Stellar Telemetry

Flexibility to Record Data In Any Environment

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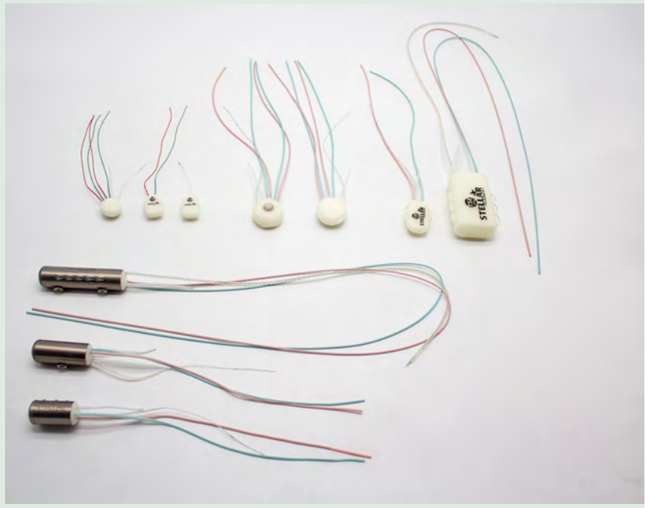
Stellar Telemetry is the next generation of implantable telemetry technology

Stellar Telemetry represents the latest technology advancements in implantable physiologic monitoring. The system allows monitoring of many animals with just one receiver and facilitates group housing and social interaction. Stellar implants can be used in animal models ranging from mice to dogs and larger animals and in a wide range of research studies including phenotyping, pharmacology, behavior, metabolic, and general physiology assessment.



Stellar implants are available in two device types – memory implants and real-time implants. Both device types offer up to four physiologic channels plus temperature and accelerometer-based activity. Memory implants offer the unique ability to remotely record data away from the home cage without data loss thanks to implant programming and data storage. Data are transmitted whenever the implant is within range of the receiver (within approximately 5 meters). Real-time implants are optimized for power efficiency and can transmit continuous data for weeks to months, depending on device size, channel configuration, and user-programmed sample rate. Both device types support continuous or programmed scheduled sampling to optimize useful battery life.

The unique capabilities of Stellar implants have enabled novel research applications such as monitoring of blood pressure and ECG for sheep in free-roaming outdoor pens and monitoring of ECG/heart rate for wild seagulls over the course of several months.

Both Memory and Real-time implants include the following:

- Wireless programming, continuous and scheduled data collection
- Single receiver for multiple animals
- Fully digital data transmission
- Transducer-tipped solid state pressure sensor (where applicable)
- Core temperature and physical activity (accelerometer)

Stellar Telemetry Receiver and Antenna

The Stellar Universal receiver supports both memory and real-time Stellar implants. Each receiver can collect data from up to 8 real-time or memory implants. One or more antennas can be conveniently placed on the wall, ceiling, or on a stand within a few meters of the cage. Memory implants may be removed from receiver range while the implant is still recording data thanks to Stellar's unique built-in self-scheduling/data storage capabilities. Transfer of the stored data is resumed once the animal is within range of the receiver.

Stellar Telemetry: Software Solutions

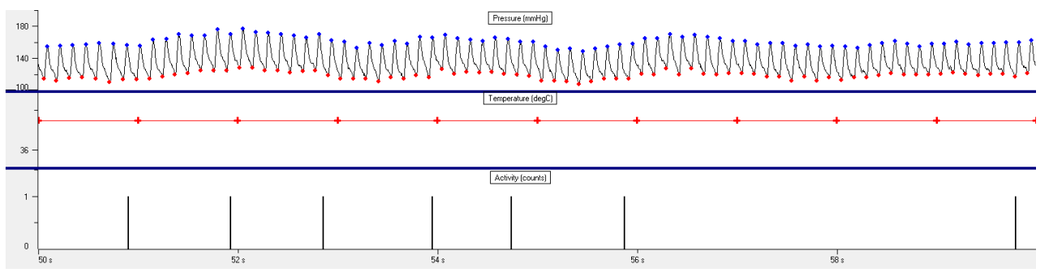
Stellar memory implants are supported in the Notocord-hem and Biopac AcqKnowledge software. Stellar real-time implants are supported in the Notocord software. The SleepSign software (from Biopac) can also be used with Biopac or EDF files for EEG/sleep assessment. Check with your TSE sales representative to determine the best software solution for your application.

