

Dental Research — Not Just for Dentists Anymore

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The profession of dentistry has a long legacy of research. One of the earliest and most dramatic examples of this tradition relates to the use of fluorides to prevent dental caries. Indeed, research on fluorides led to the development of one of the most successful public health programs in history. Dental faculties have been at the centre of some of the most advanced and progressive research in a wide array of clinical and biological fields, including the cell biology of basic connective tissue, infectious diseases, neurophysiology of pain, behavioural sciences as they relate to pain and the delivery of treatment, materials sciences, biomaterials and clinical epidemiology, to name only a few. Given the existing breadth of research undertaken by investigators in our profession, my question is why we continue to categorize it as strictly “dental research.” Even though research pertaining to dental restorative materials is obviously a “dental” concern, in that it relates directly to the restoration of decayed or broken-down teeth, the importance of this type of research to general health cannot be overstated. Moreover, I do not recall any recent discoveries suggesting that teeth are not part of the human body, and surely restoration of teeth is important not only for a person’s health (in terms of obtaining adequate nutrition as just one example) but also for the prevention of pain and suffering, important goals in and of themselves.

Yet the term “dental research” reflects a somewhat provincial and rather narrowly defined attitude toward our collective research endeavours. Such an attitude sends a message not only to the members of our own profession but also to others in disparate areas of biomedical research: that the research done in our field applies only to dental diseases and issues. Indeed, a highly placed official at the Canadian Institutes for Health Research mused recently to one of my colleagues, and I am paraphrasing here, that he did not understand what craniofacial developmental biology had to do with dentistry. This rather surprising (perhaps “outrageous” would be a better term) statement from a suppos-

edly informed individual speaks volumes, sounding an alarm that we should all heed. We must recognize and emphasize to students and colleagues alike that dental research does not exist as an entity unto itself but is part of the biological or biomedical research continuum.

Witness the ever-increasing links between the 2 solitudes of “dental” and “medical” research as discussed in this issue of *JCDA*. A growing body of evidence suggests that there may be important associations between dentoalveolar and systemic diseases. For example, some research suggests that maternal periodontitis may lead to preterm delivery and low birth weight. Similar links between periodontitis and cardiovascular disease have been hypothesized and are now being investigated exhaustively, as has been done for the putative (now fairly certain) 2-way links between dentoalveolar diseases such as periodontitis and diabetes mellitus. But do dentoalveolar diseases constitute true risk factors, or are they only risk indicators for these systemic ailments? This distinction remains to be determined and is in fact becoming a central focus of research in dental and medical faculties throughout the world. Research pertaining to endosseous implants has produced novel approaches to the development of bioprostheses for any number of osseous body parts. On another front, research about orofacial pain has yielded important insights regarding possible underlying mechanisms that may mediate chronic somatic pain. From these examples, it is clear that so-called dental research should be considered in broader terms, given its interfaces with other branches of biomedical research; hence, the term “interfacial research.”

Indeed, not only is research in dental faculties crossing the traditional boundaries between dentistry and medicine, but it is now breaking those boundaries down, as evidenced by the following partial list of exciting areas of collaborative or interfacial research. New investigations pertaining to the prevention or attenuation of myocardial damage following infarction through the use of collagenase inhibitors are

producing encouraging early results. Readers of *JCDA* are probably aware that the study of collagenases and other matrix metalloproteases (MMPs) was pioneered in dental faculties in Canada and abroad, and further work relating to cardiology may look at combination therapy using MMP inhibitors as well as other cardioprotective medications (e.g., angiotensin-converting enzyme inhibitors). Smoking, long recognized as a risk factor for a host of diseases, is now also recognized as an important risk factor for periodontitis and osteoporosis. Studies at the University of Toronto will delve into the mechanisms of the effects of smoke-derived aryl hydrocarbons on bone formation, periodontal disease and even atheroma formation, as well as the possible use of aryl hydrocarbon receptor antagonists to prevent those effects. As a result of investigations of chronic orofacial pain, new studies using functional magnetic resonance imaging are elucidating whether and how the cognition and attention centres of the brain may regulate the chronicity of pain, regardless of its location in the body. Finally, dental faculties are playing an important role in the study of stem cells, including stem cell transplantation for the purpose of regenerating lost tissues, an area of distinct interest from a biomedical perspective.

Given this list of research initiatives, it is clear that, as members of Canadian faculties of dentistry, we can and should stop referring to ourselves strictly as “dental researchers.” There is nothing inherently wrong with that term, but if we do not recognize our contributions to biomedical research on the broader scale, who will? And if we do not emphasize the more general applicability of our research, future, potentially fruitful collaborations will not develop and prospective funding and support infrastructures for areas that have erroneously been considered within the bounds of traditional dental research may well disappear. Future investigations must focus on elucidating the mechanisms underlying systemic and dentoalveolar diseases and determining why they appear to be linked to one another. Interventional trials are absolutely essential in this and other areas. Furthermore, additional transdisciplinary

studies in the behavioural sciences, epidemiology, infectious diseases and biomaterials are crucial with respect to the ongoing health of our population.

Only by recognizing that there are no borders between dental and biomedical research will our faculties of dentistry continue to flourish. And it is biomedical research that is the crux of the matter for our profession. Biomedical research is the lifeblood upon which the very existence of our faculties of dentistry within university settings must rely. Moreover, if we do not push back the boundaries of knowledge and continue to develop our knowledge base, then what differentiates a faculty of dentistry from, say, a vocational school? And certainly if we are aware of this issue, so are university administrators, who would not hesitate to close a dental faculty that is not active in research. Clearly, the health and in fact the very existence of university-based faculties of dentistry rely not only on the provision of the highest levels of clinical and biological training for undergraduate and graduate dental trainees, but also on the development of novel and cutting-edge research programs. Thus, our university-based faculties, even those with currently viable research programs, must also concentrate on the recruitment and retention of bright young academic staff. These new educators and researchers will inspire dentists and dental academics in the future to maintain the well-being of our profession and of course the health of Canadians. These young educators will also ensure that faculties of dentistry continue to play an important role at the university level in the training of dental professionals for the foreseeable future.

What does craniofacial developmental biology have to do with dental research indeed! ♦

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