (1-2) p163-9

Non-cholinergic ascending excitatory response in the cat small intestine: possible involvement of substance P. Miolan JP; Niel JP Departement de Physiologie et Neurophysiologie, D.A., C.N.R.S. No 205. Faculte des Sciences St Jerome, Marseille, France. Neuropeptides (SCOTLAND) Nov-Dec 1988 12 (4) p243-8

Involvement of different receptors in the central and peripheral effects of histamine on intestinal motility in the rat. Fargeas MJ; Fioramonti J; Bueno L Department of Pharmacology, INRA, Toulouse, France. J Pharm Pharmacol (ENGLAND) Aug 1989 41 (8) p534-40

Neuromedin-N inhibits migrating myoelectric complex and induces irregular spiking in the small intestine of rats; comparison with neurotensin. Schultz I; Wallin B; Mogard MH; Hellstrom PM Department of Surgery, Karolinska Hospital, Stockholm, Sweden. Regul Pept (NETHERLANDS) Sep 3 1991 35 (3) p197-205

Clonazepam-induced intestinal motor disturbances are linked to central nervous system release of cholecystokinin in rats. Bonnafous C; Martinez J; Fargeas MJ; Bueno L Department of Pharmacology-Toxicology, INRA, Toulouse, France. Eur 1 Pharmacol (NETHERLANDS) lun 24 1993237 (2-3) p237-42

Is nitric oxide the [mal mediator regulating the migrating myoelectric complex cycle? Rodriguez-Membrilla A; Martinez V; limenez M; Gonalons E; Vergara P Department of Cell Biology and Physiology, Veterinary Faculty, Universidad Autonoma de Barcelona, Bellaterra, Spain. Am 1Physiol (UNITED STATES) Feb 1995268 (2 Pt 1) pG207-14

Applied

Effects of intestinal secretagogues and distension on small bowel myoelectric activity in fasted and fed conscious dogs. Da Cunha Melo 1; Summers RW; Thompson HH; Wingate DL; Yanda R 1 Physiol (Lond) (ENGLAND)Dec 1981 321 p483-94

Mucosal enteroceptors with vagal afferent fibres in the proximal duodenum of sheep. Cottrell DF; Iggo A 1 Physiol (Lond) (ENGLAND)Sep 1984354 p497-522

[Intestinal motility following jejunal resection: electromyography study in the rat] Motriciteintestinale apres resection jejunale: etude electromyographique chez Ie rat. Wittmann T; Crenner F; Felder G; Pousse A; Grenier IF Gastroenterol Clin Biol (FRANCE) May 1984 8 (5) p414-8

Cyclic motor activity and trophicity after jejunal resection and bypass in rats. Wittmann T; Crenner F; Grenier JF Dig Dis Sci (UNITED STATES) lan 198631 (1) p65-72

Changes in motility after jejunal and ileal resection: electromyographic study in rats. Wittmann T; Crenner F; Pousse A; Grenier IF Digestion (SWITZERLAND) 1985 32 (2) p114-23

A slow wave frequency complex of the canine small intestine during the fasting state. Pousse A; Mendel C; Aprahamian M; Kachelhoffer 1; Balboni G; Plas A Can 1 Physiol Pharmacol (CANADA) lun 198765 (6) pi 132-5

Pathology models

Small bowel myoelectric activity in peritonitis. Frantzides CT; Mathias C; Ludwig KA; Edmiston CE; Condon RE Department of Surgery, Medical College of Wisconsin, Milwaukee 53226. Am J Surg (UNITED STATES) Jun 1993 165 (6) p681-5

Benzodiazepine-induced intestinal motor disturbances in rats: mediation by omega 2 (BZ2) sites on capsaicin-sensitive afferent neurones. Bonnafous C; Scatton B; Bueno L Department of Pharmacology LN.R.A., Touluse, France. Br J Pharmacol (ENGLAND) Sep 1994113 (1) p268-74

Human pathology

Involvement of small intestinal motility in blood glucose response to dietary fibre in man. Cherbut C; Bruley des Varannes S; Schnee M; Rival M; Galmiche JP; Delort- Laval J Institut National de la Recherche Agronomique, Nantes, France. Br J Nutr (ENGLAND) May 199471 (5) p675-85

[Small bowel motility in the irritable bowel syndrome] La motricite de l'intestin grele dans Ie syndrome de l'intestin irritable. Couturier D Service de gastroenterologie, Hopital Cochin, Paris. Gastroenterol Clin Biol (FRANCE) 1990 14 (5 (Pt 2)) p24C-28C

[Colonic motility in the irritable bowel syndrome] La motricite colique au cours du syndrome de l'intestin irritable. Frexinos J; Bueno L; Fioramonti J; Delvaux M; Staumont G Service de Nutrition et de Gastroenterologie,CHU de Rangueil, Toulouse. Gastroenterol Clin Biol (FRANCE) 1990 14 (5 (Pt 2)) p18C-23C

Electrophysiological principles of motility disturbances in the small and large intestines-- review of the literature and personal experience. Holschneider AM Pediatric Surgical Clinic, City Children's Hospital of Cologne, FRG. Prog Pediatr Surg (GERMANY) 1989 24 p125-41