

Curriculum Vitae for Professor Hans Zoellner, BDS, PhD

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Personal Details

Date of Birth: January 26, 1960

Nationality: Australian

Education

Primary

- 1965-1971. Waverley Public School, Waverley (NSW, Australia)

Secondary

- 1972 Jan - Jun. 1973-1977. Vaucluse Boys High School, Vaucluse (NSW, Australia)
- 1972-1973. Hölty Gymnasium Wunstdorf, Wunstdorf (Niedersachsen, West Germany)

Tertiary

- 1978-1982. The University of Sydney (NSW, Australia),
- Graduating with Bachelor of Dental Surgery (BDS, Hon Cl II) 1983

Post Graduate

- 1986-1990. NH&MRC Scholar, Full time candidature towards Doctor of Philosophy, Thesis: "The Vascular Response in Chronic Periodontitis", Awarded 1991. The University of Sydney (NSW, Australia).
- 1995-2000. Part-time Junior Registrar in Anatomical Pathology, The Institute of Clinical Pathology and Medical Research, Westmead Hospital (NSW, Australia)

Post Doctoral

- 1990-1992. Further research training working with Dr J.A. Hamilton. Department of Medicine, The University of Melbourne (Victoria, Australia)
- 1993-1994 Awarded the Lise Meitner Post Doctoral Research Fellowship, working with Prof Dr B. Binder. Clinical Experimental Physiology. The University of Vienna (Vienna, Austria)

Sabbatical

- 2013 July - 2015 January. Visiting Investigator on sabbatical, working with Dr MAS Moore, Cell Biology, Memorial Sloan-Kettering Cancer Center (New York, USA)

Current Academic Affiliations

- Honorary Associate and Professor (Oral Pathology), the School of Biomedical Engineering, The University of Sydney
- Visiting Professorial Fellow, Graduate School of Biomedical Engineering, Faculty of Engineering, University of New South Wales

Current Position

- Director and Head of Strongarch Pty Ltd. A freelance academic company.

Contact Details

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Google Scholar : [H Zoellner G Scholar](#)

Professional Employment Record

Private Dental Practitioner

Dental Practice of Dr J Cummins, Practices in Fernleigh Rd, Sturt St, and Gurwood St, Wagga Wagga, NSW Australia

- 1983 - 1985: Full time private general dental practice including service as an Honorary Dental Officer at Wagga Wagga Base Hospital, and Visiting Dental Officer Calvary Hospital Wagga Wagga

Dental Practices of Dr M Walczak, Sydney CBD; and Dr G Spicer, Petersham, Bankstown and Lugarno, NSW Australia

- 1986 - 1989: Part time general and emergency dental practice

Dental Practice of Dr D Tracey, Melbourne CBD; and Brunswick St Medical Centre and Dental Surgery, Fitzroy, VIC Australia

- 1990 - 1992: Part time general and emergency dental practice

Post-Doctoral Laboratory Research Scientist

University of Melbourne, Faculty of Medicine, Dept of Medicine, Royal Melbourne Hospital, Parkville, VIC Australia

- 1990 - 1992: NHMRC Senior Research Officer working with Dr J Hamilton

University of Vienna, Clinical Experimental Physiology, Dept. of Medical Physiology, Vienna, Austria

- 1993 - 1994: Lise Meitner Postdoctoral Research Fellow and Senior Research Officer in the Laboratory of Prof B Binder

Junior Registrar in Anatomical and Oral Pathology

- 1995-2000: Part time service (2 to 2.5 days per week) in Anatomical Pathology at the Institute of Clinical Pathology and Medical Research, Westmead Hospital (NSW, Australia).

Institutional Academic Appointments

The University of Sydney, Department of Pathology, Faculty of Medicine, Camperdown, NSW Australia

- 1986-1989: Part time tutor in Pathology

The University of Melbourne, Faculty of Dentistry, Parkville, VIC, Australia

- 1992: Part time clinical tutor

The University of Vienna, Dept of Physiology, Vienna, Austria

- 1994: Part time tutor in Haematological Physiology

The University of Sydney, Discipline of Oral Pathology and Oral Medicine, Faculty of Dentistry (From 2018 School of Dentistry, Faculty of Medicine and Health), Westmead Centre for Oral Health, Westmead Hospital, NSW Australia

- 1995 - 1996: Full time lecturer
- 1997: Promotion to Senior Lecturer
- 2005: Promotion to Associate Professor and Head of Oral Pathology
- 2013: Promotion and Award of a Personal Chair in Oral Pathology
- 2019 – 2021: Head of the Combined Discipline of Oral Surgery, Medicine and Diagnostics

Memorial Sloan Kettering Cancer Centre, Department of Cell Biology, New York, USA

- 2013-2015: Visiting Investigator on sabbatical, working with Dr MAS Moore

The University of Sydney, School of Biomedical Engineering, Faculty of Engineering, Camperdown, NSW Australia

- 2020 - Present: Honorary Associate and Professor

The University of New South Wales, Graduate School of Biomedical Engineering, Faculty of Engineering, Kensington, NSW Australia

- 2021 - Present: Visiting Professorial Fellow

Freelance Academic Enterprise

Strongarch Pty Ltd, Pitt St Sydney, NSW Australia, ABN 39648756594

- 2021 - Present: Director and Head
- Strongarch Website: <https://www.strongarch.com>

Academic Values for Integrity

My academic values are for: rigour in expertise; collegiality; freedom of speech; robust intellectual discourse; freedom of academic research; commitment to advancing and promulgating knowledge; and truth in all academic works.

I have sought to serve the greater good beyond personal benefit. I strive for excellence, honesty and integrity, and seek to exercise the values of respect, kindness and empathy in all dealings.

