TORONTO CITY CLERK

Clause embodied in Report No. 5 of the Economic Development and Parks Committee, as adopted by the Council of the City of Toronto at its meeting held on May 30, 31 and June 1, 2001.

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Toronto's Bio-Medical Cluster: Leader in North America (Ward 20 Trinity-Spadina and Ward 27 Toronto Centre-Rosedale)

(City Council on May 30, 31 and June 1, 2001, adopted this Clause, without amendment.)

The Economic Development and Parks Committee recommends the adoption of the following report (April 19, 2001) from the Commissioner of Economic Development, Culture and Tourism, subject to adding the following:

> **"the Commissioner of Economic Development, Culture and Tourism, in consultation with the Round Table Focus Group and various stakeholders, be requested to establish a Steering Committee to look into the creation of a medical discovery "Walk of Fame" at an appropriate site in the City of Toronto":**

Purpose:

This report provides an overview of the importance of Toronto's Bio-Medical cluster to Canada's competitive position and the need to develop an action plan to ensure its sustainability and growth in Toronto.

Financial Implications and Impact Statement:

There are no financial implications resulting from the adoption of this report.

Recommendations:

It is recommended that:

(1) the City convene a round table focus group with the University of Toronto, the major hospitals, research institutions and property owners within the "Discovery District", and Bio-Medical companies to develop an action plan to advance Toronto's competitive position as a biotechnology leader in North America including development of joint marketing opportunities, such as the establishment of a medical discovery "walk of fame";

(2) Council approve the designation of the area bounded by Bloor, Bay, Dundas West and Spadina as a Discovery District, and that staff investigate and report on the area's further designation as a Community Improvement District;

(3) the Commissioner of Economic Development, Culture and Tourism and relevant staff from Economic Development, Culture and Tourism, Finance and Urban Development Services review and report back on opportunities to advance the establishment of an innovation/commercialization centre within the Discovery District using such mechanisms as Section 28 of the "Community Improvement Section" of the "Planning Act" that would enable the city to provide tax equivalent grants that will assist in the establishment of such a centre, or under the "Municipal Act" incorporate a "Share Capital Corporation" that could provide facilities and services to assist a business start-up;

(4) Council support a communications campaign to increase awareness about the sector and to advocate support from senior levels of government; and

(5) the appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

Background:

The Economic Development Strategy, adopted by Council in August 2000, established priority actions related to economic cluster development and the need to foster innovation. The Strategy highlighted a little known fact that the Bio-Medical economic cluster in Toronto is the largest in North America and a key contributor to recent economic growth. This report proposes a number of actions intended to implement the Economic Development Strategy's recommendations related to supporting the growth of the cluster and a culture of innovation that will lead to the further commercialization of medical and biotechnology research resulting in new businesses and high quality jobs.

In June 2000, Council endorsed the establishment of the Toronto Biotechnology Commercialization Centre and the efforts of the Board of Directors to implement the project. Staff was also requested to assess the feasibility of providing City funding. This report outlines some of the options being examined with respect to supporting the creation of the Centre.

Comments:

Bio-Medical Cluster Overview:

Health care is the fastest growing economic sector in the world. The international market for pharmaceuticals and medical devices reached approximately $500 billion in the year 2000. The medical industry in the Toronto area is also huge, providing annual revenues in excess of $4 billion and jobs for more than 80,000 people. Add in health care delivery and the medical sector provides more than 140,000 jobs.

The Bio-Medical cluster in Toronto is composed of a number of industry segments; medical devices and new technologies, pharmaceutical products and medical biotechnology, as well as private health care services including diagnostic laboratories, consulting, information systems and hospital medical/surgical supplies. The main research oriented segment of this cluster is the biotechnology sector described below:

Biotechnology:

During the 1990's the number of biotechnology companies in the City of Toronto and surrounding region multiplied dramatically, thanks to new sources of investment capital, entrepreneurial drive from academia, support from Toronto's diversified business community and the municipal governments. More than anything else, this growth and development has occurred because the Bio-Medical research community in Toronto, and our research scientists, truly are world class.

