

SUMMARY

One of the main causative agents of viral gastroenteritis in adults and children worldwide are noroviruses (NoVs). They cause 210,000 deaths and 685 million cases each year. In the US, the economic cost of NoV infections totals US\$4.2 billion, while the socioeconomic loss is estimated at US\$60.3 billion. It is believed that by the age of two, every child has undergone at least one illness caused by norovirus. Outbreaks of this pathogen usually occur in high-density settings such as hospitals, nursing homes, schools, kindergartens, children's playrooms, military facilities and cruise ships. The main sources of HuNoV transmission are food, water and surfaces contaminated with vomit or faeces.

In order to determine the impact of norovirus on the human body, studies were carried out on an animal model - C56B1/6J mice. Histopathological changes and oxidative stress were studied, in organs such as brain, cerebellum, liver, lung and kidney. Histopathological changes were noted in the brain, cerebellum and liver in all individuals; changes were observed in the lungs and kidneys in some individuals. These studies suggest that MNV infection can cause significant changes in parameters in many different organs. Kidney tissues from MNV-infected mice showed increased superoxide dismutase Mn activity, while liver tissues showed decreased glutathione reductase, catalase, superoxide dismutase Mn and superoxide dismutase activity. With the exception of lung tissue, all tissues of MNV-infected mice tested had reduced glutathione reductase activity. This study also showed that while levels of total oxidative capacity were significantly reduced in the kidney, norovirus infection resulted in elevated levels of total antioxidant capacity and total oxidative capacity in the brain and liver. The source of these changes presumably lies in the reactive oxygen species produced by the viral infection. These can cause oxidative stress and damage cells. These findings allow us to look at norovirus as a pathogen that is responsible not only for damage to the digestive system, but also to the brain. Currently, norovirus infections are confirmed using RT-PCR tests - the gold standard for diagnosis. Due to the short time of infection - 2-3 days, the result confirming norovirus infection or contamination of food products and water, is often obtained too late. Early diagnosis of infection is key to reducing norovirus outbreaks. The test I have developed is rapid - detection time with sample preparation is about 20 minutes. Operation of the test is simple, requiring no specialist training. The prepared test kit will contain every item required to perform the test correctly. Testing of the sample will also be possible at home. The test will be suitable for both professional and non-professional use. The kit can be used on seafood farms, crop fields,

processing companies, shops, restaurants and health care facilities. The test has a sensitivity of 95% and a specificity of 91.6%. Of all the currently available sample identification options listed, the solution I have created appears to be the most favourable option.

To support the treatment, 10 plant extracts were tested: oregano (*Origanum vulgare* L.), coffee (*Coffea arabica* L.), hemp (*Cannabis sativa* L.), thyme (*Thymus vulgaris* L.), nettle (*Urtica dioica* L.), rosemary (*Rosmarinus officinalis* L.), ginger (*Zingiber officinale* Roscoe), purple coneflower (*Echinacea purpurea* L.) and garlic (*Allium sativum* L.), cinnamon (*Cinnamomum verum* J. Presl) and garlic (*Allium sativum* L.). The virucidal activity for all extracts was at least 99.90%. The experiment compared the total polyphenol content virucidal activity and antioxidant capacity: the higher the polyphenol content, the lower the virucidal effect and antioxidant capacity. Supplementation with natural plant extracts during norovirus infections maybe beneficial due to their high antioxidant capacity, and may have highly desirable virucidal and therapeutic effects.