Disease models

- Cardiovascular diseases
- Sleep disorders
- Epilepsy/seizures
- Cognitive disorders
- Metabolic syndrome
- Diabetes
- Ocular disorders

Stellar integration

Stellar Telemetry can be integrated into TSE Systems' suite of behavioral, metabolic, pharmacological, and inhalation products with minimum cost and infrastructure. Flexible, adaptable, and efficient, Stellar Telemetry extends the breadth of research by adding the physiological component for core body temperature, localized temperature, activity, biopotentials such as EEG, ECG, EMG, and pressures (arterial pressure, LV pressure, intracranial, bladder) or measured in sync with (cardio) metabolic parameters.



Research Applications

Cardiovascular | Physiology | EEG/Sleep Seizure | Metabolism | Behavior

Features and Benefits	Memory Implants	Real-time Implants
Built-in memory|Remote data collection Allow remote collection outside of confined cage environment	**Yes**	**No**
Transmission range Flexible receiver placement | Minimize number of receivers | Allow for enriched housing	**> 5 meters**	**> 3 meters**
Available sizes Accommodate a wide range of implant size, animal size, and battery life	**1.5-57cc XS,M,M/F,L,XL,XXL**	**2.0-7.4cc XS,M,L**
Target animal size Multiple implant sizes to accommodate wide range of animals	**20g to unlimited**	**20g to 1.5kg**
User programmable sample rate Optimize sample rate based on signal type and required battery life	**100/200/500/1000Hz**	**1/100/250/500Hz**
Battery life Tailor implant size and battery life to animal	**30 days to > 1 year***	**About 6 times the battery of Memory implants**

*** Scheduled battery life based on 10-second sample every 10 minutes. Varies based on device size, number of channels, sample rate, and data collection protocol**

Selected Publications

Jasien JV, Samuels BC, Johnston JM, Downs JC. Diurnal Cycle of Translaminar Pressure in Nonhuman Primates Quantified with Continuous Wireless Telemetry. Inves Ophthalmol Vis Sci. 2020 Feb 7;61(2):37

Jasien JV, Fazio MA, Samuels BC, Johnston JM, Downs JC. Quantification of Translaminar Pressure Gradient (TLPG) With Continuous Wireless Telemetry in Nonhuman Primates (NHPs)

Jasien JV, Zohner YE, Asif SK, Rhodes LA, Samuels BC, Girkin CA, Morris JS, Downs JC. Comparison of extraocular and intraocular pressure transducers for measurement of transient intraocular pressure fluctuations using continuous wireless telemetry. Sci Rep. 2020 Dec 1;10(1):20893.

Jasien JV, Samuels BC, Johnston JM, Downs JC. Effect of Body Position on Intraocular Pressure (IOP), Intracranial Pressure (ICP), and Translaminar Pressure (TLP) Via Continuous Wireless Telemetry in Nonhuman Primates (NHPs). Invest Ophthalmol Vis Sci. 2020 Oct 1;61(12):18.

Zhang K, et al, Violet-light suppression of thermogenesis by opsin 5 hypothalamic neurons. Nature 2020 Sept 2 (online).

Wilson KI, Godara P, Jasien JV, Zohner E, Morris JS, Girkin CA, Samuels BC, Downs JC. Intra-Subject Variability and Diurnal Cycle of Ocular Perfusion Pressure as Characterized by Continuous Telemetry in Nonhuman Primates. Invest Ophthalmol Vis Sci. 2020 Jun 3;61(6):7.

Markert M, Trautmann T, Krause F, Cioga M, Mouriot S, Wetzel M, Guth B. A new telemetry-based system for assessing cardiovascular function in group-housed large animals. Taking the 3Rs to a new level with the evaluation of remote measurement via cloud data transmission. J Pharm Tox Meth 2018 Sept;93:90-97.

Dudek M, Knutelska J, Bednarski M, Nowinski L, Malgorzata Z, Kazek G, Mordyl B, Gluch-Lutwin M, Zareba P, Kulig K, Sapa J. Pyrrolidin-2-one derivatives may reduce body weight in rats with diet-induced obesity. Eu J Pharm 2016 April;776:146-155.