The biotechnology sector in Toronto has been in existence for only 15 to 20 years, with dramatic growth having been demonstrated over the last five years as the sector has begun to mature. Toronto is Canada's leading region in industrial biotechnology with the largest cluster of companies, now in excess of 100 and representing approximately 40 percent of the industry. Of the 100+ companies in the Toronto area, more than 25 percent are listed on public stock exchanges, providing an indication of their pending maturity as business entities. It should also be acknowledged that Canada is the second largest biotechnology nation, world-wide, in terms of number of companies and revenues generated from this technology.

After years of research, a number of Toronto companies will soon be ready to move into full scale commercial production, generating significant revenues and creating a large number of permanent high paying career jobs.

The biotechnology sector of the Bio-Medical cluster in the Toronto area ranks in the top seven in North America and in the top 10 in the world. Growth is of the order of 10 to 15 percent annually. The table, shown below, will provide a snapshot of the biotech industry's revenue and employment situation at this time:

Table 1:
Biotechnology Revenues and Employment

Global Market Revenues	$10 to 12 Billion
Canadian Market Revenues	$1.9 Billion
Ontario Revenues	$700 Million
Employment – Canada	12,000 jobs
Employment - Toronto Area	6,000 jobs

Biomedical research in Toronto is predominantly in the application of human health care and diagnostics, however the community is large and diverse. Our researchers have made great advances in such new areas as Proteomics, Genomics and Bio-Informatics.

Within the Toronto area are companies representing both the brand name/research oriented companies and the generic drug manufacturers. Together they make a huge contribution to the health and wealth of the area and make Toronto a major international centre for pharmaceutical research and development. More than half of Canada's brand name industry is located in the Toronto area, Eli Lilly, GlaxoSmithKline, Astra Pharmaceuticals and Ortho Pharma to name but a few. Eighty percent of Canada's expanding generic drug businesses also call Toronto home, including Apotex and Novopharm.

The last eight years has seen R&D spending increase by more than 200 percent injecting more than $1.5 billion into the Ontario economy. In 1999, alone, Ontario received $382 million in research funding from the brand name pharma companies, representing 45 percent of the total spent in Canada. The vast majority of the research is taking place in the Toronto Area. The existence of major pharmaceutical companies in Toronto is critical to the successful development of the Bio-Medical cluster.

Strategic Priorities for Bio-Medical Cluster:

In order for Toronto and in fact Canada to continue to play a significant role in the global market place in one of the world's fastest growing sectors a concentrated and focused effort by all levels of government, institutions, and private sector must be undertaken. The City of Toronto has an opportunity to be a key player and a major beneficiary in putting Canada on the radar screen as 'the' most innovative and leading edge Bio-Medical community in the world.

There are four areas that need support within a co-ordinated action plan:

(1) Branding/Marketing Opportunities: Raising awareness of the concentration of the Bio-Medical cluster within the City;

(2) Commercialization of Research Biotechnology Incubator: Supporting entrepreneurship;

(3) Support Research and Invest in Innovation in Toronto: Attract and grow Research Institutions and businesses; and

(4) Bio-Medical – Team Toronto: Establish a Team Toronto to advocate, action and implement.

(1) Increase Awareness of Concentration of Bio-Medical Cluster

Toronto is a major world class centre for health care research. World-renowned senior scientists are found at the University of Toronto, Faculty of Medicine, and at research institutes at Mount Sinai Hospital (The Samuel Lunenfeld Research Institute), The Hospital for Sick Children, The Ontario Cancer Institute (Princess Margaret Hospital), Sunnybrook Health Science Centre, St. Michael's Hospital, Women's College Hospital, The Centre for Addiction and Mental Health and at other hospitals and health institutions in the area. Altogether more than 7,000 people are employed directly by the medical research community in Toronto as researchers, technicians and support staff.