Honours and Recognition

- Awarded a Full Dental NHMRC Scholarship to support PhD studies (1986-1989).
- Awarded the Lise Meitner Postdoctoral Research Fellowship for work in Vienna (1993-1994).
- Invitation to teach and examine Pathology for the Royal Australasian College of Dental Surgeons (2002, 2004-2014), as well as lead examiner in Pathology (2008-20013).
- Invitation to become a Fellow of the International College of Dentistry (2006).
- Invitation for a personal radio interview by Margaret Throsby (Mornings with Margaret Throsby), Australian Broadcasting Corporation, ABC Classic FM (2009).
- The Professor Roland Bryant Award for Excellence and Initiative in Teaching (2012).
- Award and promotion to a Personal Chair as Professor of Oral Pathology in the University of Sydney (2013).
- The Dr Jim Poyner Research Award for the highest ranked ADRF application in cancer research (2021).
- Invitation to serve as guest editor for the Special issue on 'Fibroblasts and Myofibroblasts' in *Biomolecules* (2021).
- Invitation to become a member of the International Scientific Research Honour society, Sigma Xi (2021).
- Invitation to serve as guest editor for the Special Issue on 'Autonomous Systems in Healthcare, Medicine and Robotic Surgery' in *Bioengineering* (2022).

Current Registration and Memberships

- Registered as a dentist by the Australian Health Practitioner Regulation Authority
- Member of the International Association for Dental Research
- Member of the Australian Dental Association
- Member of the Biophysical Society
- Member of Sigma Xi

Administrative and Professional Service

Analytical, Imaginative and Collegial Service

I apply to administration and service, the analytical and imaginative skills as well as a collaborative collegial approach, fostered throughout my research career. I subject issues to the same structural and where possible numerical analysis, that I apply to research questions and data. The imaginative creativity that is required to reconcile surprising or confounding data with previously established knowledge, is applied to solving problems in administration and service. By encouraging open collegial discussion, I am able to maximize the quality of analysis and service by leveraging the skills and expertise of colleagues.

The University of Sydney, Committees, Senior Administrative Roles and Discipline Leadership

Oral Pathology and Oral Medicine were only first established at the University of Sydney in 1992 by Prof DM Walker, and I played a key role in establishing and leading both teaching and research in these areas.

I have served on a wide range of committees and in senior administrative roles at both Faculty and University levels, including: Curriculum Committee; Learning and Teaching Committee; Research Committee; Dean's Advisory Committee; School Senior Leadership Group; Curriculum Review; Coordinator for Year 4 BDS; Sub-Dean for Year 2 BDent; Basic Sciences Coordinator for BOH; Academic Board and Head of Schools; DMD Admissions Coordinator; Deputy Chair MD & DMD Admissions Committee; and the Cancer Research Network. My principal chief recent institutional administrative role till 2021 was as Head of Oral Pathology, as well as Head of Oral Surgery, Medicine and Diagnostics from 2019 to

2021. I currently lead a team of engineers and dentists exploring dental robotics at the University of Sydney, Australian Centre for Field Robotics based at the University of Sydney.

Invited Review of Grants, Manuscripts and Theses

I have been invited to review: **Grants** for both National and International bodies (including NH&MRC; ADRF; National Cancer Council; National Heart Foundation; Heart Research UK; Austrian Science Fund (FWF); Australian Dental Research Fund); Canada Research Chairs Program **Manuscripts** for a wide range of International journals (including Acta Odontologica Scandinavica; Allergy & Immunology; Archives Oral Biology; Atherosclerosis Thrombosis & Vascular Biology; Biochemistry; BBRC; Biomolecules; Blood; Diabetes Research; Diabetologia; European Journal of Pharmacology; Inflammation Research; Journal of Oral Medicine and Oral Pathology; Journal of Pathology; Journal of Periodontology; Kidney International; Oral Surgery; Pathology; Pharmaceuticals; PLOS One; Redox Report); and **Theses** for a several universities (University of Adelaide; University of Queensland; University of Melbourne; University of Sydney; University of Western Sydney; Monash University; University of Otago).

Invitations to Present, Chair, Organize Scientific Meetings

I have been invited to organize, chair and or present at a number of meetings including for: Australian Society for Experimental Pathology (1996); The Australian and New Zealand Microcirculation Society (2003); The Australian Oral Health Alliance (2018); The University of Sydney College of Health Sciences Meeting (2000-2004); The Australian Vascular Biology Society (2006); International Microcirculation Society Meeting (2001); Harvard Society for Orthodontics (2003, 2005); Informa Health Policy Forums (2009, 2010, 2012, 2013); and the International Association for Dental Research Asia Pacific Region (2019).

Service For Associations and Organizations

Association for the Promotion of Oral Health (APOH)

Chairman and principal spokesman (2003-2013)

Australian Dental Research Foundation

Invited Member of the Research Advisory Committee (2009 - 2018)

Australian Oral Health Alliance

Invited member and presenter (2018)

Australian Research Council (ARC)

Invited member of the Excellence in Research Australia, Medical and Health Sciences Evaluation Committee (2018)

Australian Vascular Biology Society

Member of Executive Committee and Treasurer (2002 - 2006)

Council for the Ageing and Econotech

Requested briefing documents 'Proposal for determination of the economic impact of inadequate oral health services in Australia, and the effect of implementing an integrated Oral Health strategy (2006), and 'Outline of dental health in Australia, a briefing document prepared for Econotech Analysis' (2007).

