

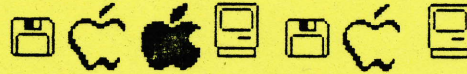
# Dental Research News

Research Development Office, (902) 424-1675

## GOODBYE 88, HELLO 89

As we wave goodbye to 1988, we can look back at a very hectic year in terms of research activity in our faculty. As we say hello to 1989, we can dream and hope and speculate about what could and should happen in our faculty. Here are a few dreams that might just come true:-

- 1) Success for the NHRDP grant and five MRC grants which have been submitted.
- 2) Success for our Biomaterials Centre of Excellence application.
- 3) A successful acceptance for all of our 18 abstracts submitted to the IADR meeting in Dublin
- 4) Success in turning our abstracts into full length papers published in journals..



## An Opportunity for Research?

The Apple Research Partnership Programme is designed to "Stimulate Research Activities in Universities. If you are using the Macintosh computer in your research the ARPP consultants on the fourth floor may be able to help you with your project. Why not drop in and discuss it with them.



## Future Resource

There is a growing sense that Canada's future lies in harnessing its brains, but there is no consensus that the resource era is over".

James Gilmour  
Research Director  
Science Council of  
Canada.



# HAPPY NEW YEAR

**Deep Rooted Problem**

A report by Yesilsoy et al in Quint Int.19:431,1988, dealt with a study to determine the pain reported by patients following endodontic treatment. The authors found that there was no difference in the level of pain reported between the under 40 and over 40 age groups, or between males and females. Seventy five % of patients had no postobturation pain. After 4 days, only 9% had reportable postobturation pain. However, the authors of another paper (Heling et al Quint.Int. 5:377,1988). described a case in which a patient had complained of severe abdominal pain. Radiography subsequently revealed an endodontic instrument in the gastrointestinal tract. A colonoscopy was successful in removing the instrument. As the authors point out a rubber dam is an essential safeguard.

**Latex Rubber Gloves give a bad impression.**

In the November issue of Reseach News (page 6) we reported that rubber gloves may cause a problem in terms of an allergic reaction on the oral soft tissues. There have been reports that rubber gloves can affect the setting of vinyl polysiloxane putty impression material. Reitz and Clark (J.Am.Dent Assoc.

116:371,1988) have shown that some latex gloves retard the setting of vinyl polysiloxane putties. The answer would be to use the vinyl type of gloves if you have a problem.

**Many Miles To Go**

"Nature has remained approximately the same since man begin, .... the growth of man's knowledge about Nature has been one single epic rise from the beginning until now, and now is not the end" Joesph Needham.

**Candidiasis and AIDS**

Oral candidal infection is considered to be an early sign of local immunosuppression.(Syrjaalle S.L. et.al. Oral Surg 65: 36-40 1988). Out of a total of 14 individuals testing positive for HIV 13 had clinical signs of candidiasis orally. In the general population, oral candidiasis is related to factors other than HIV infection, but a high percentage of AIDS patients do have clinical signs of candidiasis.

**Do you have any "RESEARCH NEWS ITEMS"**

which you would like to share with your colleagues?. If so, please forward such items to the Research Development Office, or call 1675.

### HOW SAFE IS SAFE?

Dr Richard Baker and colleagues scientists at USC School of Medicine reported in the J.Amer.Med. Ass. that ozone can significantly degrade latex condoms. They used SEM and mechanical testing to clearly show that condoms exposed to ozone undergo significant deterioration . Twenty condom controls tested by filling them with water had a holding capacity of about nine gallons, and reached a size of about 4 to 5 feet before bursting. Almost half of the test specimens exposed to ozone could not be inflated and those that could had a capacity of only about half that of the controls. It is also possible that surgical gloves used in dentistry could also suffer from the same problem when exposed to ozone.