The University of Toronto anchors the R&D infrastructure with the largest medical faculty in North America and national centres of excellence in neurobiology, cardiovascular disease and biomaterials. A highly developed research structure encompasses five health science centres working closely with specialized institutes, centres and groups closely affiliated with the university. Together they pursue a diversified range of research in cancer, immunology, cardiology, bone diseases and diabetes.

The hospitals and University are highly concentrated and form what can truly be called a medical Discovery District. The area roughly bound by Bloor, Bay, Dundas West and Spadina has been the location for numerous research breakthroughs and medical "firsts". Toronto has a history of pioneering achievements including the discovery of insulin, the development of the original heart pacemaker, the world's first single lung transplant in 1981 the development of anti-rabies vaccines and Pablum, the world's first baby food. Attachment No. 1 provides a glimpse into some of the spectacular medical discoveries that Toronto's principal medical researchers have achieved during the last 50 years.

The medical research community in Toronto spends more than $400 million dollars in medical research activities annually. Many of the institutions have now indicated the need to physically expand to accommodate additional research capacity.

Branding the Discovery District may be one marketing initiative to increase the profile of research and innovation that is occurring in the City. Toronto is home to some of the most creative and advanced research and development communities in the world. Some of the most outstanding scientists are right here working on new techniques and innovative technologies. Identified below, are two suggestions whereby recognition could be given to the ground-breaking discoveries that have taken place in our centres of research.

It would be appropriate to identify the downtown area bounded by Bloor Street and Dundas Street and from Bay Street and Spadina Avenue as the "Discovery District". This could involve placing specialized street signs or banners at appropriate intersections identifying the area as such. Also, there may be an opportunity to establish a "walk of fame" on University Avenue, by placing medallions in the sidewalk that will identify and profile Toronto's scientists who have made significant contributions to scientific research and the pursuit of knowledge, thereby bringing much increase to Toronto's competitive position. It is recommended that City staff review with the University of Toronto, the major hospitals, research institutions and property owners within the "Discovery District", and with Bio-Medical companies who invest in and benefit from medical research programs, the development of joint marketing opportunities, including the possibility of establishing a medical discovery "walk of fame".

(2) Commercialization of Research through supporting Biotech Incubator

In spite of Toronto's advantageous standing in the biotechnology industry, both nationally and world-wide, it is currently one of the last major urban centres without an innovation centre devoted to this sector. Without such a facility, Toronto - poised to lead the wave of biotechnology - could miss the biotechnology revolution and the associated economic boom.

Canada's biotechnology and pharmaceutical industries have recently experienced unprecedented growth. Toronto has the opportunity to sustain global competitiveness in biotechnology innovation by establishing a cluster of biotech companies which will draw their creative strength from the nation's largest, and most successful, centre of academic and hospital based Bio-Medical research.

Though no formal biotechnology business incubation facilities have been available for these fledgling companies, incubation space has been provided by academic institutions such as the University of Toronto, York University and the teaching hospitals and research centres located on University Avenue. Most recently, however, research programs at these centres have also dramatically increased to the extent that they are no longer able to provide this critical support to companies that are being formed around their emerging scientific discoveries. This pressure is causing one of two situations to occur; either the entrepreneurial scientists are not forming the spin-off companies to develop the commercial opportunity of their science or the companies are being pushed "out of the nest" prematurely thus increasing the risk of business failure.

The Toronto Biotechnology Commercialization Centre (TBCC) is a non-profit corporation formed by a consortium of all of the life sciences funded institutions, including the University of Toronto, seven of Toronto's leading teaching hospitals, the City of Toronto and the HRDC ministry of the Government of Canada. These research institutions spend over $400 million on R&D each year and comprise the fourth largest medical research community in North America. Their objective is to establish a 100,000 square foot incubator facility for up to 70 start-up biotechnology companies in Toronto. In addition to supporting 70 companies by providing wet laboratory research space and general office facilities, additional space would be made available to eight to 10 support service providers, including law firms, consultancies, marketing firms and venture capital companies who need to maintain a storefront at the commercialization centre.

