USE OF CULTURE-INDEPENDENT TECHNIQUES FOR FOOD INDUSTRIES WATER SURVEILLANCE

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Drinking water that comes from public suppliers is not sterile, it contains a number of autochthonous and mostly harmless bacteria. But, pathogenic or opportunistic bacteria may enter drinking water facilities in case of irregular operating conditions. In this case, some of these bacteria are able to persist and become distributed to the food production lines. If pathogens find their optimal growth conditions (e.g., nutrient, humidity and temperature) a proliferation and transfer to humans becomes a threaten. Thus, drinking water is controlled in the framework of the EU project PathogenCombat as a possible source of contamination during food production.

Our challenge within the project is to use culture-independent techniques to detect pathogenic bacteria in water of food industry and to look for possible water-derived critical control points in the production lines.

Techniques such as PCR and Real Time q-PCR, are applied to specifically detect *Listeria monocytogenes, Mycobacterium avium subsp. paratuberculosis, Campylobacter jejuni, Enterococcus ssp, Salmonella ssp, Escherichia coli,* and *Pseudomonas aeruginosa* in different points of the water distribution systems at food industries.

Denaturing Gradient Gel Electrophoresis (DGGE) is used as a tool to compare bacterial population similarities for the identification of possible critical control points at food industries. Further sequencing is performed to characterize the bacteria found in the water.

Some results of the application of these new technologies to two German food industries and two Spanish food industries are shown here.

Enterococci, *P.aeruginosa, E.coli* and *C.jejuni* were detected in some water samples from these industries when the new molecular detection methods were used, but not with conventional plating methods. Recently some methods have been developed to distinguish DNA coming from live and dead cells, but these were not included in the present work.

When the autochthonous bacterial populations of the water samples were analyzed some shifts were observed during water distribution, indicating at least one possible critical control point in each food industry. The presence of DNA of a number of opportunistic bacteria were found after sequencing the DGGE bands.

The use of these culture-independent techniques have a high applicability for the identification of bio-hazards and critical control points at all stages of food production where water is involved.