### Titanium

What do an 18th century Cornish clergyman, Greek mythology and dental implants have in common?. The answer is titanium the ninth most abundant element of the earth's crust (0.63%). The metal-ore was first identified by a Cornish clergyman the Reverend William Gregor in 1790. Although the metal has been known for over 200 years, its high reactivity has meant that

the metal in the pure form was difficult to produce and was not obtained in the pure form until 63 years ago and it's industrial production did not become very efficient until 40 years ago. An Austrian chemist, Martin Klaproth, gave the element the name "titanium", after the Titans, the Greek mythological figures symbolizing power and strength. Although titanium is very reactive, it has excellent resistance to corrosion due to a thin protective oxide layer on its surface. Since titanium relies on an oxide film for its passivity, it performs better in an oxidizing or neutral environment than in non-oxidizing solutions, where some corrosion can take place. The metal performs well in contact with body fluids and was first used as an implant for hip prostheses some 35 years ago. It has been the most successful dental implant material to date.

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### THE QUICK FIX?

"A misunderstanding of the root sources of scientific progress can lead one to look for the quick technological fix for problems the solution of which can only come from a deeper understanding of basic science". Arnold Naimark, President, University of Manitoba.

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### Computerized Probe

A new periodontal probing system was described by Gibbs *et al.*, in the J.Clin Per. 15:137.1988. The probe was said to incorporate the advantages of a constant probing force, precise electronic measurement to 0.1 mm, and a computerized data storage. The research group showed that results obtained with the new probe system were significantly more accurate than those achieved using a conventional probe. Loss of attachment could be detected with a certainty of 99% for changes in pocket depth of less than 1 mm. Conventional probes, are considered to require a 2 to 3 mm change in pocket depth before a positive value can be recorded. The development of the new periodontal probe may offer superior accuracy and sensitivity in the detection of loss of attachment.



### NEW COMPUTER SOFTWARE

New data analysis computer software for the Mac has been produced. The programme is "KaleidaGraph" for Apple Macintosh and Macintosh II. Data-analysis software contains graphic tools, statistical functions, and macro capabilities. [Peripherals, Computers and Supplies, 2457,

Perkiomen Avenue, Reading Pa. 19606, Phone:(215)779-0522]. Other new software available is the "EXSTATIX" for Apple Macintosh(512KE), Plus and SE. The statistics software includes linear and non-linear, single, polynomial, multiple, and stepwise regression with automatic cross valuation; correlations; comprehensive descriptive statistics; ANOVA; cross tabulation; time-series analyses; significance testing; can produce two-dimensional and three-dimensional graphs in full colour(Mac II), including a rotating three-dimensional scatter plot; user can add extensions for new functions and commands; [Select Micro Systems, Inc., 40 Triangle Centre, Suite 211, Yorktown Heights, N.Y. 10598; Phone:(914) 245-4670].



### FEDERAL SPENDING IN US ON RESEARCH FOR 1989

\$130,988,000. in funding has been approved for 1989 by the US Department of Health and Human Services for the Institute of Dental Research. The total NIH funding for the same period is \$7,152,207,000. The US Department of Education has approved \$5,675,000 for research libraries for 1989.[Chronicle of Higher Education Sept 88].

**RESEARCH and INDUSTRY**  
**Transferring research  
from the laboratory into  
industry.**

Canada's international economic competitiveness would be enhanced by more vigorous research linkages between universities and industry, according to a report released by the Science Council of Canada.

The report "Winning in a World Economy: University-Industry Interaction and Economic Renewal in Canada", puts forward the argument that universities should transfer more knowledge and technology directly to industry. Universities should play a larger role in the creation of wealth by exploiting existing ideas and inventions. In the spirit of this recommendation at least two possible patentable ideas have been forwarded from our faculty to the Technology Transfer Office of Dalhousie University in the past few weeks. Many university researchers have held concerns that academic values will be jeopardized by development of closer interaction with industry. However, the report goes on to say that the universities are in fact more at risk from lack of industrial participation than from too much collaboration. The report states that greater

collaboration with industry should be regarded as "an integral and valued extension of the core mission of research and teaching".

Our National Science and Technology policy states, as a strategic direction, that strong support should be given to basic and applied research as fundamental to Canada's scientific capacity and industrial competitiveness. Further, "governments --- should ensure adequate support for the explicit mission of government in areas such as health, the environment and security." The utilization of biomaterials in health care encompasses all of these areas involving as it does therapies and procedures that improve the quality of life for the patient. Canada has a very high quality of medical and dental care programmes that are recognized throughout the world for their excellence. However, Canada has also one of the highest per capita expenditures in health care costs in the world. This is reflected in the escalating costs of health care to the Provinces, in some cases as much as one third of the budget is expended on health care. Clearly there are limits to financial resources and improved technology targeted to costs is an essential strategic objective to reduce

health care expenditures. In this context the Canadian industrial contribution to biomaterials and medical devices is weak and we are vulnerable to outside pressures. To place the problem in perspective it is pertinent to briefly review the present state of the biomaterials and medical devices sector.