This incubator would make Toronto the place to be in biotechnology for the foreseeable future. It will create thousands of new jobs, turning the "brain drain" into a "brain gain". With the establishment of the commercialization centre, the City will increase the number of spin-off companies emerging from its universities, hospitals and research institutes and significantly enhance the probability of their success. Conversely without the commercialization centre, Toronto would be hard-pressed to keep up with the advancing wave of thriving biotech development.

On June 19, 2000, the TBCC received a $9 million commitment, in matching funds, by the Ministry of Energy, Science and Technology of the Government of Ontario, to be used towards the creation of this business incubator. The cities of London and Ottawa also received commitments totalling $10 million towards the creation of biotech commercialization centres in their communities. Access to these funds is assured for London and Ottawa as matching amounts have been committed by their municipal governments. Until similar matching funds are found by the initiative in Toronto access to the $9 million commitment is not possible, and could be lost.

Because of the City's present budget difficulties it has not yet been possible to secure matching funds. Staff is now exploring alternatives with respect to providing the required matching contribution. One option could be offered under Section 28 of the "Community Improvement Section" of the Planning Act which would allow the City of Toronto to provide tax equivalent grants to the commercialization centre. Under this legislation the City would adopt a community improvement plan that includes support for the centre as a stated policy. This would allow the City to forego a portion of the

municipal taxes that it would collect on the property. This would make centre's business plan more financially viable by reducing its costs related to the property taxes and allow the TBCC a means to access the $9 million commitment in matching funds from the Ministry of Energy, Science and Technology.

Staff is also exploring the use of the Share Capital Corporations provisions of the Municipal Act whereby the City can provide facilities and services to assist for-profit small business start-ups at lower than market value rents. Other municipalities in Ontario are using these provisions to provide direct, or in-kind, support to their incubator facilities. It is recommended that City staff review alternative financing opportunities whereby financial support could be provided towards the establishment of an innovation/commercialization centre in Toronto using such mechanisms as those noted above.

(3) Support Research and Invest in Innovation in Toronto: Attract and Grow Research Institutions and Businesses

There is a constant need for innovation in the Bio-Medical field. Industry Canada, in their report, "Pathways to Growth: Opportunities in Biotechnology", advised that most countries have targeted biotechnology as vital for the 21st century and are pouring enormous resources into research, development and financing infrastructure. To ensure Canada's future success, government at all levels must work with industry to support the growth of this dynamic, highly productive sector, which has the potential to provide the wages, employment and other spillovers into the overall economy.

The Government of Ontario's Ministry of Energy Science and Technology confirms that Canada's health science sector, particularly biotechnology, is in the same position today as the telecommunications sector was 10 to 15 years ago - poised to take off to a degree that is hard to imagine.

It is increasingly apparent, that technological advancement is emerging at the heart of economic progress. For Toronto to compete, and win, in this new economy we need to ensure and facilitate the transition by fostering technological innovation. Statistics Canada notes that of all industries, high tech or otherwise, the biotechnology sector generates the highest number of spin off companies and secondary jobs.

Toronto's history of pioneering achievements includes the discovery of insulin and the development of the original heart pacemaker, from anti-rabies vaccines to Pablum, the world's first baby food. Toronto's scientists have indeed made their mark. Today, the list of breakthroughs include the isolation of the T-Cell and dopomine receptors, the Ryanodine receptor, and genes for Cystic Fibrosis, Myotonic Dystrophy, Fanconi Anaemia, Alzheimer's Disease, Breast Cancer and most recently Prostate Cancer. This record of scientific achievement drives the medical industry in Toronto to the very forefront of technical innovation and discovery.

