



Dental

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Research News

AADR/CADR Deadline September 23rd

Stimulus & Challenge

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Centres of Excellence Proposal Submitted for Biomaterials (see page 3).

Expanding Knowledge Base

The knowledge base is continually expanding and changing as a result of research conducted in the dental and medical field. One example is the major scientific undertaking to advance our understanding of human biology and genetic diseases by identifying and mapping the entire DNA sequence on every human chromosome, a total of three billion bits of information. This mammoth task is now made possible with advanced super-computers. It used to take ten days to compare a ten thousand bit gene to the pre-existing data base on a VAX computer. With the new super-computer technology it takes only ten minutes. To give some idea of the amount of information involved in this project, if the DNA sequence of the human genome were translated into a volume of books at, 1,000 words per page, and 500 pages per volume, the information would fill 1,000 volumes, taking up some 80 feet of shelf space in the Kellogg Health Sciences Library. It is estimated that mapping this genome, is likely to take more than a decade. The professions of medicine and dentistry will never be the same again, once this work is completed.

Successful Summer Research Seminar Held

A very successful research seminar was held on the 10th August. A total of twelve students participated with a large group of faculty members and staff in sharing the experiences of the research projects being conducted during the summer months. Data was presented by the students with comments and discussion from the faculty supervisors relating to the various projects. The quality and breadth of subject matter of the research was impressive. The subjects ranged from diagnosis of early caries lesions to the use of lasers for treating tooth enamel, synthesis of bioactive materials, measurement of occlusal force and many others. It was clear that the students involved had a very clear grasp of the topics, and were making a very significant contribution to the research programmes within the Faculty of Dentistry. The research experience gained by the students was also seen as an enrichment of their educational programme at Dalhousie. The seminar was regarded as a great success, it resulted in the sharing of ideas and problems which was clearly beneficial to all involved.

Farewell to John

John Gregory Dwyer, departs from our Faculty this month to commence studies in the Pharmacy programme at Dalhousie. John a research technician, has been a member of our research staff in Biomaterials for the past five years. John will be sadly missed. John has been a tower of strength in our research team working on projects involving a whole range of biomaterials. We wish John all the best as he returns to the life of a student.

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**Deadline for
CADR/AADR
Abstracts for 1995
San Antonio
meeting
23rd September
1994**

Dental
Research
Development
Office

Welcome to Our Students.

This month we welcome back our students from last year and welcome a new group of first year students to our dental and dental hygiene programmes as well as to our graduate programme in Oral and Maxillofacial Surgery. September is a special month for the young students who commence their studies in the Faculty of Dentistry. Their ambition is to become health professionals, but what is a health professional? It has been said that "The crucial distinction between a profession and a non-professional occupation is that the skills characterizing a profession are derived from, and supported by, a body of knowledge which has been validated via the scientific method"

The knowledge base upon which we draw in order to teach our students in the 1994/95 academic year has been developed over many years by careful search and research using the scientific method. In order for a health care subject or profession to survive and advance as an applied science, we as faculty members in the discipline have to continually question, review and renew the knowledge base. The knowledge base is not static. Our students when they graduate will have an obligation to keep abreast of future changes which will inevitably take place in the knowledge base of the dental profession.

Research is part of a cumulative process in which new knowledge is added to the existing knowledge base. It may be useful to think of research using the analogy of a jig-saw puzzle, in which each new piece of information is fitted into the system, until all the pieces are found and the picture is clearly revealed. It is perhaps a reality of life that we may never find all of

the pieces and may never see the completion of the jig-saw-puzzle.

In the challenging times ahead for the health professions we must have a successful dialogue and interaction between the Alumni and our Faculty. The Faculty belongs to the Alumni as well as to students, staff and faculty. A successful continuing education programme is crucial in the changing climate of our crowded curriculums. As our students head back after the summer break they must realize that even after graduation, they must look towards life long learning. Our continuing education programmes can only be successful by drawing on our teaching programmes and on the vital research experience of our faculty members.

