

Webinar Q&A Report:

Telemetry 101: Exploring the New ADInstruments' Small Animal Telemetry Systems

A key question is what are the costs, and can it interface with the ADI systems we already own?

Yes, the analog outputs of the SmartPad and tBase connect to the analog inputs of the PowerLab and data can be acquired and analysed in LabChart. Most customers record up to 2 analog outputs from each animal so a PowerLab 16/35 would support recording from up to 8 animals in this case. Cost very much depends on the application that you wish to use the system for and model of telemeter (for the rat system) you wish to use. This would be best discussed with your local ADInstruments sales team.

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Have you considered adding pressure to the mouse system?

Yes, adding pressure to the mouse telemetry system is something we will look into in the near future.

In order to measure LVP where do you need to secure the transmitter?

The recommended approach for measuring LVP has the telemeter body secured in the abdominal cavity of the rat and the pressure catheter inserted into the left ventricle via the apex of the heart. This involves making an incision in the diaphragm to access the heart from the abdominal cavity. Detailed [surgical videos](#) are available on the ADInstruments website along with a pre-recorded [webinar](#) by my colleague Dr. Sarah-Jane Guild, which explains more about LVP measurements with Kaha telemetry.

When reusing the EEG/biopotential units (between subjects), can you address how or whether one can lengthen the lead wires if needed? Are splice kits available?

At the moment we do not provide splice kits for lengthening the biopotential leads due to the possible effect this may have on signal quality. The lead wires are approximately 25cm long which should provide ample length to allow customers to use the telemeters 4-5 times. If you wish to extend the usage of the telemeters further, we recommend minimising the length of lead that needs to be cut at explantation by using dental cement sparingly to secure the leads in place for EEG recording.

Is cohousing possible for mice?

The Cohousing feature is not available for the mouse system at the moment. You could however house an implanted mouse with an unimplanted cage mate.

Is there anyone you could recommend with experience placing sensors in the rat pulmonary artery?

I don't personally know anyone with experience in implanting in the pulmonary artery and to the best of my knowledge this hasn't been attempted with the Kaha Sciences telemeters. This would be a challenging surgery but not impossible. If you are interested, we could discuss options for supporting this application further.

Is there telemetry for temperature?

The rat telemeters provide temperature measurement every 2 hours during normal recording in the home-cage and continuous temperature monitoring away from the home-cage for 4-6 hours (depending on the telemeter model). This function is disabled when using Cohousing Mode. The mouse telemetry system does not offer temperature monitoring.

Any experience using pressure telemetry and ultrasound/echo for PV-loops?

I'm not aware that anyone has attempted to do this, however the rat telemeters are compatible with both ultrasound and echocardiography so it could be possible.

Can blood pressure and cerebrospinal fluid pressure (at lumbar level) be recorded simultaneously?

Theoretically this is possible using the TRM54PP dual pressure rat telemeter. The main thing to consider would be the size of the pressure sensor (2Fr, 0.66mm diameter) relative to the size of the subarachnoid cavity and whether the sensor might cause damage to the spinal cord. Another challenge would be securing the lumbar catheter in place to avoid it slipping out of the subarachnoid cavity as a result of animal movement. I'd be happy to discuss this further if you wish.

Is it possible to integrate with Matlab for custom acquisition and feedback applications?

Yes, it is possible to read raw data from LabChart into another company's software (e.g. MATLAB) and control LabChart from external software. More information can be found on the ADInstruments website:

<https://www.adinstruments.com/support/knowledge-base/there-any-way-control-powerlab-matlab-or-another-third-party-software-without>

<https://www.adinstruments.com/support/knowledge-base/can-i-read-raw-data-recorded-labchart-data-files-another-companys-software>

Is there a plan to scale-up the mouse system to record multiple biopotentials, and/or core temperature?

The question about multiple biopotentials for the mouse system is one that I'm asked quite regularly. At this stage we don't have any plans for this or core temperature for the mouse system. Our product development team is aware of this being a desirable feature of the mouse system.

I work in respiratory neuroscience and I was curious if there were any applications regarding plethysmography methods. Are there any applications for this telemetry regarding respiratory research?

