RADIONUCLIDE PERMEABILITY THROUGH FOOD AND FOOD PACKAGING AS DETERMINED BY COMPUTATIONAL AND EXPERIMENTAL STUDIES FOR HIGH THROUGHPUT SAMPLE ANALYSIS FOLLOWING A NUCLEAR INCIDENT

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The 2011 Fukushima nuclear power plant accident in Japan highlights the importance of having an efficient response plan for such events. For regulatory agencies, such as the FDA, it is critical to provide high sample throughput and rapid analysis methodologies for Sr-90 and other hard to detect radionuclides. These efficient strategies can allow for the timely dissemination of analytical data to decision makers for use in real time incident consequence management. To this end, a risk assessment strategy using computational predictive modeling software in conjunction with laboratory-based experimentation is being developed. These tools will establish a systematic understanding of the transport phenomena for contaminants through various foods and food packaging materials; allowing for the design of a laboratory triage mechanism for use in scenarios that require high sample throughput. The computational modeling portion of the project is being performed in collaboration with the French National Institute for Agricultural Research (INRA). The INRA has previously developed software for the study of contaminant leaching from food packaging materials. Beginning with their approach of studying the packaging as the source of contamination, the research will build upon the code treat the packaging material as a permeation barrier to radionuclides. Initial experimental studies on the transport of stable Sr-88 through apples have merited further investigation. Future work will focus on studying the effectiveness of common food and food packaging materials against radionuclide permeation versus material, time, state of radionuclide and location specific conditions. The knowledge gathered throughout this study will be used to greatly expedite the analysis of samples in times of emergency, thus facilitating consumer protection.