The Faculty of Dentistry by renewing the knowledge base provides a vital and important resource for the dental profession. It is clear that research is vital in order for us to be able to renew the knowledge base. It is important that universities should be funded to undertake research in the health care field which is perhaps the most important economic component of our social structure. At the present time we also recognize that research in Canada is pitifully under-funded. Two factors which we all will have to deal with in the future are:

- a) An Aging Population, and
- b) The accelerating pace of technological change.

Milton Berle once said that the future is not what it used to be. We can all agree with that. The future facing our students of today is very different to that which faced graduates of 10 or 20 years ago. The future for health care in Canada will be significantly dominated by the demographics of our population. The population increase between now and the year 2001 will only be 11%. Those in the 65 years and over age group will increase by more than 25% and they will

represent 14% of the population. More than 47% of the population will be over 40 and less than 25% of the population will be under 20. This aging population will place different and greater demands on the health care system, requiring different patterns and forms of dental treatment and greater use and diversity in prescribed medications. It is vital that we undertake research to address the unknown factors which we require to deal with in the preparation of our students for the future.

Developments in computer technology will enable new applications of computing in the health care field, including, better design and management of clinical procedures, the designing of improved biomaterials and drugs, and improved understanding of drug interactions. Networking technology will significantly change the way that we all function as health professionals and as university teachers and researchers. National and international research and educational information networks will become an every day need.

It has been calculated that the sum of all human knowledge acquired since the invention of the wheel will double within the next 15 years. In a few years we will acquire as much new knowledge as that previously accumulated since the beginning of time. The knowledge explosion during the next ten to fifteen years will make life very different for those students in the classes we are teaching in September 1994.

The excellent quality of our students and our progressive teaching and especially our research programmes must combine to equip our students to face the challenges of the future. Our students of today must also look towards life long learning and make use of the knowledge base which must be continually updated by continual research within our Faculty.

Centres of Excellence

A Letter of Intent for a Centres of Excellence proposal in Biomaterials has been submitted as part of a very powerful national group which has participation from the Maritimes to BC. The three projects from the Maritime Node are as follows:

Orthopedic Implant Fixation Biomaterials
Systematic, directed modifications of polymers using copolymer and polymer blends will be used to develop, refine and improve their use as biomaterials, extending their application and lead to more effective clinical treatment procedures. Formulations will be produced with variable strain-rate sensitivity. The research will extend our current studies of the influence of chemical composition and structure on physical and mechanical properties of methyl and higher methacrylate copolymers.

Development of Improved Composite Biomaterials
Wet chemical synthesis methods can produce ceramic/glass composite filler materials having molecular structures and macroscopic shape not attainable by conventional synthesis methods. These fillers have wide-ranging application in the design of innovative products as composite biomaterials. Such fillers may have improved physical and chemical properties applicable to both dental as well as orthopedic composite systems. Unique filler particles for ceramic/glass resin matrix as well as ceramic/glass matrix composites will be synthesized by wet chemistry. The full potential of glass/ceramic/resin matrix composite dental biomaterials has yet to be achieved and application of ceramic/glass matrix composite biomaterials in orthopedics has yet to be addressed.

Customized Bioactive Ceramic and Glass biomaterials.

Materials of controlled surface activity showing direct bonding to bone offer potential for long-term stabilization of implants. The development of bioceramics using new wet chemical synthesis technology extends our ability to provide materials with tailored chemistry. The project will address the need for bioactive materials having improved structural mechanical properties as well as methods of producing bioactive ceramic surface coatings on selected substrates. Degenerating bone disorders of an aging population such as, periodontal disease, osteo- and rheumatoid arthritis, bone cancer, avascular necrosis as well as trauma together with greater use of implants have increased the need for a suitable bone substitute or a stimulant for osteogenesis.