The rat telemetry system could be used in conjunction with a plethysmography chamber, utilising the ability to record up to 5m away from the home-cage for between 4-6 hours (depending on the telemeter model). Regarding respiratory parameters, you could use biopotential telemeters to measure diaphragmatic and/or intercostal EMG to look for changes in respiratory muscle activity. It would also be possible to measure intrapleural pressure using the rat pressure telemeters.

How deeply in the brain tissue can the oxygen sensor be implanted?

To the best of my knowledge, the TR57Y telemeter has only been used for measuring oxygen at the surface of the brain rather than implanted into deep structures. At the tissue surface the carbon paste electrode measures from a depth of ~50um and diameter of ~300um. My colleague Dr. Sarah-Jane Guild gives an excellent introduction to the tissue oxygen telemeters in a [webinar](#) recording available on the ADInstruments website.

Which is the highest rate that can be transferred? For neural signals, we may need 20KHz.

Both the rat and mouse telemetry systems offer a 2kHz sampling rate which is suitable for recording biopotentials such as EEG and ECoG for neuroscience studies. Unfortunately, the higher sampling rates required for multi- and single unit recordings are not supported at this stage.

How about thermal generation during charging?

The wireless power technology is smart enough that the field generated by the TR181 SmartPads and MT110 tBases is optimised based on feedback from the telemeter. Thermal generation in the telemeters during charging is insufficient to cause acute or chronic issues while implanted. In addition, telemeters constantly monitor their internal temperature to ensure overheating doesn't occur. If for any reason telemeter temperature exceeds a certain value, the wireless power field is temporarily disabled. We are happy to provide data to show that the core temperature of implanted rats remains stable over several days.

You mentioned analog input. If animals need 4 outputs (BP/ECG/Temperature/EEG) will you only be able to measure 4 animals with a 16 channel PowerLab?

The maximum number of parameters that you can record from a single rat or mouse telemeter is 3 (e.g. pressure, biopotential and temperature from a rat TRM54PB, or biopotential, activity index and data received from a MT10B mouse telemeter). Therefore, you would be able to record 5 animals simultaneously using a PowerLab 16/35.

If you are using Cohousing Mode to record from 2 telemeters implanted in one rat, the maximum number of parameters you can record from each animal is 4 (e.g. 2x pressure and 2x biopotential using TRM54PP and TR50BB). Therefore, you could record from 4 animals simultaneously using a PowerLab 16/35.

What is the size of a mouse telemeter?

Mouse telemeters are 1.8cm³ and have a maximum weight of 3.5g.

What is the size of the rat telemeter?

Rat telemeters are 8.3cm³ and have a maximum weight of 12g.

How many times can telemeters be implanted if one implantation lasts for 1-2 months?

The number of times a rat telemeter can be reused depends on the level of customer experience, application and the model of telemeter in question. Experienced users have reported that 4-5 implantations of 6-8 weeks with each telemeter in a standard application (e.g. ABP measurement from the descending aorta) is common. This can be discussed in more detail with your local sales team with reference to specific applications.

Are there any plans for pressure-volume catheters and oximetry?

We do not currently have plans to integrate either PV catheters or oximetry with the telemetry systems.

Is there an application for glucose measurement?

Kaha telemetry does not offer glucose measurement as a parameter at the moment, however our product development team is aware of this being a desirable application for a number of customers.

Does the company offer a course for catheter implantation?

In person training courses are difficult at the moment thanks to COVID making international travel near impossible. However, this is something to discuss with your local sales team because we may be able to offer something for your specific location. Fortunately, we do have a number of excellent surgical videos available on the ADInstruments website to walk you through the implantation process of the telemeters for most applications. We are also happy to provide remote training on Zoom and support new users through the initial set up process.

TRM designation in the part number indicates for rats only, correct?

The telemeter models TR and TRM are specific for rats. The M indicates that that particular telemeter model includes a pressure catheter. The MT10B is the only mouse telemeter we offer at the moment.

If you have additional questions for [ADInstruments](#) regarding content from their webinar or wish to receive additional information about their products and laboratory services, please contact them by phone or email:



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