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Ronald Bulthuis, *Managing Director, Metris B.V. (The Netherlands)*

Drug discovery and development companies value speed, consistency and efficiency. They use high-throughput screening and multiple assays to achieve these goals in compound selection and validation. A common bottleneck in the preclinical process is availability of novel and robust animal models, in which equipment plays a critical role in making them a success. Monitoring animals given experimental drugs is slow, expensive, and often unreliable. Metris, a Netherlands-based company, offers a technology platform that overcomes these obstacles by enhancing existing and supporting novel animal models.

Metris uses the "Laboras" technology—animal habitats on a platform outfitted with sensors that can capture a variety of mouse and rat behavior responses to medicine—to replace time-consuming human and video observation. Laboras also reduces the number of animals needed for a given drug test. And finally, Laboras refines observations, by providing immediate and in-depth results, which facilitate fast and efficient decision-making. Ronald Bulthuis, Managing Director-Metris, tells Nature how Laboras can improve both efficiency and efficacy of preclinical tests for various disease models.

Q: What is Laboras?

Laboras automatically detects the behavior of small laboratory animals in pre-clinical trials and other research environments. Each Laboras platform consists of a triangular base with sensors, with a mouse or rat home cage on top. The Laboras platform is completely non-invasive and detects every movement made by the animal in the home cage. The data is sent to a computer, where it is converted into more than 18 common and stereotypical behaviors and several other parameters. This non-invasive approach is good for the animals, but even better for the data, since stress responses can interfere with results.

> " **Laboras is good for the animals, but even better for the data** "

Q: What are some advantages of this automated system?

Reliable and consistent results are immediately available after a test, improving experimental lead times and enabling the research leader to optimize experiments when necessary. Since Laboras can do automated 24-hour testing for months, it offers unparalleled high-throughput. Laboras is also a turn-key system that doesn't require complex settings, further adding to the system's overall efficiency.

Q: How is Laboras an improvement over human observation and automated video analysis?

Humans can only observe for a limited time and handle a limited number of responses, making it a time-consuming process. Also, observers may be trained at varying skill levels, making consistency a critical concern. Even the best-trained, most-experienced observer will make mistakes. Laboras overcomes these issues by capturing every movement of the animal —from obvious ones like locomotion to more subtle ones like chewing, twitching and shaking. Automated video analysis, on the other hand, offers limited possibilities in reliable behavior detection because video data is complex and dependent on many variables such as camera and animal orientation, video resolution, frame rate and camera focus. Good video quality requires light and several gigabytes per animal, per hour, but will still not reveal all tiny movements and related behaviors. Laboras doesn't have any of these problems.

Q: How does Laboras solve these issues?

Since every movement of the animal is recorded by force sensors, the entire history of the animal is captured and automatically saved to a computer. And since it is based on force sensor data, rather than video, it requires much less memory—about one megabyte per animal. But collecting and storing this data is only the start. Our independently validated algorithms convert this raw data into distinct behaviors, which in turn can be applied to different disease models and drug responses. We are constantly developing new algorithms. And, because the data can be stored so easily, you can always reuse your raw data and extract new behaviors.

Q: How can Laboras help improve measurements and reduce the number of animals?

Because Laboras uses force sensors, the system can extract more parameters and provide more detail than accurately possible by human observation. As a result, Laboras can be used in various animal disease models that require a range of independent and standardized behavioral outputs in a single experiment. Since Laboras collects more parameters simultaneously, the same preclinical tests also require fewer animals. Overall Laboras significantly speeds up preclinical testing in an industry where time is essential.
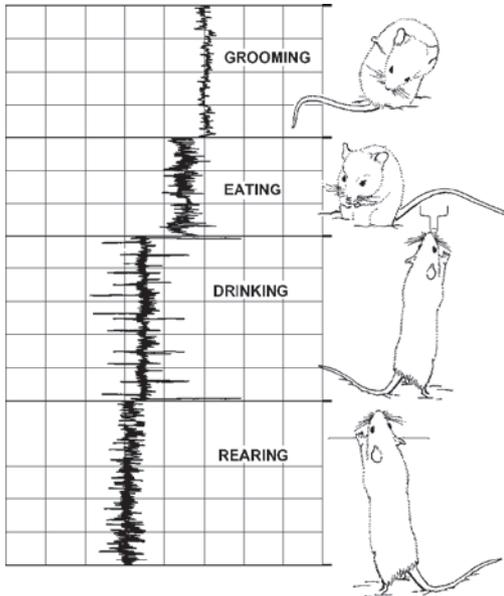
Q: How does Laboras support novel animal models?

Laboras is a multifunctional and modular system. It can be easily adapted to different research areas and disease models. Applications can be found in many CNS areas such as neurodegenerative diseases and brain disorders, including Parkinson's and Huntington's disease and autism, but also in research areas like pain, dermatology and behavioral phenotyping.

Laboras is used by more than 70% of the top-15 pharma companies and a growing number of universities and contract research organizations, fueling the process of continuous innovation. We are confident that Laboras will help the research community save time and money, optimize the use of resources and bring novel insights to the experiments.

LABORAS™

Automated Behaviour Classification & Tracking based on Force Analysis

LABORAS is a powerful system that fully automates the behavioral scoring of small laboratory animals like rats and mice.

LABORAS determines a detailed ethogram of animals (without any human observation) and provides in-depth tracking information. The system does not use video or infrared beams. Researchers can monitor many independent parameters in a single experiment; thereby reducing costs and experimental lead time; minimizing wastage of animals and resources; increasing efficiency and throughput.

- Detection of more than 18 behaviors along with all tracking information
- Completely non-invasive and home-cage system, minimizing stress on animals significantly
- Enables high throughput and long duration testing

- Enables measurements in complete darkness (no infra-red or light required)
- In-depth results are available immediately after tests, enabling faster and efficient decision making
- Modular and multifunctional system supporting a wide variety of animal models and experiments

Automatic detection of Behaviors in Mice and Rats:

- Locomotion
- Immobility
- Rearing
- Climbing (mice only)
- Grooming

- Eating
- Drinking
- Scratching
- Circling
- Seizures (mice only)

- Hindlimb Licking – Formalin test (rats only)
- Wet Dog Shakes (rats only)
- Head Shakes and Head Twitches (rats only)

- Startle and Freezing – Fear Conditioning (mice only)
- Social Interaction (mice only)
- Light Dark Preference (mice only)
- Purposeless Chewing (rats only)

Automated Tracking information and other parameters:

- Position (X,Y)
- Speed (Avg., Max.), Distance Travelled

- Position Distribution
- Energy Consumption (Physical Activity Index)

Application Areas: Drug Development (Pre-clinical), Safety Pharmacology, Efficacy Pharmacology, Pharmacodynamics Assay Development, Phenotyping, etc.

Research Areas: CNS (Neurodegenerative diseases, Brain disorders etc.), Dermatology, Inflammation, Metabolism, Safety studies, Pain research, etc.

LABORAS™
Let the computer score!

Innovative Solutions, Instruments and Software for Animal Behaviour Research

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