ANIL AGGRAWAL'S
Internet Journal of
Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 2, NO. 1
Downloaded from www.anilaggrawal.com · ISSN 0972-8074 (Online) · https://www.anilaggrawal.com/ij/vol_002_no_001/editorial.html

Editorial

CITE THIS ARTICLE
Rutty, GN. DNA contamination at scenes of crime and in mortuaries (Editorial). *Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology, 2001*; Vol. 2, No. 1 (January-June 2001): ; Published: January 1, 2001,

EMBASE.com : **EMBASE Accession Number: 2004204934**

DNA contamination at scenes of crime and in mortuaries

-Dr G. N Rutty
Senior Lecturer in Forensic Pathology,
University of Sheffield

Email:gnr3@le.ac.uk

One of the primary elements of homicide scene of crime investigation is based upon Locard's principle; that the perpetrator of that crime, by the very nature of been present at the scene at the time of the offence, should have left evidence of their presence and passage within and from said scene. The search for trace evidence at scenes and on the victim's bodies may identify particulate matter which has been shed by the perpetrator or offender finger and/or footprints which may be collected, photographed, lifted, analyzed and, assuming that sufficient information can be gained from the evidence, used to identify the offender. This in turn can be used by the prosecution in any subsequent legal proceedings.

However, it was recognized in the last century that if an offender can enter a room and contaminate the crime scene by just being there, so can the investigating team. Thus means of combating and trying to eliminate this contamination were developed and are used now days, throughout the world.

It is generally accepted that up to the late 1990's there were three main types of contamination, which could occur as a consequence of those entering the scene either when the victim is first discovered or later during the investigative phase. There are footprints, fingerprints and fibers. To

combat footprints one can use protective footwear and employ the use of stepping plates or other such devices to raise your team off the floor at the scene. Protracted routes could be taken to approach bodies, either indoors or outdoors, in an attempt to preserve offender marks. Those entering the scene in the first instance may find their footwear confiscated for elimination purposes. To try to eliminate the risk of leaving fingerprints one should wear new, sterile, disposable latex gloves which must be put on in such a manner as not to touch the outside of the glove. Many people now wear 2 pairs of gloves at a scene to avoid this very problem. In the event that a fingerprint is still left by a member of the team, all involved in crime scene investigation should have their handprints on an exclusion database, which could be subsequently reviewed to try and identify the source of the rogue print. Finally to avoid fiber contamination then one can wear a protective suit or wear a garment that is known to shed fibers but the fibers are so common that if they were subsequently found at a scene then no further investigation into their source would necessarily be carried out. An example would be those made of white cotton. These simple and inexpensive precautions should, were ever possible, be adopted by all involved in crime scene investigation. The golden rule, however, will always be; try to keep the number of people entering the scene to a minimum i.e. ***those who need to go in, not those who feel they need to go in***.

...As we move now towards the first year of the new millennium it is becoming clear that there is a new and highly significant source of contamination at not only scenes of crime but also in the mortuaries or anywhere else that a live or deceased body is to be examined in relation to a crime: DNA...

As we move now towards the first year of the new millennium it is becoming clear that there is a new and highly significant source of contamination at not only scenes of crime but also in the mortuaries or anywhere else that a live or deceased body is to be examined in relation to a crime: DNA.

DNA fingerprinting has been with us since its potential use was first highlighted by Gill in 1985. Since then, the techniques employed in the analysis of DNA evidence have become automated and highly sensitive, such that we can now potentially identify an individual from a wide range of single cellular sources. With this advance in technology however comes the problem of rogue DNA contamination. Although recognized to exist for many years within the laboratory environment, waves of panic are spreading through the investigative system as people realize that, in terms of crime scene investigation, the best thing since sliced bread may cause more problems than good and is a defense councils dream.

So let us consider the potential problems that this new technology may present us with and how one can start to consider ways to avoid the problem. As stated above, those entering a scene of crime must remember that their very presence may contaminate the scene now, not only with the standard 3 components but now with their DNA. How does this happen and how long do they have to be there for it to occur. Well, to date, no-one knows although work that is being performed by the author in conjunction with the Forensic Science Service, England is hoped to at least answer these basic questions before the end of this year (Rutty, work in progress). Theoretically one sheds cells from ones body all the time i.e. by just standing, sitting or kneeling although it is unlikely that a person wearing a crime scene suite, gloves and overshoes will contaminate a scene by this method alone. However, what if they scratch their head, their nose or their face, clean their glasses or chew their pen - well one would envisage that the chances grow significantly. Thus should we all be

wearing head protection? They then cough, sneeze, or talk or, if one is to believe the extreme views, breath on the body, this must increase the risk even more?