Canada and the United States, like most industrialized countries, have an aging population. According to Statistics Canada the population increase between now and the year 2001 will be only 11%. The over 65 years 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 greater demands on the future needs for the use of biomaterials as replacements for natural tissues, or for slow release of drugs from implantable devices and prostheses. The incidence of trauma, congenital malformations, cardiovascular disease and conditions such as arthritis or malignancy coupled with an increasing number of survivors into old age already indicates a need

for new and improved biomaterials to the end of this century and beyond. This situation will be reinforced because of a larger proportion of relatively healthy older people with increased physical activity who will make greater demands on cosmetic and reconstructive surgery and medical and dental implants. Additionally more younger people will receive implants.

Thus the biomaterials market in the 1990's is predicted to change quickly (Frost and Sullivan: Conference News. Jan. 1988). The market for the materials used in medical devices is expected to triple by the year 2002, growing from approximately \$2 billion in 1987 to nearly \$6 billion by 2002 (ibid.). Areas that are predicted to receive greater emphasis are composites, ceramics, treated tissues, surface modification for biological fixation, bioactive and anti-thrombogenic coatings, biosensors, targeted drug delivery systems, wound healing materials, vascular grafts and "living" biomaterials (i.e. with directed cellular activity). These are the areas which we have chosen to address in our proposal for a Centre of Excellence in "Biomaterials".

This rapid expansion in the usage of biomaterials and medical devices over the last two decades, is as noted previously, the result of the widespread employment of these tissue substitutes to restore and improve function. Implants such as the artificial hip, the interocular lens and the cardiovascular graft have become routine. It is estimated that in 1986 more than 80,000 cardiovascular implants, 15,000 artificial hip joints, 6000 knee joints and 120,000 interocular lenses were placed in Canada. The corresponding USA figures are 10-15 times this number. Thus, during the period 1978-1985 almost 2,000,000 interocular lenses were placed in the US alone; currently the annual numbers are in excess of 1-million a year as part of a 1 billion dollar industry world wide. In 1987 about 130,000 mammary prostheses were placed in the U.S.A. at an estimated materials cost of \$40 million and a medical cost of \$325 million. The field of dental materials also has developed rapidly with the use of advanced composites, new alloys and ceramics. It is documented that the current usage of biomaterials and devices is growing at a rate of 10-15 per cent a year. The expenditure by Canadian dentists on materials is in