NSW Council of Social Services

Member and advisor on dental health (2004 - 2013)

NSW Ministerial Taskforce for Oral Health

Member of the taskforce (2011)

Report to the NSW Department of Health

Invited report to the NSW Department of Health: 'Response to Functional Review' (2003)

Royal Australasian College of Dental Surgeons

Examiner and lecturer in Pathology (1998-2007), Principal examiner (2008 - 2013)

Westmead Hospital Scientific Advisory Committee

General Member (1999-2006, 2017-2018); Secretary (2001-2006); Chairman (2007-2009)

University of Sydney Association of Professors

Council Member (2022 to present)

Australian State and Federal Government Advisory Service

I have been invited to make representations to State and Federal parliamentary committees on dental health including: NSW Upper House Enquiry Into Dental Services (2005); Senate Committee on Community Affairs - Public Hearing; Dental Amendments Bill (2012); Federal National Oral Health Plan Committee and National Oral Health Promotion Planning Committee (2012). Further, I have been asked to present to the Tasmanian Parliament Legislative Council Inquiry into the Provisions of the University of Tasmania Act, as a representative of Public Universities Australia (2022).

I have also been asked to provide advice on dental health policy to State and Federal Parliamentarians in both Government and Opposition, at Representative and Ministerial levels (2003 - 2012).

Advice and Presentations to Australian Community Associations on Dental Health

I have been invited to present advice on dental health policy to a range of community stakeholders including: The Australian Council of Social Services (ACOSS); Combined Pensioners and Superannuants Association (CPSA); The Council for the Ageing (COTA); Econotech; Diabetes Australia; National Seniors; The Dental Board of Victoria; the Australian Health Insurance Industry Association; the Australian Dental industry Association; and The Australian Oral Health Coalition. I was also asked to prepare a detailed proposal for a public private partnership between Dr J Hannah and NSW Health, as well as with the Commonwealth Government for a dental clinic in the Campbelltown Private Hospital.

Advice to the Print and Electronic Media (Dental Health, Cancer Research)

Since 2003, I have been frequently interviewed for advice on both dental health and dental health policy, as well as occasionally on scientific issues by National and International print media (including: SMH; The Australian; The Age; The Advocate; Dental Tribune International); online media (Brisbane Times; WA Today; Metro Krant; Zita; New Atlas; Scientias; Impact Lab); as well as radio and television (including ABC; 2GB; 2UE; and Channels 7,9,10).

Leadership Experience

A Diversity of Leadership Experience

As outlined elsewhere in this document, I have held a range of leadership roles in university, hospital and advocacy settings. These have provided a rich experience to build my skills in leading: academics; students; research colleagues; clinicians; administrators; people from industry; people from government and non-governmental organisations; and representatives from community groups.

Personal and Professional Values I Project to Inspire My Teams

My consistent projection of core academic values inspires trust and confidence in my leadership, as well as commitment to a shared vision.

Important amongst my values is service to a greater good, beyond personal benefit. Central to any vision I share, is the pursuit of excellence with commitment to honesty and integrity. And finally, the values of respect, kindness and empathy, guide all dealings in manner and ambition.

My Approach of Active Collegiality To Maximise the Benefit of Human Capital

I bring the analytical data driven skills developed through my research, to analysis and decision making elsewhere. The creativity I exercise generating research hypotheses and interpreting data, is applied to find solutions to complex problems.

Whilst demonstrating clarity of purpose and decisiveness of action, I do seek to inform priorities and decisions as best possible, 'expanding the data set' by considering a diversity of viewpoints.

I respect the expertise and experience of those I lead. I embrace collegiality and encourage robust exploration of issues through open discussion of diverse viewpoints and creative dialogue. I listen and try to understand the perspectives of those I seek to bring along. The process of sharing and exchanging views, improves my understanding, and also engages others with my own thoughts. I make note of strong arguments and important points that others raise, and take care to weave these into a coherent, informed and defensible platform. This is similar to my practice in laboratory research, of working to reconcile diverse and sometimes conflicting observations, to come to final conclusions.

This analytical and transparent approach, permits all to understand the reasoning behind decisions made, and also to see their own contributions in the process. I believe that my collegial approach: makes for better decisions; generates a sense

of community and commitment to the shared vision; and supports confidence in my leadership and the team's communal capacity.

Importantly, the emotional and conceptual ownership this establishes throughout the team, is valuable for ultimate implementation by the group of any decisions made, including the effectiveness of delegation.

Building a Culture of Support and Community: 'We are all here to do something great together'

I demonstrate personal commitment to the team and group outcomes, and show empathy and concern to support the well-being and careers of team colleagues.

Those who work with me, know that I recognise and am grateful for their diverse contributions, and that I will support their efforts to fulfil their ambitions. I foster an atmosphere of creativity, nurturing and encouragement.

I take care that colleagues who I lead, see that I treat their successes as my own, and that I celebrate their achievements as achievements for us all. My teams know that I share responsibility for success, and that I similarly accept responsibility for any difficulties that may arise.

I project enthusiasm in a way that permeates the group. People in teams I lead, are given autonomy tailored to ability, and enjoy the atmosphere of creativity and mission that I actively encourage. My leadership 'touch' is light, but effective.

I create a sense that *'we are all here to do something great together'*.

Diversity and Inclusion Are Active Elements in My Leadership Approach

Because I embrace diversity of viewpoint as a key element of my leadership strategy, my leadership benefits from diversity and inclusion. I am personally committed to supporting diversity and inclusion in the workplace, not only because it is socially and morally responsible, but also because this improves the quality and outcomes of my leadership.

Active Contribution Within Teams Led by Others

I believe that good leadership requires capacity to work constructively in teams led by others, and I have a record of good service within teams across many different settings. These are briefly outlined elsewhere in this document.

I am an active participant in any team that I join, and I contribute to work and discussion wherever possible.

My voice is often influential during meetings, and has at times swayed opinion of the group. Nonetheless, I always strive to support whatever ultimate decision may be made, regardless if it is in accordance with my suggestions or not.

