"It is well known that the pestilential fevers, phthisis and many other diseases are liable to seize on those who live with the infected, although they have come into no direct contact with them. It is no small mystery by what force the disease thus propagates itself...."

Though it was put to the quill nearly five centuries ago, this statement by Girolamo Fracastorius, the Italian poet, physician, mathematician, astronomer and geologist, displayed his remarkable insight into the modern concept of the nature of infection.

It was the terror of spread of disease through infection that gave hospitals their "death house" image well into the nineteenth century, until Joseph Lister introduced a carbolic acid spray to disinfect the air in operating rooms. It involved the principle of antisepsis – the killing of germs, not asepsis – germ-free air.

Today, a germ-free, pure environment is no less vital than the urgent quest for it was in the epidemic era of cross-infections like childbed fever. It is however, vastly more essential in this modern era of long, complicated surgery on internal organs, bones and joints, surgery that historically was only possible on the autopsy table and of risk only to the anatomist.

Clean air is not only critical in the surgical suite but throughout hospitals and laboratories where testing goes on continually on potentially disease-spreading organisms. It is equally needed in a great number of other research settings where both deadly organisms and highly toxic substances are studied. Depending on the level of potential danger, air purification standards rise constantly to the highest range of containment and isolation from the outside environment.

The critical component in obtaining a pure, safe atmosphere is a constant air flow and exchange and highly refined filtration systems capable of capturing and filtering out minute particles.

Several Canadian firms have become major suppliers of state-of-the-art air flow filtration systems designed and manufactured to meet the most rigid of international air quality standards.

One manufacturer, Canadian Cabinets Company Limited, located in Nepean, Ontario, near Ottawa, produces modular-design environmental air control equipment ranging from biological containment hoods to vertical and horizontal laminar flow work stations, laboratory fume hoods, animal isolation units, wet benches and glove boxes. Suspended vertical laminar flow systems are also available.

Using a patented "zero bypass plenum airseal", the laminar flow stations ensure that only high efficiency particulate air (HEPA) filtered air passes into the work area. The units exceed Class 100 conditions under federal standard 209B. These filters have efficiency ratings of either 99.97 or 99.99 per cent in removing particles smaller than 0.3 microns. It is only with such clean air environments that many processes are reproducible and that certain products can be manufactured.

Biological containment hoods provide a high degree of protection to both worker and product in handling low-to-moderate risk biological agents. With their HEPA filtered exhaust systems, and depending on the agents being handled, the units may be operated without any external venting. They are negative of pressure with automatic dampers on recessed faceshields. Options include air, gas and vacuum petcocks, duplex electrical outlets, ultra-violet light and ground fault interrupter circuitry.

The firm produces modular clean rooms from the Class 100 to Class 100 000 range.

Laboratory workers handling pathogens and isotopes require special environments; such rooms operate at negative pressure with HEPA filtering of both incoming and exhausting air.