Another key strategy will be to continue to pursue key medical research institutions and the attraction of researchers to Toronto. Project MARS (Medical and Related Sciences) and Genome Ontario are two initiatives that increase the City's research capabilities.

(a) Project MARS (Medical and Related Sciences)

A group of leaders in the Bio field have developed a vision called Project MARS. This will establish, adjacent to the University of Toronto, a large complex of research institutes and business facilities, banks, venture capital companies and other special services required by research intensive businesses. Their goal is to see the College and University area as the largest complex in Canada and in North America. The complex would include a wide range of special services for knowledge based companies and even affordable housing for young researchers.

MARS will be the fusion point for invention, investment, development and marketing of medical discoveries. It will bring together the ideas, the organizations and the finances to generate a multi-disciplinary medical "knowledge factory". The short range plans (three to five years) for MARS call for more than 2 million square feet of additional research facilities in Toronto and five to seven million square feet in seven to ten years.

Though they do not have a formal relationship with the MARS project at this time, the TBCC do support the MARS vision. The biotechnology commercialization centre is a logical first building block for the concept of a high technology complex of this type. The Economic Development Division will be contacting the MARS leaders as focal point to facilitate the Bio-Medical Cluster action plan.

(b) Genome Ontario

Ontario's scientists have contributed strongly to establishing Canadian involvement and leadership in genomic science over the last two decades. Toronto's scientists have had major success in cloning disease genes and establishing world class protein structural groups.

Following the establishment and re-funding of Genome Canada in early 2000, a group of researchers in Ontario formed Genome Ontario to promote the establishment and funding of a genome centre in Ontario. Applications for grants in the order of $200 million were made in January 2001. Toronto based researchers have already received $37 Million from this funding source. Ensuring this centre is located in Toronto's Discovery District is of major importance.

(4) Bio-Medical – Team Toronto: Establish a Team Toronto to advocate, action and implement a cluster action plan.

In addition to the City, there are a number of key stakeholders that support the advancement of the Bio-Medical cluster. They include the University of Toronto, the major hospitals, research institutions, property owners within the "Discovery District", Bio-Medical companies and the senior levels of government.

In order to strategically align the intentions and activities of these players it is proposed that the City convene a round table focus group to develop an action plan to advance Toronto's competitive position as a biotechnology leader in North America. An action plan would further refine the issues noted above, develop and implement strategies to resolve problematic issues and capitalize on research and growth opportunities. Ideally, an action plan would also develop a communications campaign to increase awareness about the Bio-Medical cluster and advocate for its support from senior levels of government.

Conclusions:

The Bio-Medical economic cluster in Toronto is the largest in North America and a key contributor to the City's recent economic growth. Toronto has the largest cluster of companies in Canada representing approximately 40 percent of the nation's industry. In order for Toronto to maintain its leadership position and to continue to play a significant role in the global market place, a concentrated and focused effort by all levels of government, institutions, and private sector must be undertaken.

To secure the City's place as one of the most innovative and leading edge Bio-Medical communities in the world there is a need for the stakeholders to develop an action plan to advance Toronto's competitive position. It is proposed that the City convene a round table focus group with the University of Toronto, the major hospitals, research institutions, Bio-Medical companies and property owners to create and implement strategies that raise the awareness of the importance of the Bio-Medical cluster through branding and marketing, support the further commercialization of biotechnology research including the creation of a biotech incubator, support new research, investment and innovation activities in Toronto, attract and grow research institutions and businesses and that establish a Team Toronto to advocate for and implement initiatives benefiting both the cluster and the City.

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Attachment No. 1

Toronto Bio-Medical Discoveries
Faculty of Medicine: University of Toronto
So What Have We Done Since Banting and Best?

1948 Dr. W.G. Bigelow begins studies of hypothermia as a means of performing open-heart surgery and designs the first electrical cardiac pacemaker.