I accept the leadership of others, and see that others accept my leadership when I have that role.

Some Examples of Positive Leadership Outcomes

I achieve remarkable leadership outcomes with limited resources, on strength of my leadership qualities, political sense and judgement.

Establishment of a Think-Tank and Advocacy Group: The Association for the Promotion of Oral Health

As a dental academic, I recognised responsibility to work towards improvement of Australian Oral Health. To that end, I led establishment and operation of a think-tank and advocacy group, the Association for the Promotion of Oral Health (APOH). This grew from an initial Strategic Group of eight, to a Council of thirty five representatives from a wide range of professional and community stake-holders, that was supported by a general membership of over three hundred.

Under my leadership, APOH became highly influential in public and political discourse, driving for example an Upper House Enquiry in the State of NSW, and other important initiatives some of which are outlined below.

Raising Dentistry to be an Election Issue

I played an important role elevating Dentistry to a State and National election issue in Australia (2006-7; 2010). This was through my leadership as Chairman of APOH, as outlined immediately above. The campaign for this commenced in 2003 on establishment of APOH. Within three years, that ambition was achieved. My key role was articulated by the media at an early stage of the electoral cycle (Life Matters, Radio National; Australian Broadcasting Commission, 19th Dec 2006).

A National Dental Medicare Scheme That Treated One Million Australians

I played a central role as Chairman of APOH in instigation and defence of a trial of dentistry in the Australian Medicare system that ran from 2007 to 2011. This was for people with chronic systemic diseases who had medical need of dental treatment, and delivered comprehensive care for one million Australians at a four year cost of \$2B.

The scheme resulted from an APOH media and political campaign that I led, and that brought the Federal Government to discussion and action. Collaborating stakeholders who contributed to the campaign, included elements of the NSW State Government; the NSW ADA; NCOSS and other community groups. I described need for the scheme and requirement for political activism, in articles published in 2006 and 2007 (Publications 43 and 50 respectively in this CV).

Policy and Operational Changes in Oral Health

APOH played a similarly significant role advocating for and achieving a range of policy and operational changes including: increased salaries for NSW Government Oral Health Professionals to increase retention in the public workforce; establishment of a trial dental intern program; expansion of scope of practice for oral health therapists; and compulsory continuing education for dental health professionals.

Development of the Discipline of Oral Pathology at the University of Sydney

The Discipline of Oral Pathology was only first established in the University of Sydney in 1992 by my predecessor, Prof DM Walker. I joined him in 1995 and played a major role establishing a successful and sustainable Discipline with an active research laboratory and program. Office, laboratory and student space, as well as Discipline staffing were developed through negotiation with a web of stake-holders including: my then employer the Sydney Dental School; The Westmead Centre for Oral Health; The Institute for Clinical Pathology and Medical Research; and Westmead Hospital.

Negotiation for Key Strategic Appointments, and Leadership to Beneficial Outcomes

Clinical Conjoint Appointments: I negotiated and established valuable strategic clinical conjoint appointments with the University Faculty; Institute of Clinical Pathology and Medical Research; and Westmead Centre for Oral Health. This was for appointments with shared responsibility for clinical service and teaching in the separate areas of clinical Oral Pathology, and clinical Oral Medicine. These appointments were highly successful, and strongly supported both clinical service and academic outcomes. One outcome, is sustained clinical Oral Pathology service in the State of New South Wales, that would otherwise not exist.

Successful Mentorship for Post-Doctoral and Discipline Research Success: I give one specific example of how I advance both the needs of the organisation, and the staff I lead. To increase quality research output in a self-sustaining manner in my Discipline, I negotiated for the strategic appointment of a junior post-doctoral scientist in a position designed to mentor and grow the successful applicant.

The strategy was to first make careful selection of an outstanding but very junior person at minimal cost to the School, and to and nurture their skills and provide opportunity for rapid growth and advancement, such that the position would be self-funding within three years. This was achieved by the appointee Dr Belal Chami, under my leadership and with my mentorship. He now has major external funding and is in process of establishing a patent position to cover a valuable diagnostic test for inflammatory bowel disease, that was developed with my support.

Teaching Experience

Undergraduate and Graduate Level

Teaching and Examination

I have taught dental and medical students across a range of disciplines, including haematological physiology (Vienna, 1994), and clinical dental student supervision (Melbourne, 1993), but have mostly taught in Basic, General and Oral Pathology (Sydney, 1986-1988, 1995 to 2021). Teaching formats have included: lectures; tutorials; problem based learning; case-based learning; and web-based student exercises and microscopy. Examination formats have included: written essays; short answers; multiple choice; and viva voce (1986 - 2021).

Curriculum Design

I have designed curricula for Pathology and Integrated Basic Sciences, both independently within discipline as well as in committee in either Member or Chairman roles (1996-2012). I have also had responsibility for implementation of curricula. I played a leading role in development of the integrated Basic Sciences curriculum for BDent, introducing a number of innovations including 'Dental Relevance Material' for problem based learning cases, and Clinico-Pathological Enquiry Learning Sessions.

Course Coordination

I have designed and coordinated courses in Oral Pathology in BDS, BDent, DMD and BOH courses. I similarly designed and coordinated the Basic Sciences curriculum for BOH (2011-2013). I recently coordinated the integrated course for Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, Special Needs Dentistry, and Conscious Sedation / Medical Emergency for DMD3 and DMD4 students (2017-2020).

Course Accreditation

I have collaborated with colleagues to prepare documents, and participated in representative School panels to achieve and renew accreditation for BDent, DMD, BOH, MDSc and DClintDent courses. I have similarly served as a School representative to Committees reviewing the School.

