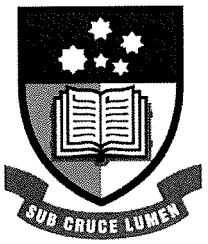

THE UNIVERSITY of ADELAIDE

School of Dentistry

University of Adelaide

"Research contributions to Paediatric Dentistry in the areas of Dental Development, Orofacial Pathology, Prevention, Education and Patient Management"

Submission for D.D.Sc.

Professor Alan Brook

Submission of papers for the Doctor of Dental Science

October 2013

CONTENTS

OVERVIEW

I am grateful for the opportunity to submit this summary of my research for the degree of D.D.Sc. at the University of Adelaide. This research relates particularly to the discipline of Paediatric Dentistry; this is my clinical speciality in which I hold a U.K. Platinum Clinical Excellence Award.
My research contributions have emerged from undergraduate interests in basic science, particularly the development of the oral tissues and the dentition, and the clinical care of patients, principally child patients.

As an undergraduate I had the opportunity to undertake a 'student demonstrationship in Dental Anatomy' for two years teaching junior students followed by a short research project. After qualification I undertook a three year training period of general practice and hospital courses combined with junior hospital posts, passing the examinations to become a Fellow in Dental Surgery of the Royal College of Surgeons on England. I then gained a Clinical Academic post in Paediatric Dentistry and began my research training and publishing papers.

I will provide in Section 1 an overview of the research component of my career as a clinical academic. To illustrate how my career pathway has related to the research publications, this first section includes a short curriculum vitae, emphasising the points relevant to research and listing my research qualifications, prizes, awards and funding. This is followed by a listing of the research students I have supervised and their awards and my research related editorial activities. For me, the research has benefited and opportunities have been created by the interaction with clinical, teaching and leadership roles.

In Section 2 there is an outline of the research cycle that I developed in planning my projects.

Section 3 is the declaration of originality and a statement of the extent and nature of my contribution to each publication defined by my position in the list of authors of each paper.

In Section 4 there is a brief summary of each of the research themes, listing some of the key contributions to each topic.

These themes are presented in the order:

1) Orofacial Pathology in Children
2) Prevention of Dental Diseases
3) Patient Management
4) Developments in Dental Education
5) Dental Development: normal and abnormal

The early papers were based around the anomalies of dental development and the oro-facial pathology of uncommon and rare conditions I was seeing and treating in children. My research thesis was an epidemiological and family study of the prevalence, clinical features, associations and aetiology of anomalies of tooth number, size and form. The prevention of dental disease was also a clear clinical need as was the management of children who were anxious and had special needs and these became additional ongoing research themes. When I became a Dean, my responsibilities included curriculum innovations and I added research in the delivery of dental care by undergraduates, particularly in relation to child patients, to the other ongoing research themes. Over recent years the opportunity has come to concentrate on the development of the dentition,

currently examining it as a Complex Adaptive System and as a paradigm for general biological development.

In Section 5 each theme will be considered in turn, providing in greater detail the main contributions in each area. For each theme, all the publications are listed. In the accompanying text each is briefly mentioned to show the relevance to the topic. Then a selection of my papers is included in full to illustrate the contribution to advancing the area. These references are highlighted in bold in Section 5.

In Section 6, the Conclusion briefly summarises the key points form each section and outlines the aspects that cut across several themes. The present position in the principal theme of Dental Development is set out with current work and future plans.

SECTION 5 – SIGNIFICANCE OF THE WORK: DETAIL OF EACH THEME AND PUBLISHED PAPERS

A) PRESENTATION OF EACH THEME

1. More detailed description of major contributions within the theme, with references to the relevant papers
2. Listing of all papers within the theme
3. Selected papers are incorporated to provide evidence of the major contributions noted. These are highlighted in bold.

B) PRESENTATION OF EACH THEME

Theme 1. Oro-facial Pathology in Children

Topics

A) Staphylococcal Cervico-facial lymphadenitis in children – References 1, 2 and 3

This condition presents as unilateral swelling involving tissues of the face and neck arising from the facial lymph node.

This work described the clinical features of the condition, which were not well defined, and also identified by phage-typing that the probable site of access of staphylococci to the lymphatic system was via the anterior nares.

Further it was found that by the prescription of an appropriate antibiotic, assuming that the infection was due to penicillin resistant staphylococci as was shown by surgical drainage in the initial patients, the need for a general anaesthetic and surgery could be avoided for subsequent child patients.

1 **Cervico-facial Suppurative Lymphadenitis Due to Staphylococcal Infection in Childhood.**
A. H. Brook and G. B. Winter
Br. J. Oral Surg. 1970, 8(3):257-263

2 Staphylococcal Cervico-facial Lymphadenitis in Children.
A. H. Brook and G. B. Winter
Lancet. 1972 Sep 23, 2(7778):660-1

3 Idiopathic Cervico-facial Infections in Children.
A. H. Brook and G. B. Winter
ASDC J. Dent. Child. 1976, 43:14

B) Acute Herpetic Gingivostomatitis in children – Reference 4

This condition has a variable presentation from a sub-clinical infection detected by later antibody titre to a serious condition requiring hospitalisation. The infection in its moderate and severe forms was not well recognised either by general medical or general dental practitioners. This study

reported the clinical features and treatment of 73 consecutive patients referred for specialist opinion.

