

Examples of published papers illustrating different uses of typing for international outbreaks

Outbreak paper. Example of use of PFGE for an international outbreak of *Salmonella* Thompson, associated with imported lettuce

Outbreak with *Salmonella* Thompson first detected in Norway in 2004. A case control study identifies rucola as the source. Following an urgent inquiry, cases with the outbreak PFGE profile are searched for and found in other European countries. Rucola lettuce produced in Italy is also found positive for *S. Thompson*.

[Nygård et al. Foodborne Pathog Dis. 2008 5:165-73](#)

Outbreak paper. Example of use of PFGE for an international salmonella outbreak associated with peanuts

Outbreak with *Salmonella* serotypes Stanley and Newport first detected in Australia in 2001. PFGE is used to link this outbreak to outbreaks in European countries and Canada.

[Kirk et al. Epidemiol. Infect. \(2004\), 132, 571-577](#)

Outbreak paper. Example of use of PFGE to link STEC outbreaks in two countries

Outbreaks with STEC O157:H- occurring in both the Netherlands and Iceland are found to be caused by the same strain using PFGE but also serotyping, virulence gene typing and phage typing. Dutch lettuce is found to be the likely source, food trace-back being an important investigation tool.

[Friesema et al. Eurosurveillance, 2008,13\(50\): pii: 19065](#)

Outbreak paper. Example of use of PFGE for a US multi-state outbreak with STEC O157 associated with spinach

Large outbreak with STEC O157:H7 in USA in 2007 caused by fresh spinach. PFGE is used to link this outbreak all over the US and Canada (through PulseNet) and also to link patient isolates to environmental isolates. There are several papers describing this outbreak from different angles, this paper provides the Wisconsin (first state to recognise the outbreak and do an investigation) view.

[Wendel et al. Clinical Infectious Diseases 2009; 48:1079-86](#)

Outbreak paper. Example of use of MLVA for an international *Salmonella* Typhimurium outbreak caused by pork meat.

Severe *Salmonella* Typhimurium outbreak primarily affecting Denmark and found to be caused by different kinds of pork meat all from one specific slaughterhouse. MLVA was instrumental in solving the outbreak, linking isolates from food with patient isolates. Furthermore, the outbreak spread to Norway and Sweden. This also became clear through the use of MLVA. Initial phage typing efforts failed to make this connection as different phage typing results was obtained in the three affected countries.

[*Bruun et al. Eurosurveillance, 2009;14\(10\):pii=19147*](#)

Outbreak paper. *Shigella sonnei* outbreaks in two different countries linked via typing with antibiograms and PFGE

Large outbreak in Denmark in 2007 with *Shigella sonnei* traced back to fresh baby corn imported from Thailand. Both PFGE (which is generally very discriminatory for *Sh. sonnei*) and resistance profiling (utilising the fact that the outbreak strain in question had an unusual resistance profile) were used to distinguish cases from the background of *Sh. sonnei* patients in Denmark. PFGE profiles were compared to the profiles in the US PulseNet database, but a connection to an outbreak in Australia (eventually) made on the basis of the antibiogram following a report in Eurosurveillance (and not through PulseNet International).

[*Lewis et al. Epidemiology & Infection, 2009; 137:326-334*](#)

Discussion paper. Paper discussing phage typing of *Salmonella* Typhimurium as an outbreak investigation tool.

Phage typing as an adequate outbreak investigation tool for *Salmonella* Typhimurium is discussed in the light of more recent typing methods, such as MLVA.

[*Baggesen et al. Eurosurveillance, 2010;15\(4\):pii=19471*](#)

Discussion paper. Review and definitions of bacterial typing in an epidemiological context by an ECCMID study group.

Guideline paper on development, validation and appropriate application of typing methods from study group under the European Society for Clinical Microbiology and Infectious Diseases

[*Van Belkum et al. Clinical Microbiology and Infectious Diseases, 2007, 13 \(Suppl. 3\): 1–46.*](#)

Discussion paper. Paper describing the US PulseNet system.

Review of several years of activity in the US PulseNet. Description of the system. System using PFGE only at the time on several organisms. Paper some years old by now, but illustrates the concept well.

[*Gerner-Smidt et al. Foodborne pathogens and disease 2006, 3: 9-19*](#)

Discussion paper. Paper describing PulseNet international.

Paper describing the idea behind and efforts (2006) to establish a global typing network consisting of the different PulseNet systems.

[*Swaminathan et al. Foodborne pathogens and disease 2006, 3: 36-50*](#)