Post-Graduate and Continuing Education Level

Guest Lectures

I have delivered occasional guest lectures for post-graduate continuing education courses for the University of Sydney (1996-current time), as well as in MDSc, DClintDent clinical and coursework curricula (1996-current time). I have also been invited to deliver guest lectures for a range of professional associations including: the Haemostasis and Thrombosis Society (1991); Royal Australasian College of Pathologists (1996); Dental Assistants Association (2007); Australian Dental Association Tasmania (2008); Australian Society for Periodontology (2009); Centres for Excellence in Integrated Primary Care Conference (2011); Australian Dental Prosthetists Association (2012); Public Health Association of Australia (2012); and the Australian Asian Association of Dentists (2019).

I have served as a lecturer and examiner in Pathology for The Royal Australasian College of Dental Surgeons (2002, 2004-2013), and held responsibility as Lead Examiner in Pathology from 2008 to 2013.

Research Students

Supervision of research students enrolled for: BSc Honours (7 students, 1991-2021); MSc Dent (1 student, 1995-1998); PhD (15 students, 1997-2021); MDSc/DClintDent (13 students, 1995-2019). Two honours students were awarded the University medal.

The Relationship Between Teaching and Research

Research informs my teaching, and I find that teaching offers stimulus for research.

Innovation in Teaching

I have developed a novel teaching tool 'Clinico-Pathological Enquiry Based Learning Sessions' (CPEBLS), that uses blended learning modalities to help students to develop a highly structured understanding of disease processes based on first principles, and to also establish a grasp of the link between clinical presentation at the macroscopic level that patients present at, and the microscopic and molecular levels at which disease processes are understood. The CPEBLS strategy can now be adapted to courses targeted to the needs of students in areas other than Oral Pathology.

I have separately developed a computer simulation of the career exposure to diseases ranging in prevalence from the very common to the vanishingly rare, of individual clinicians and the entirety of a graduated student cohort. Based on that computer simulation, I have constructed and delivered a class for first year dental students, in which in-class on-line real-time surveys are combined with in-class real-time computer simulation, to increase student interest in learning about rare diseases. This novel approach is now published in BMC Medical Education, and is available at [this link](#).

Research Experience

Main Direction of Research

Early Work

An early and ongoing interest has been in the common dental problems of chronic inflammation and wound healing, and particularly the vasculature in these processes. PhD and later collaborative studies on the histopathology of chronic inflammatory periodontitis characterized vascular changes as well as other features seemingly important for disease progression.^{1-5,14,15,17,23,30}

Two Main Biological Questions have Driven Most of My Research

Significant vascular remodeling in periodontitis,^{5,30} together with recognition of an endothelial synthetic phenotype in periodontal high endothelial-like venules,² led to two separate broad but related biological questions, being: 1 - the feedback relationship between functional demand and structural change in tissue remodeling; and 2 - the synthetic capacity of vascular cells in inflammation. Most of my work has addressed one or the other of these two main questions.

Relating directly to tissue remodeling are studies on: endothelial apoptosis;^{18,19,20-22,25-27,29,37,38,45,51,55, 58,66} wound healing;^{24,28,33,41,52,56,58,61,62} bone remodeling and tooth eruption;^{64,67,79, 81} orthodontic tooth movement;^{35,47} oral submucous fibrosis;^{54,57,72,74,76} and tenon's fibroblast proliferation and migration as it relates to fibrosis post-glaucoma surgery.^{39,48,70,71,77}

Relating to inflammatory synthetic capacity of endothelium are studies on vascular cytokine synthesis,^{7,8,11,51,74} and vascular fibrinolysis.^{6,9,10,12,13,16,20}

Main Current Work in Biology - Cell Projection Pumping as a Novel Aspect of Cancer Biology

Emerging from work on tissue remodeling, as well as personal observations in my role as a junior anatomical pathology registrar in the late 1990's, was the question of why despite widely accepted tumour angiogenesis, the vasculature of malignant neoplasms I encountered whilst dissecting cancers for histopathology, was usually rarefied compared with the adjacent normal tissue replaced by the invading malignancy. The two seemed entirely contradictory to me. With an interest in endothelial apoptosis, I performed studies demonstrating that malignant cells induce endothelial apoptosis in a contact dependent manner, thus accounting for the apparent contradiction,³¹ and this was supported in near simultaneous publications by others.

Expecting to find similar malignant cell induced apoptosis of fibroblasts as a mechanism in tissue invasion, I was surprised to discover instead, exchange of membrane and cytoplasm between malignant and stromal cells.^{65,68,73} After many years of effort, we elucidated the biomechanics of a previously unknown mechanism that could account for this exchange, including an apparent role for cell stiffness in determining principal directionality of transfer.^{75, 83} We proposed the term 'cell-projection pumping' to describe this mechanism,⁸³ and much recent work is focused on exploring the significance of cell-projection pumping in malignant cell biology, particularly with regard to cancer cell morphology, cytokine synthesis, proliferation, migration and evasion of both chemotherapy and the immune system.^{65, 73, 82, 90, 91}

Dental Robotics - A New Initiative Driven by Community Needs and Technological Opportunity

Governments and insurance companies intermittently lament the manner in which health costs grow beyond potential capacity of the system. I believe the solution lies in embracing artificial intelligence, machine learning and autonomous robotics. I also believe that dentistry plays a central role in this process, as a 'sand-box' for autonomous surgical robotics.^{IP-2}

Having a dental background, and also having established collaborations with the Faculty of Engineering, I have built a collaborative team towards development of dental robotics. I am the convener and leader of this team, which is comprised of academics from within the Dental School and separate Engineering Faculty of the University of Sydney (Australian Centre for Field Robotics), and see this work as a natural although surprising extension of my long-standing interests in biomechanics related to tissue remodelling, and health equity as outlined below.

