Dalhousie University, Faculty of Dentistry

Dental Research News

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Dental Laser Hits Wall Street.

The Wall Street Journal of May 18th 1990, carried an article dealing with the use of lasers in dentistry. The article said that lasers are moving into the dental office, offering the prospect of painless dental surgery and quicker treatment of tooth decay. The article was triggered by the news that the US Food and Drug Administration had blessed the sale of lasers for periodontal surgery. It was stated that "this was the first time that lasers had been approved for general dentistry". The use of the term general dentistry for this type of treatment may cause some concern amongst the periodontists. The article stated that "the FDA is expected to approve lasers for cavities, potentially displacing the dentists drill". It also pointed out that the cost of these lasers was expected to be about $50,000 US. It was claimed that "these lasers have undergone five years of clinical trials". The article quoted Dr. Joel M. White an Assistant Professor at the University of California at San Francisco who it was said "has conducted extensive clinical trials of lasers". According top Dr. white "this technology can now b offered to nearly every patient in the USA." The article also quoted Dr. Terry D. Myers a consultant to American Dental Lasers, who holds the patent for the dental lasers, he stated " that within a decade we hope to send the dental drill to the Smithsonian. Typical of the media in dealing with developments in science and technology this item is exaggerated and distorted. Our own research at Dalhousie University being conducted by Ken Zakariasen and his group have shown that the universal use of the laser in clinical dentistry for the surgical cutting of both soft and hard tissues requires further research before it can be fully established.

IADR Deadline see p. 5. ☞

CD-ROM Information Retrieval.

During the past 4-5 years personal computers have been getting faster, more powerful, smaller and less expensive. The next major breakthrough which is about to make a significant impact on our use of the computer in research and teaching is the linking of the personal computer to the compact disc technology which has proved itself in the audio field. The computer-version of the CD technology which is called compact-disc read-only memory (CD-ROM), has 1,500 times the capacity of a conventional floppy disc. We will in future have instant access to an encyclopedia's worth of information, and that information can be delivered with the graphics animation and sound. The computer of the future will become an information tool dramatically more powerful than to-days systems. We can even now access the CD-ROM disc for the searching of Med-Line in the Health Sciences Library, the future may be much more impressive as new information and knowledge discs become available. Multimedia software is now becoming established as a means of rapid access to information. This software contains coloured graphics, still and moving images and Hi-fi sound, whilst this is aimed at the home consumer market the technology will be bound to have a dramatic impact on teaching and research for both students and faculty in our Universities.

Ames and Objectives

Bruce Ames (the 'Ames Test' man) is in the news with the claim that man-made chemicals are less harmful than natural compounds. Bruce Ames seems to have switched from warnings against man-made toxins to concern about the danger of nature's own toxins. Ames said recently that "water from the most polluted well has a HERP (daily, Human Exposure dose/Rodent Potency dose) value orders of magnitudes less than for carcinogens in an equal volume of cola, beer or wine." Ames also made the statement that "there is no good evidence that there is any increase in cancer due to the modern industrial world" This statement by Ames is difficult to understand when we look at the statistics showing the steady rise in cancer rates since 1900. Even if we accept that part of the perceived increase is due to a significant increase in life expectancy and improved methods of detection and diagnoses for cancer, it clearly would be difficult to defend his argument.

Eight Dalhousie Papers Presented

The following two papers were presented at the American and Canadian Academies of Oral Pathology in San Diego, Cal.in April 1990.

B.B. Harsanyi, "Benign Lesion of the Lower Lip Mimicking Squamous Cell Carcinoma."

J. Lovas "Smoker's Melanosis or Oral Sign of Lung Disease?"

The following four papers papers are being presented at the 11th Annual Conference of the Canadian Biomaterials Society meeting in London Ontario June 20th-22nd.

