

co-ordinated with the Director of the Institute / Research Unit

**Independent Research Unit Comparative Medicine**

**PSP-Element:**

G-500900-001

**Person to contact for further enquiries:**

Dr. Markus Brielmeier

**Title of the highlight:**

Exhaust air particle PCR marks a new era in microbiological monitoring

**Keywords:**

Rodent health monitoring, exhaust air dust PCR, sentinel monitoring, murine norovirus, *Pasteurella pneumotropica*, *Helicobacter hepaticus*

**Central statement of the highlight in one sentence:**

Exhaust air particle PCR is a sensitive, reliable and quick method superior to soiled bedding sentinels for the detection of pathogens in IVC systems.

**Text of the highlight:**

The group of Markus Brielmeier, AVM, has established a novel method for pathogen detection in rodents that marks a breakthrough in health monitoring of rodent colonies in individually ventilated caging. The patented (patent EP20080004970/WO2009EP01730) technology, using exhaust air particle (EAP) samples and PCR analysis instead of sentinel mice, signifies a change in paradigm in hygiene monitoring of all experimental animal colonies housed in IVC systems.

Animal studies are an indispensable tool in biomedical research and arising technologies (e.g. CRISPR/Cas) increase animal use. There is however a constant public debate on the necessity of animals in science, with lack of reproducibility being a major concern. Animal health and hygiene status is one central factor influencing standardization and reproducibility of animal studies.

Individually ventilated cages have become the predominant housing system for laboratory mice as they prevent cage to cage infection. This technical feature, however, constitutes a major drawback for the routine health monitoring of mouse colonies, as traditional screening programs rely on easy cage to cage transmission of infectious agents from experimental animals to so-called sentinel

mice subject to health monitoring. In recent years the laboratory animal community has come to realize that this approach is insufficient for screening in modern IVC systems; valid alternatives however -while urgently needed- have not been available. As a consequence infections in IVC systems are often overseen, resulting in unknown and unpredictable effects on study results. Commercial laboratories recently developed PCR panels to test for relevant unwanted infectious agents to be excluded from experimental animals. Tecniplast, the world leading supplier of IVC mouse caging, recently presented the "Interceptor" for EAP sampling. This device, jointly developed by Brielmeier and Tecniplast is based on an exclusive license of the patented technology. So far, scientific evidence that the new technology is superior in and capable of detecting relevant organisms such as viruses and bacteria was missing. Therefore, the group has designed and conducted studies on the detection of three of the most relevant mouse pathogens, Helicobacter, Pasteurella and Murine Norovirus by EAP sampling. Results show a clear superiority of the novel technology over the conventional sentinel method, which does not reliably detect infections of mouse colonies at low prevalence. This is the first proof of principle of the novel EAP method and the data shows that is a significant improvement over health protocols using sentinels.

**Publication:**

Miller M, Ritter B, **Zorn J, Brielmeier M.** Exhaust Air Dust Monitoring is Superior to Soiled Bedding Sentinels for Detection of Pasteurella pneumotropica in Individually Ventilated Cage Systems. J Am Assoc Lab Anim Sci. 2016 (in press)

Miller M, Ritter B, **Zorn J, Brielmeier M.** Exhaust Air Particle PCR Detects Helicobacter hepaticus Infections at Low Prevalence. 2016. J Veterinar Sci Technol 7: 343. doi:10.4172/2157-7579.1000343

**Zorn J,** Ritter B, Miller M, Kraus M, Northrup E, **Brielmeier M.** Murine norovirus detection in the exhaust air of IVCs is more sensitive than serological analysis of soiled bedding sentinels. Lab Anim. 2016; doi:10.1177/0023677216661586

**Taking account of the HMGU mission:**

By improving standards of experimental animal use the new technology enables researches at the Helmholtz Zentrum München to better model complex diseases and therefore promotes better research.

**The internal HMGU co-operation partners with whom the highlight was compiled, if appropriate:**

Tecniplast S.p.A., Buguggiate (Varese– Italy), Via 1° maggio no. 6