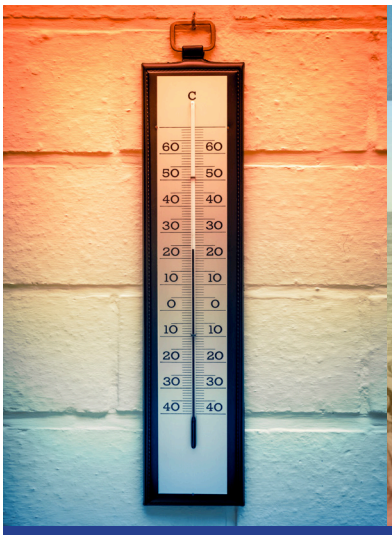

Noroviruses: More Heat Resistant Than We Thought?

Historically, thermal inactivation is among the most widely used and reliable food processing methods but a new study from NoroCORE researchers at N.C. State University suggests that human noroviruses may be more resistant to inactivation by heat than previously thought. Human noroviruses are the leading cause of foodborne disease in the United States, responsible for around 5.5 million illnesses annually, and accounting for 58% of all domestically acquired foodborne illness from known causes, costing around $2 billion in healthcare expenses and lost productivity. A better understanding of prevention and control methods, like thermal inactivation, is critical to managing the foodborne transmission of these pathogens.

In the case of norovirus, understanding thermal inactivation is particularly important because it is very resistant to disinfectants and sanitizers. As human noroviruses are difficult to study, there is not much information on their heat resistance. Many thermal inactivation studies have relied on surrogate viruses (substitutes similar to human noroviruses) that do not always behave in the same manner as human noroviruses. Other, non-surrogate studies rely on measuring the presence of human noroviruses with molecular methods such as polymerase chain reaction (PCR). This method has its own drawback, detecting both infectious virus and non-infectious remains of damaged or incomplete virus - the results can be misleading.

To better characterize the actual thermal inactivation profile of human noroviruses, NoroCORE researchers employed molecular methods that allow for quantification of noroviruses, but with additional steps that distinguish between infectious and non-infectious virus. They were able to determine norovirus inactivation resulting from different temperature and time combinations. Their findings show that human noroviruses may be relatively resistant to heat, more so than previously thought. For perspective, the results suggest human noroviruses are not likely to be completely inactivated under normal milk pasteurization conditions. The data also indicates that human noroviruses are more heat stable than the surrogates often used to study them. Noroviruses may be even more heat resistant when present in food, where they are protected by the food matrix itself. The study also provided important proof-of-concept for methods that allow distinction between infectious and non-infectious particles.

It may be time to "rethink" the thermal stability of human noroviruses. They appear to be more heat resistant than originally thought, in addition to their trademark resistance to disinfectants and sanitizers, which has important implications for food processing methods. The results also reinforce the fact that surrogates are not always a reliable indicator of human norovirus behavior (meaning results based on surrogate studies should be interpreted with caution), and provides proof of concept for methods that distinguish between infectious and non-infectious virus.

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