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Noroviruses as a Cause of Nonbacterial Gastroenteritis

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Noroviruses (NoV) are major causes of acute nonbacterial gastroenteritis and a major public health concern [1]. Noroviruses (NoV) are members of the family Caliciviridae, they are single-stranded RNA, non enveloped viruses [2] with three major open reading frames (ORFs) that encode non structural capsid and minor structural proteins, respectively [3]. Since the first identification of this pathogen in 1972 [4], NoV have become one of the most commonly reported causative agents of large outbreaks of nonbacterial gastroenteritis worldwide [5]. NoV infection relies on the interaction of the viruses with histo-blood group antigens (HBGAs) as host receptors [6]. Based on antigenic and genetic distinctions NoV (formerly called Norwalk- like viruses) can be divided into 5 different genogroups including 29 genetic clusters (subtypes): 8 in genogroup I (GI), 17 in GII, 2 in GIII and 1 each in GIV and GV [7]. Moreover, worldwide, the GII-4 genotype (Bristol virus like genotype) has been shown to be the predominant strain of NoV associated with gastroenteritis [8,9].

Human associated NoV outbreaks resulting from ingestion of contaminated food, such as raw oysters [10] and water [11] or by person to person transmission in semi closed communities such as hospitals, schools, nursing homes and cruise ships [12]. NoV usually cause acute self-limited infections in human of all ages. However NoV infection can be severe in elderly persons, young children and immuno compromised persons. After an incubation period of 1 to 3 days, the clinical manifestations are characterized by diarrhea that lasts 12 to 60 hours accompanied by other symptoms such as nausea, vomiting, abdominal cramps, headache and low-grade fever [13].

Direct and immune electron microscopy (EM) were used to detect the presence of NoV in faecal specimens, but EM is not routinely implemented in the laboratory because of technical limitations , dependency on trained medical staff for its operation [2] and low sensitivity as it requires at least 10^6 viral particles per ml of stool [14]. Norovirus can infect and replicate in a physiologically relevant 3-dimensional, organoid model of human small intestine epithelium [15]. Enzyme linked immunosorbent assay could be used for the screening of stool samples for NoV because of its simplicity [16]. Recently real-time reverse transcription-PCR was used for detection of GI and GII NoV from stool samples using Taq Man probes [17,18] or SYBR Green [19]. A sensitive colorimetric reverse transcription loop-mediated isothermal amplification (RT-LAMP) method was established to detect norovirus genotype GII. The method employed a set of six specially designed primers that recognized eight distinct sequences of RNA-dependant RNA polymerase and capsid protein gene [20].

References

1. Inouye S, Yamashita K, Yamadera S, Yoshikawa M, Kato N, et al. (2002) Surveillance of viral gasrtroeteritis in Japan:pediatric cases and outbreak incidents. J Infect Dis 181: 5270-5274.
2. Schmid M, Oeha R, Schalasta G, Kimming SB, Ender G, et al. (2004) Fast detection of Norovirus using a real –time PCR assay and automated sample preparation. BMB Infect Dis 4:15.
3. Clarke IN, Lambden PR (1997) The molecular biology of caliciviruses. J Gen Virol 78: 291-301.
4. kapikian AZ, Wyatt RG, Dolin R, Thornhill TS, Kalica AR, et al. (1972) Visualization by immune electron microscopy of a 27 nm particles associated with a nonbacterial gastroenteritis. J Virol 10: 1075-1081.
5. Lopman BA, Reacher MH, Van Duijnhoven Y, Hanon FX, Brown DWG, et al. (2003) Viral gastroenteritis outbreaks in Europe. Emerg Infect Dis 9: 90-96.
6. Zhang XF, Dai YC, Zhong W, Tan M, Lv ZP, et al. (2012) Tannic acid inhibited norovirus binding to HBGA receptors, a study of 50 Chinese medicinal herbs. Bioorg Med Chem 20: 1616-1623.
7. Hutson AM, Atmar RL, Estes MK (2004) Norovirus disease:changing epidemiological susceptibility factors. Trends Microbiol 12: 279-287.
8. Hansman GS, Doan LTP, Kguyen TA, Okitsu S, Katayama K, et al. (2004) Detection of Norovirus and sapovirus infection among children with gastroenteritis in Ho Chi Minh City,Vietnam. Arch Virol 149: 1672-1688.
9. Lopman B, Vennema H, Kohli E, Pothier P, Sanchez A, et al. (2004) Increase in viral gastroenteritis outbreaks in Europe and epidemic spread of new norovirus variant. Lancet 363: 682-688.
10. Centers for Disease Control and Prevention (CDC). Notes from the field: norovirus infections associated with frozen raw oysters - Washington, 2011. MMWR Morb Mortal Wkly Rep. 2012 Feb 17; 61:110.
11. Schvoerer E, Bonnet F, Dubois V, Rogues AM, Gachie JP, et al. (1999) A hospital outbreak of gastroenteritis possibly related to the contamination of tap water by a small round structured virus. J Hosp Infect 43: 149-154.
12. Widdowson MA, Cramer EH, Hadley L, Bresee JS, Beard RS, et al. (2004) Outbreaks of acute gastroenteritis on cruise ships and on land: identification of a predominant circulating strain of norovirus in United States. J Infect Dis 190: 27-36.
13. Green KY, Chanock RM, Kapikian AZ (2001) Human Caliciviuses In :Knipe DM Howley PM, editor. In Fields virology. Lippincott Williams and Wilkins, Philadelohia Pa 4: 841-874.
14. 14. Caul EO, Appleton H (1982) The electron microscopical and physical characteristics of small round human fecal viruses; an interim scheme for classification. J Med Virol 9: 257-265.
15. Straub TM, Honer ZU, Bentrup K, Orosz-Coghlan P, Dohnalkova A, et al. (2007) In vitro cell culture infectivity assay for human noroviruses. Emerg Infect Dis 13: 396-403.
16. Burton-MacLeod JA, Kane EM, Beard RS, Hadley LA, Glass L, et al. (2004) Evaluation and comparison of two commercial enzyme -linked immunosorbent assay kits for detection of antigenically divergent Noroviruses in stool samples. J Clin Microbiol 42: 2587-2595.
17. Ishida S, Yoshizumi S, Ikeda T, Miyoshi M, Okano M, et al (2008) Sensitive and rapid detection of norovirus using duplex Taq Man reverse transcription polymerase chain reaction. J Med Virol 80: 913-920.
18. Kageyama TS, Kojima S, Shinohara M, Uchida K, Fukushi S, et al (2003) Broadly reactive and highly sensitive assay for Norwalk –like viruses based on real-time quantitative reverse transcription –PCR . J Clin Microbiol 41: 1548-1557.

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19. Richards GP, Watson MA, Fankhauser RL, Monroe SS (2004) Genogroup I and II Norovrus detected in stool samples by Real –time Reverse transcription –PCR using high degenerate universal primers. Appl Environ Microbiol 70: 7179-7184.

20. Luo JM, Wu XY, Xu ZQ, Luo L, Nie K et al. (2012) Colorimetric detection of norovirus genotype GII by reverse transcription loop-mediated isothermal amplification. Bing Du Xue Bao 28: 165-171.