1957 Surgeon Robert Salter designs an operation to correct congenital hip dislocations.

1961 Drs. James E. Till and Ernest A. McCulloch discover the hemopoietic stem cell. This is the basis for bone marrow transplantation, which is a highly successful clinical story today.

1962 Dr. Harold E. John establishes Canada's first Department of Medical Biophysics and develops cobalt therapy units which revolutionise radiation treatment of cancer around the world.

1963 Dr. W.T. Mustard perfects his surgical method for correcting the "blue baby" syndrome.

1970 Dr. Aron Rappoport, a pioneer in hepatic research, discovers the physiological and pathophysiological significance of liver acinus, a functional unit that also explains some characteristics of liver blood flow.

1978 Dr. Cecil Yip identifies the insulin receptor.

1981 Drs. Griffith Pearson and Joel Cooper perform the world's first single lung transplant.

1981 Dr. Harald Sonnenberg, with A.J. DeBold and G. Flynn from Queen's University, discovers the atrial natriuretic factor, a hormone secreted by the atrium of the heart. This hormone is believed to have an effect on salt balance thus affecting blood pressure regulation.

1984 Dr. Tak Mak helps identify the T-cell receptor gene, a major advance in our understanding of the body's immune system.

1988 Surgeons Alan R. Hudson and Susan E. MacKinnon perform the world's first nerve transplant on a nine year old boy.

1988 Dr. Victor Ling discovers the process which cancer cells use to resist anti-cancer drugs.

1989 Medical researchers Drs. Lap-Chee Tsui, Manuel Buchwald and Jack Riordan announce they have isolated the gene that causes cystic fibrosis.

1989 Dr. David MacLennan identifies the cause of malignant hyperthermia and develops a DNA based test for the pig industry contributing to our understanding of muscle membranes and ion transport.

1989 Dr. George Alexander Patterson performs the first double lung transplant.

1990 Dr. Tony Pawson discovers that cancer cells will grow without the stimulation of the SH2 domain, an element, which allows cell proteins to interact and transmit growth signals.

1991 Dr. Mladen Vranic discovers new mechanisms involved in regulation of glucose turnover, a key to understanding the pathogenesis development of diabetes. This is important for treatment strategies.

1991 Dr. Philip Seeman identifies two new dopamine receptor proteins, D4 and D5, clearing the way to finding more effective and safer medicines for treating psychosis, schizophrenia and possibly cocaine addiction.

1992 Dr. Peter St. George Hyslop identifies a defective gene on chromosome 14, which may be responsible for familial Alzheimer's disease.

1993 Dr. Philip Seeman discovers that the D4 receptor, one of the five known types of brain cell receptors for the chemical dopamine, is six times more abundant in people with schizophrenia than in other people.

1993 Dr. David Jenkins discovers that diets high in soluble fibre reduce blood cholesterol levels, even after significant dietary reductions in saturated fat and cholesterol have been achieved.

1994 Dr. Endel Tulving, one of three scientists awarded the annual Killam Memorial Prize, proves that different areas of the brain are activated when different types of memory are engaged.

1994 Dr. Anthony J. Pawson is the recipient of the Gairdner Foundation International Award with Dr. Tony Hunter of The Salk Institute in recognition for their contributions to our understanding of the role of tyrosine kinases in signal transduction pathways that control cell growth.

1994 Drs. Philip Seeman, Hyman Niznik and Hubert Van Tol are the recipients of the 1994 Prix Galien for Research in recognition for their illumination of the receptor basis for therapy of schizophrenia and of Parkinson's disease and their discoveries and cloning of four dopamine receptors.

1995 Dr. Peter St. George-Hyslop in collaboration with Dr. Joanna Rommens and international colleagues identified and cloned the mutations on the gene that causes early onset Alzheimer's disease. This is a rare but extremely aggressive form of Alzheimer's disease, which affects individuals aged 30 to 60.

1995 Dr. Peter St. George-Hyslop and his colleagues identified a second gene responsible for early onset Alzheimer's Disease within two months of the first discovery. The second gene, located on chromosome one is associated with a less severe form of familial Alzheimer's.