Gates, K.A., Jones, D.W., Foong, W.C., Mezei, M. and Vargha Butler,E.I, Wettability Studies on Drug Modified Soft Polymer Matrices,

D.W. Jones, K.M. Özcan, W.C. Foong, M. Mezei and E.J.Sutow. Influence of Drug Incorporation on Gelation of a Prosthodontic Soft Polymer, Paper submitted to the 11th Annual Conference of the Canadian Biomaterials Society

D.W. Jones, A. S. Rizkalla, R. Miller, J. A. Johnson, and E.J. Sutow. The effect of 'True' Hardness on Indentation Fracture Toughness Values for Feldspathic Glass.

D.W. Jones, A. S. Rizkalla, J. Dwyer, B. W. Darvell and E.J. Sutow:. An Evaluation of Setting Characteristics of Glass Polyalkenoate Cement Systems.

The following paper was presented at the 16th Annual Meeting of the Society of Biomaterials and the 22nd, International Biomaterials Symposium, Charlston, South Carolina, May 20th-23rd 1990.

D.W. Jones,.A.S. Rizkalla, J. A. Johnson and E.J. Sutow Comparison of Elastic Moduli and Poisson's Ratio of Biomaterials:

The following paper is also to be presented at the Controlled Release Society Meeting, July 22nd-25th 1990, Reno, Nevada.

K. A. Gates, W.C. Foong, D.W. Jones, M. Mezei. Antifungal Drug Delivery Using Commercially Prepared Soft Polymer-Gel Systems.

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Elementary

"The diffusion of scientific discoveries, and expository writing about them, are usually regarded as meta-activities of science. Yet we must remember that Mendeleev discovered the periodic table while planning the arrangement of topics for an elementary chemistry textbook".

Pat Langley et al.

Technology Transfer Not Easy

The Monsanto research biotechnology laboratories are aiming to produce such products as potato plants which develop their own protection against viruses, tomato plants which will engender their own insecticides, a hormone which will make pigs yield leaner pork. However, an unexpected problem occurred recently with their biotechnology breakthrough BGH. This is a growth hormone which is said to boost cow's milk production. The problem is that dairy farmers fear that the BGH hormone will cause an over-supply of milk, forcing prices down. It has always been recognized that it is difficult to transfer technology from the laboratory to the industrial sector, it seems that product introduction can be as tortuous and time consuming as laboratory research and development. Genetic engineering ventures tend to produce passionate reaction from the market place. It is forecast that the biotechnology products from the Monsanto Co will have an annual sale of $100-200 million for BGH, $300-$500 million for a new fat substitute and $500 million for an ulcer drug (Cytotec). BGH is a protein similar to one that cows produce naturally, it is made by genetically engineering bacteria and then injecting twice a month. In farm trials, milk yields have shot up by 10%-25%. At the present time a one year ban has been put on the use of BGH triggered by the protests from worried dairy farmers.

Electronic Publishing

Several examples of information are currently available on CD-ROM which might be of interest to those of us involved in research. For example the International Dictionary of Medicine and Biology (John Wiley and Sons, NY.). This contains more than 160,000 terms which are cross-referenced, as well as synonyms, and proprietary symbols. The cost is $195. Another interesting disc is the McGraw-Hill CD-ROM Science and technical Reference Set (McGraw-Hill Book Co), this contains 98,500 defined terms, 115,500 definitions, as well as the Concise Encyclopedia of Science and Technology all for $300. However, perhaps the most impressive is the Oxford English Dictionary on Compact Disc, by TriStar Publishing, Fort Washington, Pa. This unbelievably contains the original 12 volume dictionary and costs $950. The New Electronic Encyclopedia by Goller Electronic Publishing, of Danbury, Conn. contains the full text of the Academic American Encyclopedia at a cost of $395.

BEIR. V.

