AFO1

NORISK

Transmission routes of noroviruses, emerging human pathogens in food

DURATION OF THE PROJECT
Phase 1: 01/01/2007 – 31/01/2009
Phase 2: 01/02/2009 – 31/01/2011

BUDGET
569.911 €

KEYWORDS
Norovirus, detection, molecular typing, zoonose, food safety, risk profile

CONTEXT

Noroviruses (NV) are among the most important causes of gastroenteritis in adults worldwide and often occur as outbreaks. In the Netherlands, the Public Health Institute investigated 153 outbreaks of acute gastroenteritis between 1994 and 1999. Of those outbreaks 17% were considered food-borne and 76% were presumptively caused by NV. Bivalve shellfish are notorious as a source of food-borne viral infections, because filter-feeding bivalves can concentrate viruses. Several other foods have been implicated as vehicles of transmission (fruits, vegetables, sandwiches) contaminated by contact with polluted water in the growing area or during processing or by unhygienic handling during distribution or final preparation. Furthermore, NVs are present in several animal species, raising important questions about zoonotic transmission and potential animal reservoir.

PROJECT DESCRIPTION

Objectives

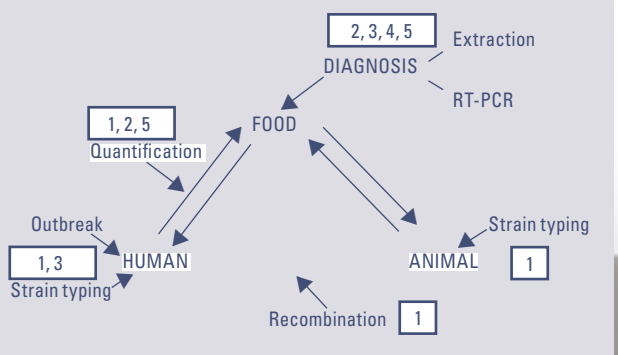
- Elaboration, optimization and evaluation of a real-time PCR format and determination of its specificity, sensitivity and robustness.
- Evaluation of the effectiveness of several virus concentration / viral RNA extraction and purification protocols from a variety of food matrices and elaboration of an appropriate extraction procedure in fresh produce/ready-to-eat foods.
- Development and implementation of a standard protocol with establishment of appropriate controls for routine detection of NVs in food stuffs (seafood and fresh products).
- Elucidation of transmission routes (zoonosis hypothesis) through molecular tracing, with a global view on NV strains circulating among human, animal and also in food.
- Tracing of outbreaks: scenario for coupling clinical data from NV outbreaks to their food-borne cause and risk profiling.
- Development of a risk profile.
- Tracing of the genetic evolution of NVs: genetic profiles and emerging of recombinants.

Methodology

Real-time PCR methods: for the detection and surveillance purposes in the food chain, it is the objective to detect the NVs GGI and GGII by real time PCR will be based upon and compared to the method described by CEN (European Committee for Standardization) working group. However, the assay will be optimized and validated as no international standard is available yet.
Extraction methods are inevitable to concentrate the viral material and to remove inhibitory components in order to avoid false negative results with real-time PCR. So far no standardized method is available.
Epidemiological networks, human outbreak testing and tracing outbreaks: all human and food samples in case of food-borne outbreaks will be analysed by the methods set up in this project. All these samples will form a Belgian database.
Zoonoses and molecular typing: the first part of the project will consist in the set up of a sample collecting system (food, human and animal stools) and NV strains isolated will be studied. In a second part, the NV isolated strains will be used for studying the recombination intra and inter species, genogroup and genotype.
The information gathered at the level of agro-food, clinical, veterinary will be combined to elaborate a risk profile.
The originality of this project relies on the integration of the three aspects involved in the evaluation of the risk of transmission of NV by an analysis of the NVs: food, animal and human.

INTERACTION BETWEEN THE DIFFERENT PARTNERS

With all the partners, we will have internal meetings, at least every 6 months, to expose achievement and discuss about problems, next tasks and network coordination. Different partners could also have some meetings in between if necessary. A website will be developed with privileged access to the partners and an open access for outside people.



SSD SCIENCE FOR A SUSTAINABLE DEVELOPMENT

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EXPECTED RESEARCH RESULTS AND/OR PRODUCTS

- A sensitive and robust real-time RT-PCR method for the detection of the acknowledged GGI and GGII strains.
- An appropriate real-time RT-PCR method for the detection of a wide diversity of NV genogroups.
- An approved viral extraction method for detection of NV in food.
- A standard operating procedure for routine screening of NVs.
- Data gathered on the prevalence and distribution and genotypes of NV in fresh produce/ready-to-eat foods and shellfish, in human and animal species.
- Data on the incidence of NV as a cause of food-borne gastro-enteritis.
- Data on NVs in domestic animals.
- Development of a risk profile on NVs.
- Development of a network to identify the most important sources of NV and to present existing and potential for emerging recombinant types in Belgium.
- Elucidation of transmission routes of NVs.

Results and conclusions will be discussed in regular Technical Project Meetings with the members of the Users Committee (every 6 months).
Progress of the project will be presented in Interim and final (after 2 and 4 years) project reports.
An informative Internet Portal Site will be established.
More classical dissemination in (inter-)national peer reviewed scientific journals, presentations at (inter-)national conferences and workshops will also be of high importance.
The research consortium will make concerted efforts to render the project-related information accessible through sector-specific journals or appropriate media.
Bibliographic knowledge and experimental experience acquired during the project will be reported to the Scientific Committee of the Belgian Federal Agency for Safety of the Food Chain.
The progress and expertise built up with real time RT-PCR methods for detection of NVs will be communicated to the CEN working group.
At the end of the project, an open workshop will be organised to inform other interested parties (food industries and diagnostic laboratories, scientists, legislative authorities and inspection experts) on the project results.

PARTNERS - ACTIVITIES

C1 - The unit studies the pathogenesis of animal viral diseases and molecular genetic of viruses.

P2 - The microbial safety of food products is a key activity of the LFM-FP. Research is focused on methods for the detection of emerging pathogens.

P3 - The department of microbiology is National Reference Laboratory (NRL) for foodborne outbreaks. Its responsibilities include laboratory-based surveillance of four important bacterial diseases in humans, as well as food microbiology.

P4 - The mission of ILVO consists of the execution and co-ordination of policy-supporting scientific research and its associated services, with a view to sustainable agriculture and fisheries.

P5 - Its laboratory is accredited and is the NRL for monitoring bacteriological and viral contamination of bivalve molluscs and also for food microbiology.

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Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting http://www.belspo.be/fedra or http://www.belspo.be/ssd

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