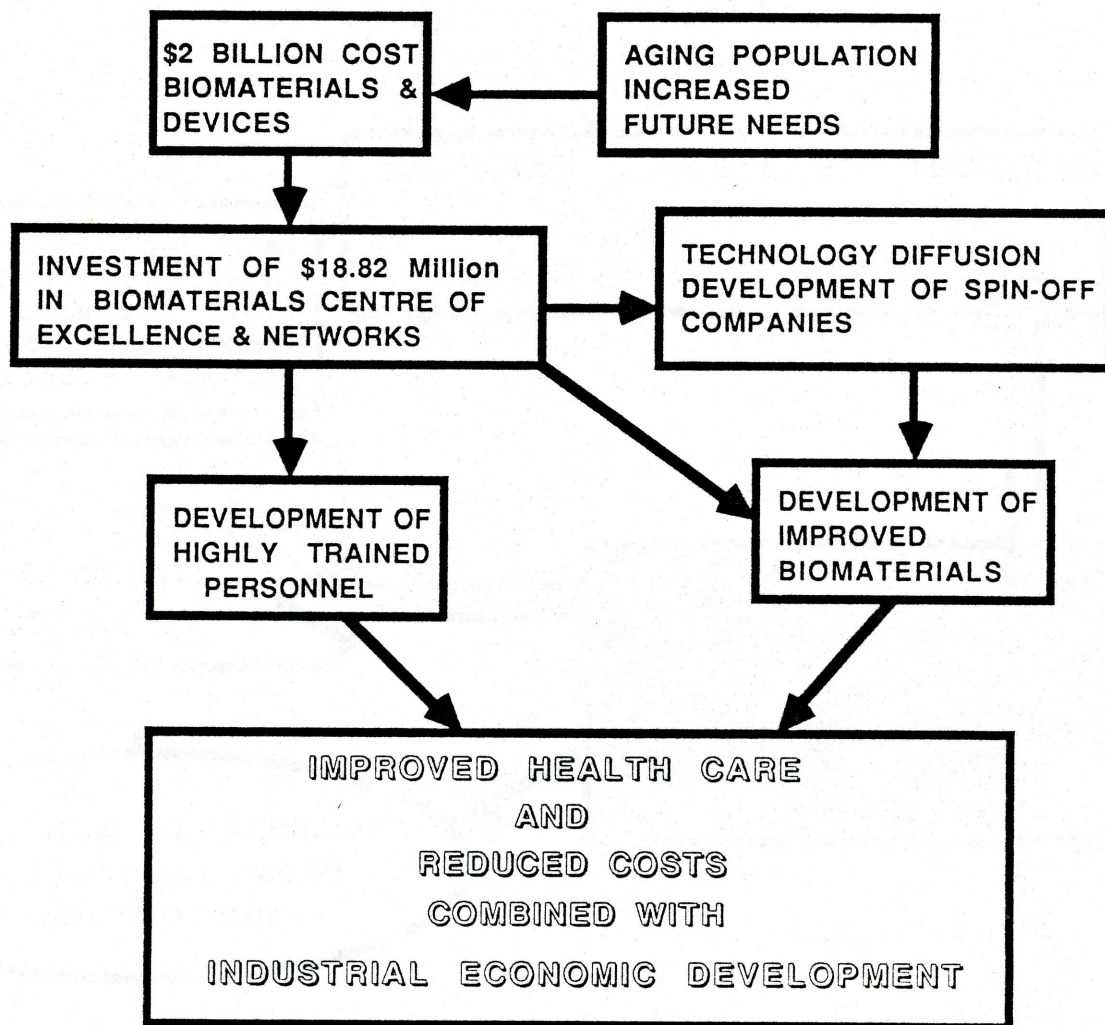
excess of \$100,000,000 a year. By way of illustration of events in other jurisdictions, in 1985 the Council of Europe Ministers responsible for R and D agreed on a new biomaterials initiative aimed at transferring research from the laboratory into industry. They stated "Biomaterials are now seen as having a growth potential perhaps exceeding the market contribution made by pharmaceuticals by the turn of the century." A further example is the multimillion dollar Medical Technology Stimulation Programme established in Holland. Since 1981 the Programme has funded more than 400 projects in such areas as bioceramic materials and medical biotechnology (it is estimated that the world market for bioceramics alone will be worth some \$400,000,000 by 1990). Unfortunately Canada, as yet, has little part to play in any of this except as a consumer.

The justification for a Network and Centre of Excellence in "Biomaterials" and the advantages that this would provide for the Faculty of Dentistry at Dalhousie University are shown in the flow diagrams on pages 8 and 9.