The affected children presented as unwell and fractious, with bleeding from the gingivae and vesiculo-ulcerative lesions of the oral mucosa. As this is usually a self-limiting infection with the Herpes Simplex Hominis virus, the essentials of management emphasised general supportive care and pain relief. At the time of this work antiviral agents were at an early stage of clinical use. There is now some evidence that if used at an early stage of the infection they may reduce the prevalence of recurrent secondary infection e.g. herpes labialis and slightly reduce the length of the primary infection. General supportive measures, particularly maintaining hydration remain the important foundation of care.

This paper also provided a new diagram / model to explain the spread of the infection in the population.

4 **Acute Herpetic Gingivostomatitis in Children.**
A. H. Brook
J. Dent. Child. 1973, 40:12-18

C) Recurrent Parotitis – Reference 5

This uncommon condition presents as a unilateral facial swelling, which unlike viral parotitis (mumps) reoccurs. By studying a small series of cases together with the literature it was possible to highlight important differences for the management of the condition in children compared with the same condition in adults. In adults the episodes of swelling can often become increasingly frequent with progressive damage of the gland structure, sometimes requiring major surgery, such as a sub-total parotidectomy. On the basis of our cases and the literature search, I was able to suggest that if the child patients were treated energetically by appropriate conservative methods, the episodes in the child become less frequent and eventually the condition ceased, presumable with new growth of glandular tissue.

By culturing the exudates from Stenson's duct and testing the organisms for sensitivity it was shown that the parotitis was usually an ascending infection of oral micro-organisms. The responsible bacteria were similar in the recurring episodes for a given child and therefore this information could be used to determine the appropriate antibiotic to prescribe at the start of the next episode, so reducing the damage to the internal structure of the gland. Between episodes, salivary flow could be stimulated to reduce the chances of future infection by oral organism via the duct.

5 **Recurrent Parotitis in Childhood.**
A. H. Brook
Br. Dent. J. 1969, 127:271-275

The Kelsey Fry Prize in Oral Surgery was received for an essay based on the work in these three topics (A, B & C).

D) Regional Odontodysplasia – Reference 6

In this rare condition, a group of teeth, usually adjacent, have grossly abnormal enamel and dentine, while the remainder of the dentition is normally formed. The affected primary teeth have affected permanent successors.

This clinical and histological study supported the proposal that this condition may be due to the vascular abnormalities during development. It was also found that adjacent teeth, which appeared clinically normal, could show histological anomalies.

6 Regional Odontodysplasia: A Clinical and Histological Evaluation.
A. H. Brook, J. M. Fearne and D. M. Williams
J. Int. Assoc. Dent. Child. 1986, 17:21-25

E) Developmental Arrest of Permanent Tooth Germs following Pulpal Infection of Deciduous Teeth – Reference 7

While there can be a superficial clinical resemblance in the affected teeth to odontodysplasia, in this condition only permanent teeth are affected and there is a clear aetiology.

Developmental arrest, with gross anomalies of enamel and dentine, was shown in this paper to be the most severe of the spectrum of conditions in permanent teeth that can arise from untreated pulpal infections of deciduous predecessors.

This paper is important in reinforcing the need for treatment of deciduous teeth with extensive caries by demonstrating the possible pathological consequences on non-treatment. This remains an important consideration currently when some advocate leaving asymptomatic caries deciduous teeth untreated.

7 Developmental Arrest of Permanent Tooth Germs Following Pulpal Infection of Deciduous Teeth.
A. H. Brook and G. B. Winter
Brit. Dent. J. 1975, 139:9-11

Papers 6 and 7 provide a link between the themes of Oro-facial Pathology in Children and Normal and Abnormal Development of the Dentition.

F) Oral pathology of further uncommon or rare conditions in children - References 8, 9, 10, 11, 12

- Benign Cystic Lesions of the Jaws in Children
- General, Cranial and Oral Manifestations of Juvenile Hypothyroidism
- Haemophilic Pseudotumours
- Facial Clefts
- Carpenter's Syndrome

In each paper I contributed new information on the clinical presentation and management of the conditions.

8 The Occurrence of Benign Cystic Lesions of the Jaws in Children.
A. H. Brook. J. A. Osborne and G. B. Winter
Proc. Br. Paed. Soc. 1971, 1:16-19

9 Changes in General, Craniofacial and Dental Development in Juvenile Hypothyroidism.
R. Bedi and A. H. Brook
Br. Dent. J. 1984, 157:58-60

10 Haemophilic Pseudotumours of the Mandible: Report of a Case in a One Year Old Child.
A. H. Brook, R. Bedi and N. Ma
Br. J. Oral Surg. 1985, 23:47-52

11 Bilateral, Asymmetrical, Complete Oro-ocular Facial Cleft and Supernumerary Teeth in a Young Chinese Female.
A. H. Brook, D. O'Donnell and G. Ma
J. Dent Child. 1985, 52:191-194

12 Oral Findings in Carpenter Syndrome.
R. Blankenstein, A. H. Brook, R. N. Smith, D. Patrick and J. M. Russell
Int. J. Paed. Dent. 2001, 11:352-360