A new spin on blood glucose testing

Many people with diabetes routinely use glucometers to measure their blood glucose concentration and make decisions on the basis of these results to help manage the disease. Glucometers are also used in veterinary medicine to monitor blood glucose levels in cats and dogs with diabetes or other conditions, and veterinarians similarly use that information to guide diagnostic and treatment decisions.

Glucometers are popular because they work quickly and require only a small drop of blood to produce a reading, but they are not as accurate as some other methods. “It’s widely known that glucometer readings come with a degree of inaccuracy, and until now we’ve just lived with it,” said Rebecka Hess (University of Pennsylvania School of Veterinary Medicine, Philadelphia) in a press release. Biochemical analyzers, for example, produce more accurate results but are slower and more expensive to operate and require larger amounts of blood.

Hess and her colleagues noted some concern among veterinary clinicians that

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the inaccuracy of glucometer readings might affect the quality of clinical decisions based on these readings. They considered that the inaccuracy of glucometers might be due in part to the fact that glucometers obtain readings from whole blood rather than plasma (whole blood without red and white blood cells) or serum (whole blood without red and white blood cells or clotting factors), both of which can be obtained by spinning whole blood in a centrifuge. To test this idea, they carried out a study comparing glucometer readings obtained from whole blood, plasma and serum with the serum glucose concentration measured by a biochemical analyzer as the ‘gold standard.’

They obtained 96 blood samples from 80 dogs and 90 blood samples from 65 cats that were being treated at their institution’s veterinary hospital and took aliquots of whole blood, plasma and serum from each sample. They measured glucose concentration in each aliquot using a glucometer and in serum aliquots using a biochemical analyzer. They found that glucometer readings obtained from plasma or serum—but not whole blood—correlated well with the concentration measured by a biochemical analyzer (*J. Am. Vet. Med. Assoc.* **246**, 1327–1333; 2015). The results indicate that obtaining glucometer readings from plasma or serum rather than whole blood might enable veterinarians to make better diagnostic and treatment decisions, and practices at the authors’ institution’s veterinary hospital have been changed accordingly. Additional studies are needed to assess whether the results hold true—and might therefore have implications for glucose monitoring—in people.

Monica Harrington

TAPEWORMS TEMPER IMMUNE REACTIONS

Autoimmune and immune hypersensitivity disorders are increasingly common conditions in which dysfunctions of the immune system cause deleterious effects in an individual. These disorders include allergic responses, chronic inflammation and possibly even some psychiatric disorders, but little is known about their causes or why they are now appearing with greater frequency.

One possible explanation is the ‘biome depletion theory’, which considers the complete ecosystem of the human body and posits that our immune system evolved to function properly alongside a robust microbiome. According to this theory, modern hygiene’s intense policing of the human microbiome can destabilize this ecosystem and dysregulate immune responses.

Recently, neuroscientist Staci Bilbo and colleagues at Duke University (Durham, NC) tested how this theory might apply to neonatal development in lab rats (*Brain Behav. Immun.* doi:10.1016/j.bbi.2015.07.006; published online 7 July 2015). Previous studies have found that lab rats, when infected with bacteria as neonates, show cognitive deficits later in life caused by the induced immune reaction.

“We have faced bacterial infections throughout our entire evolutionary history, presumably also during the neonatal period,” said Bilbo in a press release. “It always seemed kind of strange that the immune system would have evolved to overreact like that.”

In their most recent study, Bilbo’s team again infected rats with bacteria, only this time some of the rats had been previously colonized with helminths, or tapeworms. Helminths are common in wild rats, so Bilbo’s team used them to model a more complete microbiome than is typical of lab rats. Once the rats matured, Bilbo’s team administered tests for hippocampal-specific memory deficits, finding that rats with helminths did not show the cognitive impairments seen in worm-free lab rats.

When they examined cell samples from each rat, Bilbo’s team confirmed that cells from rats with helminths expressed lower levels of inflammatory response factors during immune stimulation, compared to cells from the worm-free rats. This suggests that the small parasite load tempered the immune reaction that otherwise causes deleterious and enduring effects during development.

Coauthor William Parker noted that, in some ways, lab rats are a very appropriate model for testing the biome depletion theory. “In a real sense we’ve done the same things to our lab animals that we’ve inadvertently done to ourselves,” he said, referring to modern hygiene practices. Studies like this contribute to mounting evidence of the importance of microbiotic ecology, indicating new, if not classically hygienic, possible treatments for complex immune disorders.

Gregory D. Larsen