Separate Research Contributions

Separate Research Contributions Related to My Broader Academic Role

Much of my career has been in context of having mixed academic responsibilities in a small dental faculty, albeit the largest and oldest in Australia. As the sole 'basic scientist' appointed for most of my tenure, I was both duty bound and interested to support colleagues in developing their scientific interests, and so became involved with highly divergent collaborative work on: tooth structure and dental caries;^{32,59,78} oral pre-cancer;⁸⁰ epithelial-mesenchymal transformation in cancer;⁸⁸ cryptococcosis;³⁴ cytokine and receptor biology;^{36,42} single-cell tracking analysis;^{84, 88, 84} trace element analysis;^{44, 92} bio-materials science;^{69, 85, 92} clinical case reports^{40,46}, and the COVID-19 pandemic.⁸⁷

Public Health Research and Non-Research Contributions

Accepting responsibility as a dental academic to advocate for improved oral health, I also contributed to: informing the community and wider health professions of the medical impact of dental disease;^{43,49,53,60} public health research;⁶³ and advocating for improved oral health services.^{50, NP1-8, PH1-24}

Invited Seminars and Lectures

I have been invited to present original research as well as to provide further separate lectures on scientific topics, oral disease and oral health policy by National and International institutions including: Dept. Rheum. Royal North Shore Hosp., Dept. Dermatol. Uni. Syd.; Dept. Med. Uni. Melb.; Haemost. & Thromb. Soc.; Aust. Inst. Lab. Sci.; Dept. Haematol. Uni. Melb.; Royal Melb. Hosp.; Dept. Pathol. Vanderbilt Uni.; Dept. Exp. Physiol. Uni. Vienna; Inst. Dent. Res. Syd.; RCPA; Delta Biotech. UK; Dept. Infect. Dis. Westmead Hosp.; Dept. Surg. Westmead Hosp.; World Congress Microcirc 2001; RACDS; Kolling Inst.; Bernard O'Brien Inst. Microsurg. Melb.; Dept. Pharmacol. Uni. Syd.; Dept. Med. Weill Cornell Uni.; Dept. Pathol. Uni. Syd.; Dept. Pathol. UNSW; Diabetes Aust. Conven. 2005; H&N Cancer Inst.; NCOSS Ann. Conf. 2006; Dept. Surg. Westmead Hosp.; Dental Assis. Assoc.; Aust. Dent. Indust. Assoc.; Aust. Prosth. Soc.; Memorial Sloan-Kettering Can. Cent NYC; Kids Research Institute Westmead; Children's Medical Research Institute Westmead; Dept of Pharmacology University of Sydney; Australian Asian Association of Dentists.

Original Research Contributions of Note

- Independence of the high endothelial venule phenotype from lymphocyte emigration,² and expansion of the vasculature in human chronic inflammation.^{5,30}
- Presence of vascular basement membrane derived hyaline material in periodontal disease, potentially contributing to burst progression in periodontitis.^{1,4,30}
- Accumulation of immunoglobulin derived amyloid in chronic periodontitis.^{14,15}
- Regulated synthesis of G-CSF and GM-CSF by human vascular smooth muscle cells.^{7,8}
- Anti-embolic canalicular fragmentation, and maintained anti-thrombotic fibrinolytic and platelet anti-aggregatory activity during endothelial apoptosis.^{18,20,25,29,37}
- Anti-apoptotic activity of serum albumin for endothelium, mediated by G-protein coupled endothelial receptor binding of a cryptic albumin protein domain, exposed by either intra-molecular movement or fragmentation of albumin.^{19,21,22,26,38,55,58}
- Adipogenic wound healing in mice as an alternative to healing with scar formation.^{24,28,33}
- Endothelial cell apoptosis induced by malignant tumour cells in a contact dependent manner.³¹
- An effective physiotherapeutic method for management of trismus in oral submucous fibrosis.⁵⁴
- New models for tooth eruption and cyst expansion in which bone remodelling is mediated by strain sensing by soft-tissues closely applied to relevant bony surfaces.^{51,64,67,81}
- Cell-Projection Pumping as a novel mechanism for exchange of cytoplasm between mammalian cells that plays an important role in tumour cell diversity.^{65, 83}
- Tumour cell diversity due to cell-projection pumping from fibroblasts into cancer cells, independent of genetic change.^{65, 68,73, 82, 90, 91}

Innovation in Development of New Scientific and Analytical Methods, and Creativity Interpreting Observations and Make Discoveries

Throughout my research career, I have addressed challenging laboratory problems by significantly adapting or innovating new methods.^{3, 15, 18, 19, 21, 25, 26, 28, 37, 38, 41, 45, 47, 55, 56, 58, 65, 75, 79, 82, 83, 89, 90, 91, 92}

I have similarly developed novel analytical approaches to illuminate otherwise obscured observations.^{3, 19, 21, 26, 37, 58, 63, 65, 67, 75, 81, 83, 89, 90, 91, 92}

Where observations have been reproducible but nonetheless inconsistent with expectations from the established literature, I have demonstrated creativity and imagination developing new scientific models that have not only reconciled new with past observations, but also significantly advanced understanding.^{2, 4, 18, 19, 25, 30, 37, 38, 45, 55, 58, 65, 67, 81, 83}

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90. Mahadevan S, Cornwell JA, Chami B, Kelly E, **Zoellner H**. Cell-projection pumping of fibroblast contents into osteosarcoma SAOS-2 cells correlates with increased SAOS-2 proliferation and migration, as well as altered morphology. *Biomolecules*. 2021. 11:1875 (21 Pages). <https://doi.org/10.3390/biom11121875> PMID 34944519
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Submitted Papers

- S-2. **Zoellner H**, Goktogan A, Deaker E, Martin E, Howse D, Hooi K, McEwen A, Brooker G. A roadmap for dental robotics that lowers risk barriers for autonomous robotic surgery to improve health economics and equity.
- S-3. Ullah M, Irshad M, Yaccoub A, Carter E, Thorpe A, **Zoellner H**, Cox S. Life threatening dental infection is a major public health problem in Australia for which there is a paucity of systematic data.