The National Research Council report called BEIR. V, which stands for the fifth report dealing with Biological Effects of Ionizing Radiation has had quite an impact. According to the report the risks of exposure to low levels of X-rays and gamma rays may have been considerably underestimated in the past. An expert panel found that the chance of developing cancer from ionizing radiation may be three to four times higher than previously estimated. The report also states that fetuses exposed to low levels of radiation between the 8th and the 15th weeks of gestation have a greater risk of being mentally retarded than earlier studies had indicated. The revised dose estimates are said to be based upon epidemiological evidence from the survivors of the Hiroshima and Nagasaki atomic bombings and from individuals exposed to radiation as part of medical therapy. These findings have implications for dentistry especially for those aspects which require greater use of X-rays such as orthodontics and Maxillofacial surgery. Research protocols which call for X-rays other than for diagnostic therapy would not now be acceptable.

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BioTech Venture

Canada is committed to expand and support biotech ventures, however, time is running out. Japan's biggest drug company, Yamanouchi Pharmaceutical and fledgling Genetics Institute said recently that they plan to form two joint ventures to develop and market bone treatments based on bio-technology research. Industrial analysts estimate the ventures to be worth about $100 million. The announcement came at a time when the USA are concerned that Japan will pass them by in the promising field of bio-technology. The take-over of the Canadian Connaught Laboratories by foreign interests highlights the problem facing Canada in this highly competitive field. The Canadian federal government has clearly stated that it has three major priorities: 1) Biotechnology; 2) Information Technology, and 3) Advanced Materials. Dentistry could actually benefit significantly from all three areas, each of which offer our faculty members opportunities for research projects.

IADR DEADLINE

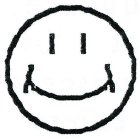
It is 16 weeks to go to the the deadline for the submission of abstracts for the 1991 meeting in Acapulco which has has been set for 5th October 1990.

Open Wide the Windows

Apple Macintosh must be thinking of the Chinese curse that says may you live in interesting times. On the 21st May Wall Street threw a party for software stocks due to the announcement by Microsoft which has unveiled its revolutionary personal computer software programme Windows 3.0. The programme is expected to make use of IBM personal computers (and look alike IBM's) and is said to be as easy to use as the Apple Macintosh and at a much lower price. It is possible that we may see a price war developing which would be an advantage for the consumer.

Biomaterials the Industrial Needs

A recent survey of US industrial companies engaged in the field of biomaterials reported that 90% were involved with polymer materials, almost 40% with metallic, 25% with ceramic, 15% with natural biomaterials and some 10% with composites. The most common area of involvement was drug delivery, closely followed by orthopaedic and cardiovascular. This is most interesting from the perspective of our faculty since two of our graduate students are involved in these areas of research. Jim Johnson's PhD thesis is in the area of orthopaedics and Kim Gates is conducting her MSc in the area of drug release. In response to the question what PhD degree requirements in biomaterials are considered appropriate in order to work at your company the following ranking was produced. Materials Science 17%; Controlled Release 16%; General Biomaterials 8%; Fundamentals of Biocompatibility 8%; Soft Tissue Biomaterials 8%; Surface Analysis 8%; and immunology 7%.



SMILE

Research Definitions

"Three of the samples were chosen for detailed study." means:-

The others made no sense.

"Typical results are shown." means:-

The best results are shown.

"A careful analysis of obtainable data..."means:-

Three pages of notes were obliterated when I knocked over a glass of beer.

Research is Mere Child's Play?

"When we begin the study of any science, we are in a situation, respecting that science, similar to that of children; and the course by which we have to advance is precisely the same which nature follows in the formation of their ideas. In a child, the idea is merely an effect produced by a sensation; and, in the same manner, in commencing the study of a physical science, we ought to favour no idea but what is a necessary consequence, an immediate effect of an experiment or observation. Besides, he that enters upon the career of science is in a less advantageous situation than a child who is acquiring his first ideas. To the child, nature gives various means of rectifying any mistakes he may commit respecting the salutary or hurtful qualities of the objects which surround him. On every occasion his judgements are corrected by experience; want and pain are the necessary consequences arising from false judgement; gradification and pleasure are produced by judging ariglet. Under such masters we cannot fail to become well informed; and we soon learn to reason justly, when want and pain are the necessary consequences of a contrary conduct."