…Well, there is growing evidence that the main potential source for DNA contamination at a scene is the respiratory tract. So how do we stop this; we wear a mask. But is it that simple? Again to date there is no research supported evidence that there is an actual problem, just a theoretical problem although work is at hand…

Well, there is growing evidence that the main potential source for DNA contamination at a scene is the respiratory tract. So how do we stop this; we wear a mask. But is it that simple? Again to date there is no research supported evidence that there is an actual problem, just a theoretical problem although work is at hand (Rutty, in progress). Even if we are to wear masks, which one should we wear? The surgical literature abounds with the argument as to whether a mask is of any practical use. There are many types of masks on the market and no one knows whether one is better than the next in relation to DNA contamination. One should also consider that wearing a mask is not without problems. Some people may find the very fact of wearing a mask restrictive to their breathing. If one works in a hot humid scene the mask will make you sweat, and for those who wear glasses, may result in them steaming up and thus reducing your vision. Sweat dripping from the face of a scene worker will be a bigger problem than if you didn't wear a mask in the first place. Maybe a mask is not the right thing to wear? Maybe we should wear visors instead? Better visibility, yet more cumbersome and more expensive. Finally maybe all those who could potentially find themselves entering a scene of crime should go on a DNA exclusion database? This is occurring within the United Kingdom but there are human right issues and thus the process is by no means complete.

As with the scene of crime, by the very nature of the investigation the mortuary were the body is to be examined and traditionally were many of the exhibits are to be taken may be full of people breathing, talking, coughing, sneezing and heaven forbid eating or drinking. Now, as with scenes, we must consider who should be there and what these people are wearing if we are to ensure that the DNA samples that we can now recover from a body are from an offender and not a member of the investigating team. Remember it is now possible to get a DNA profile of a person who has merely touched another person (Wiegand, 1997, Rutty, in press,).

…It has been reported over the last couple of years that there is a problem with issues of DNA contamination in mortuaries. Mortuaries, by their very nature are covered in DNA from previously autopsied bodies. It may be on the walls, the tables, the cutting areas or even the instruments that we use…

It has been reported over the last couple of years that there is a problem with issues of DNA contamination in mortuaries. Mortuaries, by their very nature are covered in DNA from previously autopsied bodies. It may be on the walls, the tables, the cutting areas or even the instruments that we use (Toledano 1997, Rutty, 2000). Even though your instruments may appear clean, unless they are brand new and manufacturer certified to be DNA free then the chances are, unless you go to extreme sterilization procedures, that they will have one or more persons DNA on them. Remember that autoclaving alone does not remove DNA from instruments. This problem of instrument contamination has been reported to have lead to the erroneous identification of DNA profiles at homicide autopsies which have arisen from previously autopsied bodies rather than the victim or offender (Rutty, 2000). This lead to a fruitless search for an offender when in fact the source of the

DNA was already dead and buried/cremated! Thus, now not only must we consider policies related to the collection of DNA samples in mortuaries, we must consider policies of sterilization of such places of work. This will include the bag that the body was transported to the mortuary in, the bags used to store the swabs, the swabs themselves, the needles and syringes used to collect blood, the bottles that the blood goes into, and don't forget that the drying room used to dry the exhibits must also be DNA free and restricted entrance to people wearing appropriate protective clothing. Many people are now going over to the retrieval of all exhibits at the scene rather than risk the body becoming contaminated on its way to or on arrival at the mortuary.

We work in exciting times. For the first time in a very long time we now have a tool which is making a significant impact on crime investigation i.e. the present format of DNA analysis and yet we ourselves could render this tool unusable unless we strive to identify ways of not allowing the very team investigating the crime from rendering the evidence contaminated by the very way we go about our work.

References

1. Gill P, Jeffreys A.J, Werrett D.J. Forensic applications of DNA 'fingerprints'. Nature. 1985; 318; 577-579.
2. Rutty G.N, Watson S, Davison J. Contamination of mortuary instruments and work surfaces by human DNA; A significant problem in forensic practice? International Journal of Legal Medicine. In Press.
3. Rutty G.N. DNA contamination of mortuaries. Is there a problem? J Pathol 2000; Suppl 190: 35A
4. Rutty G.N. Human DNA contamination of mortuaries; Does it matter? J Pathol 2000; 190: 410-411.
5. Toledano T, Quarino L, Leung S, Buffolino P, Baum H, Shaler R.C (1997) An assessment of DNA contamination risks in New York City Medical Examinaer facilities. J Forensic Sci 42: 721-724
6. Wiegand P, Kleiber M. DNA typing of epithelial cells after strangulation. Int J Legal Med. 1997; 110: 181-183.
7. Rutty G.N, Watson S.K, Lowe A.L. Investigation of transferral of squamous epithelial cells and their period of survival and detection following human / human contact. Submitted to the Pathological Society of Great Britain and Ireland, Winter Meeting 2001, Netherlands.

Editorial appearing in the Previous Issue

Editorial appearing in the Next Issue

Editorials - Cumulative Index