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French IRSST Studies Efficacy of N95 Respirators in Conditions Representative of Human Breathing

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On June 28, 2016, Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST) issued a press release announcing the availability of a study on "Efficiency Evaluation of N95 FFRs under Cyclic and Constant Flows." Researchers tested the efficacy of N95 filtering facepiece respirators (FFR) in conditions of constant and cyclical air flow, simulating human breathing, from 42 to 360 liters per minute.

According to the press release, N95 respirators "are the personal safety equipment most commonly used in Quebec by industrial and health-care workers to protect themselves against exposure to ultrafine particles" (UFP) (diameter of particles less than 100 nanometers). Researchers examined the impact of breathing frequency and inhalation flow rate on the efficacy of N95 respirators; compared the efficacy of N95 respirators in conditions of cyclical air flow with the results for constant air flow; and assessed the impact of the clogging time of the filter on the performance of N95 respirators as a function of relative humidity and air flow (cyclical and constant). The press release states that UFPs "are potentially toxic and liable to cause serious health problems.

They may be of natural origin (sea spray, smoke from forest fires or volcanic activity) or human origin (welding, diesel or exhaust fumes) and, due to their nanometric size, these particles may, once inhaled, be deposited deep in the lungs' alveoli." According to the press release, the study results indicated that the influence of a high inhalation flow rate significantly affected the penetration of UFPs, while the impact of breathing frequency was moderate. Researchers established that with a constant air flow, the best assessment of UFP penetration levels is obtained using a moderate inhalation flow rate typical of the human respiratory cycle. The results also showed that filter clogging time and relative humidity have a major impact on particle penetration through N95 respirators.

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