

## **Individual-based quantitative risk assessment of listeriosis for ready-to-eat foods in France**

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### **INTRODUCTION**

*Listeria monocytogenes* is a gram-positive pathogen that is primarily transmitted to humans through food. Listeriosis is a severe disease that predominantly affects pregnant women, the elderly and immunocompromised individuals. New improved data from national surveys on food consumption open up new opportunities for identifying high-risk individuals and determinants for risks (e.g.: food consumption, food storage time, fridge temperature). The integration of individual-based consumption data into the exposure assessment module of already established quantitative microbial risk assessment (QMRA) models could therefore support risk managers in their decision-making process. The aim of this study was to identify high-risk subgroups based on observed consumption and food storage patterns and to explore the refinements in QMRA studies when accounting for individual-based data, particularly related to storage conditions and ability to influence the risk of listeriosis.

### **METHODOLOGY**

We developed a consumer-phase probabilistic model that estimated the risk of listeriosis associated with different ready-to-eat food categories in different subgroups of the French population. We used data from The French National Survey of Diet and Physical Activity (INCA3) to describe the dietary intake and storage conditions, and food contamination data from the 2018 EFSA scientific opinion on *L. monocytogenes* to estimate the risk of each food and the total risk. The total number of cases was estimated, accounting for the sample weight of each individual within the INCA3 study.

### **RESULTS**

Our model estimated that high-risk subgroups are linked to 97 % of listeriosis cases in France for a given year, where long storage times are involved, and 83 % of cases if the temperature is above 7°C. Our model estimated that 385 cases (363-423, 95 % Confidence Interval) occur each year in France. 213 cases involve males and 171 cases involve females. Among these cases, 151 involve male individuals between the age of 64 and 74 years. The

foods linked with the highest number of cases are smoked fish and pâté, accounting for over 70 % of cases.

## DISCUSSION

To our knowledge, this is the first time that a QMRA combines dietary intake and storage conditions at the individual level to assess the risk of listeriosis for the French population. Our results showed that the foods associated with a higher number of cases for the French population were smoked fish and pâté. This is in contrast with previous studies, which suggested that cold cut meats and sausages were associated with a higher risk.

Those studies highlighted that long storage times and high fridge temperatures are known risk determinants but could not quantify the associated cases because storage conditions were extrapolated from an empirical distribution rather than individualised.

This study demonstrates that considering individual-based data in QMRA makes it possible to establish risk-based measures specific to distinct subgroups within the population.