

Test tube containing pathogenic agent breaks during centrifugation (aerosol exposure)

Inside a biological safety cabinet (BSC) a researcher filled screw-capped centrifuge tubes with a cell/supernatant mix, presumed to contain pathogenic viral particles. The centrifuge tubes were placed in a rack and removed from the BSC to a table-top swinging-bucket centrifuge (not equipped with safety cups) for spinning down at a relative low speed for 10 minutes. During the spin the centrifuge made an unusual noise. As previously instructed, the researcher waited at least 20 minutes before opening the centrifuge lid to allow time for centrifuge-generated aerosols to settle out. After opening the centrifuge lid, it appeared that one of the centrifuge tube's seams was slightly cracked and liquid was observed inside of the centrifuge proper. At this point another lab occupant, present in the room during the spin, quickly (and wisely) exited the lab. Neither researcher was wearing respiratory protection during this period. Before decontaminating the centrifuge and its contents, the researcher swiped the interior liner of its body with a sterile gauze-pad. The pad contents were later tested for the presence of viral particles. The tests revealed that 4×10^3 viral particles (pfus) had escaped the tube enclosure and had deposited on the interior liner of the centrifuge.

Caution: The energy released during centrifugation will generate small particle aerosols when primary containers (such as screw cap tubes) rupture during a spin. Small particles may float in the lab's ambient air for long periods before settling because they do not have enough weight to settle out quickly. It takes over an hour for 99.9 % of particles, 0.3 microns diameter, to clear the air, in a lab with a typical 6 air changes per hour ventilation rate. This particular virus was thought to be transmissible by, ingestion, parenteral inoculation, droplet or aerosol exposure of mucous membranes or broken skin.

- Be sure all centrifuge tube specifications meet the *g* force required for the speed of spin you will be using. Polystyrene tubes can be easily mistaken for polycarbonate tubes that can be spun at a higher *g*-force.
- Check centrifuge tube supplies to ensure that a tube substitution has not occurred by accident and you are using the correct type.
- Never spin down pathogens in a centrifuge that is not equipped with gasket-based centrifugation safety cups or rotor heads (safety cups or rotor safety seals).
- When cleaning up any pathogenic material released outside of a BSC, ensure you and any other people present in the lab are wearing appropriate PPE. Cleaning up spilled pathogenic material requires all participants to wear a respirator (N95 or higher) in addition to face/eye, hand, and clothing protection, during the clean-up.