Maximisation of postmortem information for identification of severely incinerated victims

John William Berketa

Forensic Odontology Unit

School of Dentistry

University of Adelaide

A thesis submitted for the degree of Doctor of Philosophy

at the University of Adelaide

December 2015

Contents

Table of Contents

Abstract

The identification of victims of incineration events can be an intensive and daunting task as the usual comparison methods, including visual, fingerprint, and DNA, may not be possible due to the destruction of postmortem tissue. Dental comparison may also not be possible due to damage and further loss of what remains of the fragile dental tissues.

The aim of this thesis is to provide knowledge and practical suggestions to assist the identification of deceased persons through the successful recognition, retrieval, stabilisation and treatment of postmortem information from incinerated human remains together with prosthetic devices and materials within them to facilitate more successful identification outcomes.

The stabilisation of fragile dental remains was the first step in successful retrieval of information and following pilot studies; non-volatile Clag™ paste solution stabilising agent was identified as the material of choice. Further testing on sheep heads, then trials on human mandibles, produced positive results. An alternative of using a plain flour solution is also offered where Clag™ paste is unavailable. In parallel studies for cases where dentition would not be available, the retrieval of numerical data from the most commonly placed hip and knee incinerated implants was investigated and the use of information from cochlear implants, dental implants and gold alloy analysis were also considered.

This research has proposed practical suggestions that have already been placed into practice to maximise postmortem information of severely incinerated victims.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

I give consent to this copy of my thesis when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

The author acknowledges that copyright of published works contained within this thesis resides with the copyright holder(s) of those works.

I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

28/04/2015

Acknowledgements

I would like to firstly thank my supervisors Lindsay Richards, Helen James and Neil Langlois; and my other co-authors Ellie Simpson, Paul Pigou, Stephen Graves, Grace O'Donohue and Yen-Liang Liu. All have given me great encouragement and support. I also wish to thank the University of Adelaide Forensic Odontology Unit, Forensic Science South Australia (FSSA) and their staff, the Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR), Denice Higgins and Victor Marino at the University of Adelaide, Michele Bayly-Jones at South Australian Coroner's office, Wesley Fisk Ray Last Laboratory at the University of Adelaide, Richard Duddy at Legal Risk University of Adelaide, John Wells and Robert Pitt at Adelaide Cemeteries Authority, Adam Kenny and Bryan Elliott at Centennial Park Crematorium, Ken Neubauer at Adelaide Microscopy, Robert Morrisey, Ken Naismith at South Australian police (SAPOL), the Australian Dental Research Foundation (ADRF), Paul Mitchell at Stryker Corporation, Kevin Roberts at DePuy Corporation, Chris Price and Shane Nicholls at Smith and Nephew Corporation and the Cochlear Ltd., Advance Bionics and Med-El companies. Most of all I would like to thank my great loves: my wife Lindy and my two sons Jack and Sam for their love and support throughout this long process.