In Preparation

- IP-1. There are differences in coherent cell shape change between fibroblasts and SAOS-2 osteosarcoma cells, and these are affected by TNF- α . Gondalwala F, Mahadevan S, Kelly E, **Zoellner H**.
- IP-2. Cell-projection pumping: a new cancer target? **Zoellner H**, Moore MAS.

Guest Editor

Biomolecules - Special Issue on the Biology of Fibroblasts and Myofibroblasts - 2021

https://www.mdpi.com/journal/biomolecules/special_issues/fibroblasts_myofibroblasts.

Bioengineering - Special Issue on Autonomous systems in healthcare, Medicine and Robotic Surgery - 2022

https://www.mdpi.com/journal/bioengineering/special_issues/155H215Q13

Invited Newspaper and Magazine Articles (Separate to Interviews)

NP-1. **Zoellner H.** Dental Medicare uptake now up to the profession. *Medical Observer* - 24 Oct, 2008:22.

NP-2. **Zoellner H.** Dental care in Australia. Opinion piece requested by the *International Dental Tribune*, April. 2009. Page 4

NP-3. **Zoellner H.** Dental Medicare a bridge too far. Opinion piece requested by *The Australian*, Health Weekend Professional Section, July 18-19, 2009. Page 13.

NP-4. **Zoellner H.** Does dentistry need reform or just inclusion in the health system? *Radius Sydney Medical School Magazine*. Dec 2009. Page 13

NP-5. **Zoellner H.** Dental equity by 2020. *Sydney's Child*. Sep 2010. Pages 26-28.

NP-6. **Zoellner H.** The Question: Should dentistry be covered by Medicare? Opinion piece requested by the *Sydney Morning Herald*, News Review Section. October 8-9, 2011. Page 12.

NP-7. **Zoellner H.** How to make public dentistry work. *Health Voices: Journal of the Consumers Health Forum Australia*. 10 Issue May, 2012. Pages 18-19.

NP-8. **Zoellner H.** A lesson in Spin. Invited Editorial. *Australian Doctor*. 3 September, 2012.

NP-9. **Zoellner H.** John Gibbins; Inspiring researcher and educator. *Sydney Morning Herald*, 30th May, 2013, [Link](#).

NP-10. **Zoellner H.** Catherine Groenlund; Generosity of spirit. *NSW Dentist*, July 2017, Page 31

NP-11. **Zoellner H.** Evelyn Howe, psychologist made dental visit less painful. *Sydney Morning Herald*, 10th October 2017, [Link](#).

Book of Lecture Notes

B-1. **Zoellner H, Kumar R.** Royal Australasian College of Dental Surgeons Primary Orientation Course Lecture notes in pathology. Published by the Royal Australasian College of Dental Surgeons. ISBN: 0 957 71265 0, 2009, Edition Updated Each Year to 2011. 1-80.

Public Health Policy Reports

As Chairman of the Association for the Promotion of Oral Health (APOH), I have had primary responsibility for the preparation of the following health policy documents

Discussion Documents:

PH-1. APOH. Achievements, challenges and opportunities for improvement for oral health. August 2004. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health*; Sydney: 2004. 1-22.

PH-2. APOH. The national oral health plan: Proposals for implementation. June 2005. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health*: 2005. 1-26.

PH-3. APOH. Dental education in Australia: Unique opportunities for the University of Sydney. Prepared for the advice of Prof M Spence, Vice Chancellor elect of the University of Sydney. 15 May 2008. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health*: 2008. 1-36.

Invited and Commissioned Costings and Briefing Notes for Government, Private Industry, and Health Stakeholders:

- PH-4. APOH. Ten-point plan for improved oral health in NSW - Final draft costing requested by the Health Minister The Hon. Morris Iemma. 15 April 2005. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2004.* 1-65.
- PH-5. APOH. Review of the NSW oral health for fee service scheme and discussion of the possible introduction of co-payments. 31 January 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2006.* 1-4.
- PH-6. APOH. Proposal for determination of the economic impact of inadequate oral health services in Australia, as well as for the effect of implementing an integrated oral health strategy - Prepared for COTA for Econotech economic modelling. 4 May 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2006.* 1-12.
- PH-7. APOH. Pilot project proposal: Public-private partnership dental clinic in the Campbelltown private hospital between the Federal Government and Dr J Hanna. November 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2006.* 1-24.
- PH-8. APOH. Analysis of dental faculty infrastructure requirements: Report requested by the Chief Financial Officer Mr B Kotic and the Pro-Vice Chancellor for Infrastructure Prof A Brewer- The University of Sydney. 18 September 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2006.* 1-6.
- PH-9. APOH. Outline of dental health in Australia. A briefing document prepared for Econotech analysis. July 2007. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2007.* 1-22.
- PH-10. APOH. Suggestions to the Dental Practice Board of Victoria national standards in dentistry project. February 2009. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2009.* 1-24.