1996 Dr. Bibudhendra Sarkar developed an effective treatment of Menkes disease which is a genetic neurological disorder that kills children with the disorder before the age of three. The disease is caused by a defect in the transport of copper, which is required for the activity of many life-sustaining enzymes. The effectiveness of this treatment has been proven in two Canadian patients who are still living at age 20 and 10.

1996 Dr. Jeff Wrana and Dr. Liliana Attisano identified a gene, which can lead to colon cancer.

1996 Dr. Don Low lead a network of laboratories in Ontario to study the severe invasive group A streptococcal disease (flesh-eating disease). This study has made it possible to identify those that are at the greatest risk of developing the disease, thus enabling the development and implementation of control and prevention of this disease.

1996 Dr. Brenda Gallie and co-workers developed a new therapy for retinoblastoma, a cancer of the eye that leads to blindness. The new therapy has revolutionized the saving of eyes and prevention of blindness. It represents the first major change in the management of this disease in 35 years.

1996 Dr. James Rini using x-ray crystallography solved a crucial part of the structure of a cell membrane protein called e-cadherin. This protein suppresses cancer cell invasion, and tumours, which have lost the function of this protein through mutations of this part of the structure, are much more diffuse and metastatic.

1996 Dr. Robert Salter discovered an effective method of regenerating joint cartilage in a severely damaged knee joint in patients. Joint cartilage normally has little ability to regenerate. This new method will greatly enhance the recovery and repair of damage joint cartilage.

1996 Dr. Michael Moran and colleagues discovered that a protein called GRB2 found inside a cell functions as a kind of On-Off switch responsible for turning on or off the signalling for cell growth and division elicited by growth factors. This discovery lays the groundwork for the development of drugs targeting this protein to prevent cancer cells from responding to growth factors to grow and divide.

1996 Dr. Dan Drucker and his co-workers discovered that the peptide hormone called GLP-2 (Glucagon-Like Peptide 2), normally found in the body, can powerfully stimulate the growth of the lining of the small intestine which is vital to digesting food. This discovery may well result in major benefits for patients with severely compromised intestinal function, allowing treatment that will grow new cells in the lining of the small intestine.

1996 Dr. Shoukat Dedhar and his colleagues have discovered ILK, a protein kinase, which has revealed new ways in which cell adhesion via integrins can signal. It has also demonstrated for the first time that an integrin associated protein can behave as an oncogene when overexpressed or when expressed inappropriately. ILK is overexpressed in the human breast and prostate carcinomas.

1997 Dr. Tirone David and colleagues culminated fifteen years of research, that studied ways to improve the hemodynamic performance and durability of porcine aortic valves, with the approval of the Federal Drug Administration. The valve had previously been approved in Canada and most of Europe. The research process, from animal model through clinical trials to patient care, provides a stentless porcine prosthesis, which is far superior to the previous treatment.

1997 Dr. Ren-Ke Li, a staff scientist with the division of Cardiac Surgery, demonstrated that cell transplantation can improve cardiac function. He demonstrated that transplanted cardiomyocytes survive in myocardial scar tissue and form a cardiac tissue, which limits scar expansion and improves heart function. In addition cardiomyocytes and vascular endothelial cells stimulate angiogenesis in damaged myocardium. These data suggest that cell therapy could be a means to repair broken hearts or to treat ischemic heart diseases.

1997 Dr. Christopher Feindel developed a new technique for preserving hearts for transplantation by using the shed blood from a donor to provide nutrient blood flow to the heart prior to being transplanted into the recipient. The recycling of donor blood can increase the safe preservation of the heart from four to eight hours in a pig transplant model. Clinical trials are underway.

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Councillor Brian Ashton, Ward 36 Scarborough Southwest, appeared before the Economic Development and Parks Committee in connection with the foregoing matter.