In the study and practice of science it is quite different; the false judgments we form neither affect our existence nor our welfare; and we are not forced by any physical necessity to correct them." -

Lavoisier

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Truth and Beauty

"Mathematics, rightly viewed, possesses not only truth, but supreme beauty - a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of paintings or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as in poetry".

Bertrand Russell

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Solving Problems

"University expertise can help solve societal problems, and through which discoveries and inovations derived from University research can be put into practical use."

Nils Hasselmo, President University of Minnesota.

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Leading Ideas of Modern Science.

"No man of letters was ever more hospitable to science than Goethe; indeed, some of the leading ideas of modern science were distinctly foreshadowed by him; yet they took the form and texture of literature, or of sentiment, rather than of exact science. They were the reaching forth of his spirit; his grasping for the ideal clews to nature, rather than logical steps of his understanding; and his whole interest in physics was a search for a truth above physics,"

- John Burroughs

Scientific Theory

"Whether or not data gathering, description, explanation, and theory testing are strictly cyclical, each of these activities can be subdivided further. Data may be gathered by the observation of natural events or by the production of phenomena through experimentation. If the data are to be obtained by experimentation, the experiments must be designed; in either case (experiment or observation), data gathering instruments must be invented and improved".

Pat Langley et al.

A Multitude of Errors.

"Instead of applying observation to the things we wish to know, we have chosen rather to imagine them. Advancing from one illfounded supposition to another, we have at last bewildered ourselves amidst a multitude of errors. These errors becoming prejudice, are of course, adopted as principles, and we thus bewilder ourselves more and more." -

Abbe de Condillac

Scientific Realism

"Discussions about scientific realism or antirealism usually talk about theories, explanation, and prediction. Debates at that level are necessarily inconclusive. Only at the level of experimental practice is scientific realism unavoidable but this realism is not about theories and truth. The experimentalist need only be a realist about the entities used as tools".

Ian Hacking

Experiment and Observation.

"We must trust to nothing but facts: these are presented to us by nature and cannot deceive. We ought, in every instance, to submit our reasoning to the test of experiment and never to rearch for the truth but by the natural road of experiment and observation." - Lavoisier

A New Image for Dentistry

Magnetic resonance imaging is rapidly becoming established in medicine to provide 3-D viewing of both bone and soft tissue. Radiation technologists are using new computer techniques to develop improved three dimensional images for pre-surgical operation planning or studies of the shape and structure of sound or diseased tissues. The system scans the body part in question and a computer inside the scanner records the data in sections called voxels for each layer of the body part being scanned. The computer stacks voxels to assemble a 3-D model. It is also possible to selectively filter out unwanted information from each voxel. A computer model of a specific part of the body such as the mandible or the complete skull can easily be produced. These computer models are three dimensional and can be rotated or enlarged at will. The technology has the potential to revolutionize several aspects of dentistry such as orthodontics, maxillo-facial surgery prosthodontics, implantology, as well as craniofacial biology. The potential for dental research in this area is absolutely phenomenal. A further exciting prospect is that it should be possible to develop systems which will take the 3-D computer data and use the information to machine and or plastically mould replicas of internal tissue shapes for further study by the clinician. It may also be possible to model implants to custom fit individuals. It is possible that in a few years time that the largest area of research in dentistry may make use of computers rather than being dominated by traditional laboratory and clinical research.

11) When you get the good deal on some new equipment, the brown envelope arrives to tell you that your grant application has failed.

12) You know you are getting old when you find the comments from reviewers of you grant application amusing.

Idle Curiosity

"Sometimes a technique precedes a science; at other times a new technology grows from a series of discoveries motivated by idle curiosity."

John Ziman