JUSTIFICATION FOR A

NETWORK and CENTRE of EXCELLENCE  
in  
BIOMATERIALS

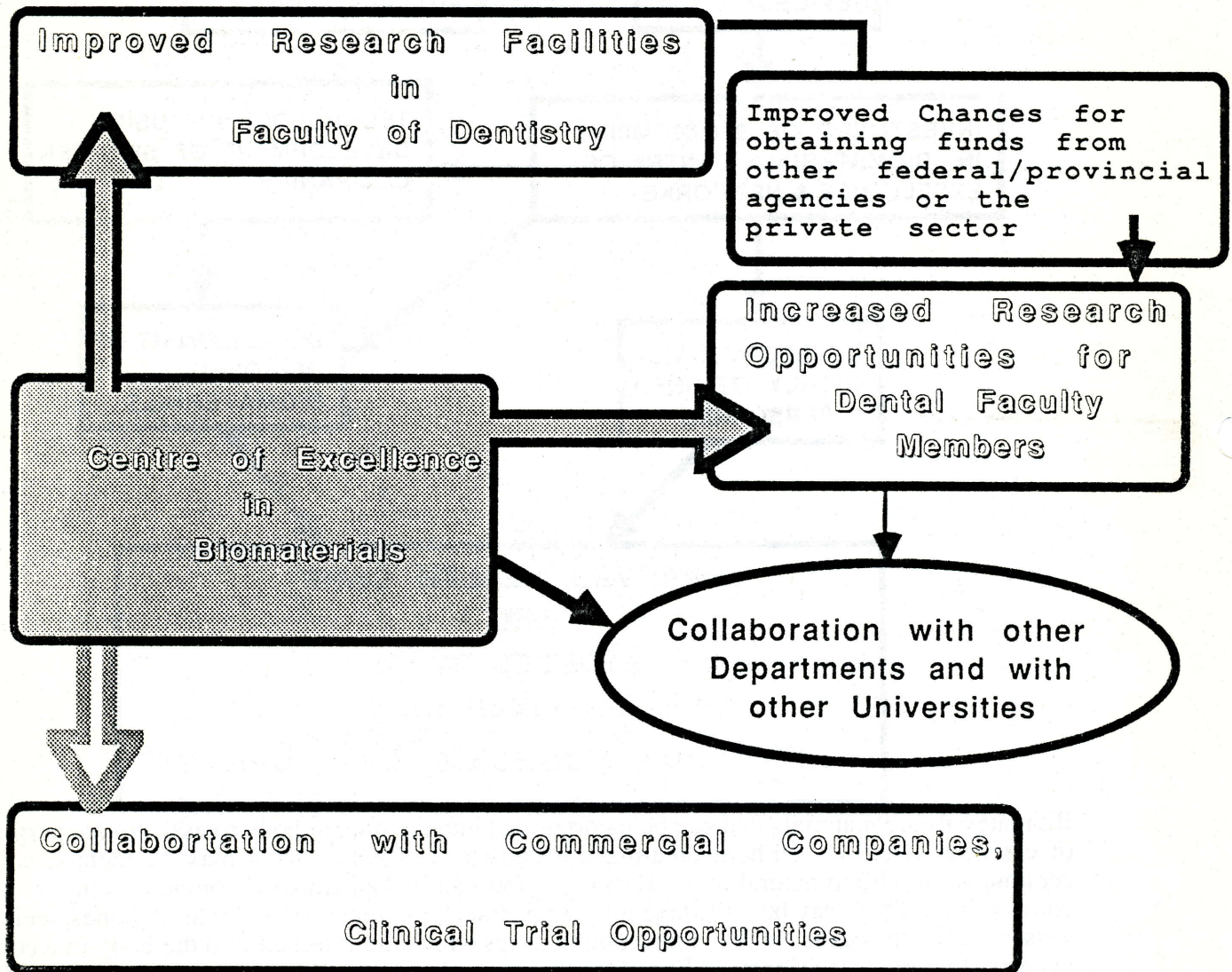


Biomaterials are materials that can be incorporated into the human body to assist in the performance of essential functions without creating injurious side effects. They may be metals, polymers, ceramics or modified natural materials and are frequently sophisticated composites involving these components. They may be fashioned into replacement or support parts for skin, bones, teeth, blood vessels or entire organs, or they may contain drugs which are released into the body in a controlled manner. Our proposed Centre of Excellence research programme will concentrate on areas which are based on ongoing research and existing facilities, but which involve projects that represent new foci of collaborative work. An estimated 1.5 billion dollars worth of biomaterials implants and other biomedical devices are imported annually into Canada, embodying nearly 80% of the total used. Thus, this is an area of industrial activity that is poorly represented in Canada because of the limited funding available for the scientific support structure. There is obviously great potential for improvement in this situation with contribution to both our scientific understanding of the mechanisms involved between biomaterials and natural tissues and to our potential for industrial innovation, leading ultimately to improved biomaterials and a reduction in health care costs.



# The Centre Of Excellence in Biomaterials

## Advantages for Dental Faculty



The above diagram illustrates some of the potential advantages for the Faculty of Dentistry which the proposed Centre of Excellence in Biomaterials would bring if it were successful in the federal funding programme. The results of the competition should be known some time between April and June 1989. The proposed budget put forward by Dalhousie for the programme is \$5,716,383, this includes \$1.26 million for equipment.