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Development of monoclonal antibodies for the detection of novel staphylococcal enterotoxins in food

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Staphylococcal enterotoxins (SE) are responsible for frequent food poisoning outbreaks (FPO) worldwide, causing non-specific gastrointestinal symptoms such as nausea, vomiting and diarrhea. Detection and identification of SEs are therefore essential in the health, security and food sectors. To date, 33 SE types have been described in the literature but only five classical toxins (SEA to SEE) can be routinely detected in food via commercially available immunoassays. During the analysis of contaminated food samples, it regularly happens that genes encoding newly identified SEs are detected but methods for confirmation of the toxins presence are not currently available. Recently, through collaboration between the SBCL unit (Anses) and the LERI and LI-MS laboratories (CEA), SE detection has been extended to 8 SEs, including SEG, SEH and SEI toxins in foods by immunoassay [1] and multiplexed LC-MS/MS [2].

Analytical methods are thus restricted to only few SEs (SEA-SEI) due to the lack of antibodies able to capture the wide range of enterotoxins. To overcome this issue, we are developing new antibodies to capture the most relevant SE types based on data obtained from the genomic analysis of strains involved in several FPO cases in France and in Europe [3]. Thus, we focused our work on the toxins SEK and SEY whose genes are often detected in strains isolated from FPO. Recombinant SEK and SEY were produced in the laboratory and were used as immunogens to produce murine monoclonal antibodies (mAbs) specifically directed against these toxins. The monoclonal antibodies produced were screened towards multiple SE types and bacterial culture supernatants to confirm their specificities. Finally, the best antibodies will be used for the development of new sandwich ELISAs and for the immunocapture of SEs to be performed before LC-MS/MS SE detection to evaluate the occurrence of these new toxins in staphylococcal FPO.

Keywords: staphylococcal enterotoxin, food poisoning outbreaks, monoclonal antibodies.

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