Briefing Notes for the Advice of Federal Parliamentarians

- PH-11. APOH. Challenges and strategies for dental training and services in Australia. Prepared for the advice of the Federal Minister for Health and Ageing The Hon. T Abbott and the Federal Minister for Education Science and Training the Hon. J Bishop. May 2007. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2007.* 1-169.
- PH-12. APOH. Challenges and strategies for dental training and services in Australia. Prepared for the advice of the Deputy Prime Minister and Minister for Education, Science and Training, The Hon J Gillard and the Federal Minister for Health and Ageing, The Hon. N Roxon. March 2008. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2008.* 1-174.
- PH-13. APOH. Dental Medicare briefing note prepared for Mr P Dutton, Federal Shadow Minister for Health and Ageing, 20 June. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2009.* 1-6.
- PH-14. APOH. Recommendations for dental policy. Prepared for the advice of the Federal leader of the opposition The Hon M Turnbull and the Shadow Minister for Health and Ageing Mr P Dutton. September 2009. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2009.* 1-15.
- PH-15. APOH. Dental election briefing note July 2010. Prepared for the advice of political parties in the Federal election. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2010.* 1-10.

Submissions to Government Inquiries and Commissions

- PH-16. APOH. Submission to the inquiry into dental services by the NSW legislative council standing committee on social issues. 11 May 2009. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2005.* 1-57. - ALSO - Presentation as an expert witness to the Public Hearing of the Committee
- PH-17. APOH. Supplementary submission to the upper house inquiry into dental services in NSW by the standing committee on social issues Legislative Council, NSW parliament, 2005-2006 - Analysis of the public hearings and submissions. 25 February 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2006.* 1-142.
- PH-18. APOH. Submission to the National Health and Hospitals Reform Commission - Challenges and strategies for dental services and training in Australia. May 2008. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2008.* 1-164.
- PH-19. APOH. Response to the interim report of the National Health and Hospitals Reform Commission 'A healthier future for all Australians'. March 2009. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health: 2009.* 1-22.
- PH-20. **Zoellner H.** One page summary of the relationship between oral infection and chronic disease. Literature reviewing current knowledge. A collection of literature reviews requested by the NSW Agency for Clinical Innovation, NSW Health. January 2011. 1-84.

PH-21. **Zoellner H.** Submission to the Federal Senate Community Affairs Committee, regarding the Dental Benefits Amendment Bill 2012. October 2012. 1-2.

PH-22. **Zoellner H.** Submission supporting the public hearing testimony by A/Prof Zoellner on the 23rd October 2012, To the Senate Standing Committee on Community Affairs Inquiry into the Dental Benefits Amendment Bill 2012. October 2012, 1-18. ALSO - Presentation as an expert witness to the Public Hearing of the Committee

PH-26. **Zoellner H.** Submission to the Tasmanian Parliament Legislative Council Inquiry into the Provisions of the University of Tasmania Act, as a representative of Public Universities Australia, regarding the importance of enshrining academic values in university administrative process. October 2022 1-3.

Reports on APOH Forums

PH-23. APOH. Report on a public forum held "Supporting the national oral health plan: APOH's proposals discussed" - 1 July 2005, Kerry Packer Auditorium, Royal Prince Alfred Hospital Sydney. July 2005. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health*: 2005. 1-10.

PH-24. APOH. Report of APOH Forum: Internships - What should they be like? 4 October 2006, Lecture Theatre 3, Westmead Hospital, Sydney. 4 October 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health*: 2006. 1-5.

PH-25. APOH. Report on the APOH Forum: Dental teams: How should they work? 7th November 2006, Mercure Hotel, Railway Square, Sydney. 7 November 2006. Editor: **Zoellner H.** *The Association for the Promotion of Oral Health*: 2006. 1-5.

Major Internal Working Papers and Reports

IWP-1) **Zoellner H.** Report requested by Pro-Vice Chancellor D Nutbeam on financial difficulties in Oral Pathology and Oral Medicine, including the Cellular and Molecular Pathology Research Unit. 28 April 2004. 1-18.

IWP-2) **Zoellner H.** Suggestions for improved Faculty finances and research productivity: Request for NSW Health to cover public patient treatment costs. Submission to the Extraordinary Meeting of the Learning and Teaching Committee. October 2008. 1-4.

IWP-3) Working Group 3 (Basic and Medical Sciences) BDent Curriculum Review. Chairman **Zoellner H.** Recommendations to of Working Group 3 for the curriculum review 7 April 2009 Meeting. Basic and Medical Sciences – Life Sciences and Human Biology. April 2009. 1-20.

IWP-4) **Zoellner H.** A detailed timetable for a new BDent curriculum integrating basic and medical sciences with dental clinical studies: Confirmation of physical capacity and financial viability (saving of \$1.7M per year). 1-75. Presented to an Extraordinary Meeting of the Learning and Teaching Committee, 15th July 2009

IWP-5) **Zoellner H.** Dental Internships. A document requested by the Dean of Dentistry. October 2010. 1-7.

IWP-6) **Zoellner H.** Analysis of DMD, BDent and BOH teaching workload from the 2012 timetable. An analysis requested by the Dean of Dentistry. April 2013. 1-22.

IWP-7) Spallek H, **Zoellner H.** Final change proposal and final implementation plan, Discipline Restructure Sydney Dental School, Faculty of Medicine and Health. July 2018. 1-16.

Publication Metrics

There are 136 published documents in total comprising:

- 92 scientific and professional articles
- 1 book of pathology lecture notes for the Royal Australasian College of Dental Surgeons.
- 25 APOH public health documents
- 11 invited opinion pieces as newspaper or magazine articles
- 7 major internal working papers and reports for the University of Sydney
- Of 92 scientific and professional articles
 - 25 (27.2%) are First – Principal Author papers
 - 36 (39.1%) are Last – Senior Author papers
 - 31 (33.7%) are Middle – Collaborative Supporting Author papers

[Citation data from Google Scholar](#)
(September 2022)

	All	Since 2017
Citations	3,101	1038
h-index	30	16
i10 index	58	25