

# **Investigation of serious crimes using DNA from dust and air**

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Humans constantly shed deoxyribonucleic acid (DNA) into the surrounding environment. This DNA may either remain suspended in the air or it settles onto surfaces as indoor dust. In this study, we explored the potential use of human DNA recovered from air and dust to investigate crimes where there are no visible traces available—for example, from a recently vacated drugs factory where multiple workers had been present. Samples were collected from three indoor locations (offices, meeting rooms and laboratories) characterized by different occupancy types and cleaning regimes. The resultant DNA profiles were compared with the reference profiles of 55 occupants of the premises. Our findings showed that indoor dust samples are rich sources of DNA and provide an historical record of occupants within the specific locality of collection. Detectable levels of DNA were also observed in air and dust samples from ultra-clean forensic laboratories which can potentially contaminate casework samples. We provide a Bayesian statistical model to estimate the minimum number of dust samples needed to detect all inhabitants of a location. The results of this study suggest that air and dust could become novel sources of DNA evidence to identify current and past occupants of a crime scene.