

Mowbray N, Ansell J, Warren N, Wall P, Torkington J. Is surgical smoke harmful to theatre staff? A systematic review. *Surg Endosc* 2013; 27: 3100-3107

LINK - <https://www.ncbi.nlm.nih.gov/pubmed/23605191>

Abstract

BACKGROUND:

Smoke is generated by energy-based surgical instruments. The airborne byproducts may have potential health implications. This study aimed to evaluate the properties of surgical smoke and the evidence for the harmful effects to the theatre staff.

METHODS:

Cochrane Database, MEDLINE, PubMed, Embase classic and Embase, and the metaRegister of Controlled Trials were searched for studies reporting the constituents found in the smoke plume created during surgical procedures, the methods used to analyze the smoke, the implications of exposure, and the type of surgical instrument that generated the smoke. Studies were excluded if they were animal based, preclinical experimental work, or opinion-based reports. The common end points were particle size and characteristics, infection risk, malignant spread, and mutagenesis.

RESULTS:

The inclusion criteria were fulfilled by 20 studies. In terms of particle size, 5 (25%) of the 20 studies showed that diathermy and laser can produce ultrafine particles (UFP) that are respirable in size. With regard to particle characterization, 7 (35%) of the 20 studies demonstrated that a variety of volatile hydrocarbons are present in diathermy-, ultrasonic-, and laser-derived surgical smoke. These are potentially carcinogenic, but no evidence exists to support a cause-effect relationship for those exposed. In terms of infection risk, 6 (30%) of the 20 studies assessed surgical smoke for the presence of viruses, with only 1 study (5%) positively identifying viral DNA in laser-derived smoke. One study (5%) demonstrated bacterial cell culture (*Staphylococcus aureus*) from a laser plume after surgery. Regarding mutagenesis and malignant spread, one study (5%) reported the mutagenic effect of smoke, and one study (5%) showed the presence of malignant cells in the smoke of a patient undergoing procedures for carcinomatosis.

CONCLUSIONS:

The potentially carcinogenic components of surgical smoke are sufficiently small to be respirable. Infective and malignant cells are found in the smoke plume, but the full risk of this to the theater staff is unproven. Future work could focus on the long-term consequences of smoke exposure.