

Original Submission - Prasad

APPLICATION FORM To Name Streets, Parks & Civic Properties

Please complete the attached application form for all new name submissions and requests for re-naming a street, park, or other civic properties.

Name: A. MABOOD QURESHI
 Address: Pathology and Laboratory Medicine College of Medicine, Univ. of Saskatchewan / Saskatoon Health Region, Royal University Hospital, 103 Hospital Drive
 City/Town: SASKATOON Province: SK Postal Code: S7N 0W8
 Phone: 306-655-6949 E-mail: mabood.queshi@saskatoonhealthregion.ca
☒ New Name Submission ☐ Re-naming Request

Requested Name(s) (please print):

DR. KAILASH PRASAD

Requested Use of Name:

☒ Street ☐ Park ☐ Municipal Facility
☐ Neighbourhood ☐ Other ☐ Any of the Above
☐ Suburban Development Area

If this is a request for re-naming an existing location, please indicate the current name:

PLEASE INCLUDE THE FOLLOWING INFORMATION AS PART OF YOUR APPLICATION
 (Indicate which items are attached to the application form)

- 1 Background Information (Reason for request)
- 2 Short Biography (Given name, date of birth/death, place of birth, contributions, awards, achievements, or other relevant information)

Do you wish to speak to the Naming Advisory Committee? ☐ YES ☒ NO

Please send the completed application form to:

City of Saskatoon Naming Advisory Committee
 Community Services Department: Planning & Development Branch
 222-3rd Avenue North
 Saskatoon, SK
 S7K 0J5

BACKGROUND INFORMATION

Dr, Kailash Prasad has made outstanding contribution to the city of Saskatoon, province of Saskatchewan, Canada and internationally in two ways. Outstanding professional achievements, and exceptional dedication to service.

A. Outstanding Professional Achievements that brings considerable benefits to the city of Saskatoon, province of Saskatchewan, Canada, and Internationally

1.MEDICAL USES OF FLAXSEED AND ITS COMPONENTS

Dr. Prasad have been doing the research on the flaxseed and its components from the last 26 yrs .This discovery stated in 1990 when a farmer came to him to enquire if he can find out how flaxseed intake cured his benign prostatic hypertrophy (prostate enlargement) . Dr. Prasad mentioned to him that he does not do research in prostatic disease but he does research in heart and blood vessel disease. The gentleman from the farmer community , next day brought him a big bag of flaxseed for research. His research showed that flaxseed lowered the blood bad cholesterol and reduced the development of hardening of the artery (atherosclerosis). He got very much interested in finding out three things: 1. what is the active ingriedients?; 2. What are the effects of flaxseed and its active ingradient? ;and 3. what types of diseases can be prevented/ treated with flaxseed and its components? These questions were new. Firstly he tried to find out the active components. Flaxseed contains 35% of its mass as oil, of which 55% is alpha linolenic acid (Omega-3 fatty acid) and 15% is linoleic acid. Flaxseed is rich source of omega-3 fatty acids and the richest source of plant lignans. Lignan ,the active ingredient of flaxseed is called secoisolariciresinol diglucside (SDG) was isolated from flax meal which is devoid of oil. SDG content of flaxseed varies from 0.6 to 1.8gram/ 100gram.

a. Pharmacological activities: He was the first to discover the following pharmacological activities of flaxseed and its components

I. Antioxidant activities: Flaxseed and its components have antioxidant activity and is due to SDG content of flaxseed. Antioxidant activity of is 1.25 times more than that of vitamin E. Metabolites of SDG have greater antioxidant activity than SDG. Flaxseed reduces the generation of oxygen radicals (toxic metabolites of oxygen) from white blood cells. Oxygen radicals cause many types of diseases. Reduction in the levels of oxygen radicals by flaxseed and its components will prevent the development of oxygen radical-induced diseases.

II. Cholesterol lowering activity:

Flaxseed and its components reduce bad cholesterol (total cholesterol, LDL-cholesterol, triglycerides) and raise good cholesterol(HDL-cholesterol) in the blood.Bad cholesterol is involved in the development of atherosclerosis(thickening of the arterial wall and reduction of lumen of the artery and hence reduction in blood flow to the artery causing heart attack and chest pain, stroke and pain in the leg(intermittent claudication). Good cholesterol reduces the development of atherosclerosis and hence prevent the development of heart attack, stroke intermittent claudication. Flaxseed oil did not affect serum cholesterol.

III. Blood pressure lowering activity:

SDG, the active component of flaxseed lowers the blood pressures through stimulating guanylate cyclase and by inhibiting angiotensin converting enzyme. This effect of flaxseed component will be useful in the treatment hypertension(high blood pressures).

IV. Blood glucose lowering activity:

Dr. Prasad has reported that SDG lowers blood glucose through suppression of PEPCK enzyme. This effect of flaxseed will be helpful in the prevention/treatment of type 1 and type 2 diabetes. Flax oil does not affect serum lipid and glucose.

V. Antiinflammatory effects of flaxseed and its components:

Flaxseed components have anti-inflammatory effects. This effect would have antiatherosclerotic effects because inflammation takes part in the development of atherosclerosis

VI. Toxicity of flaxseed and its components:

Dr. Prasad has reported that flaxseed and its components does not have deleterious effects on liver, kidney and blood cells.

b.. Prevention/treatment of diseases with flaxseed and its components:

I. Atherosclerosis:

- i. Suppression of atherosclerosis: Suppression of atherosclerosis is prevention of development of atherosclerosis in individuals with risk factors for development of atherosclerosis. Both flaxseed that has omega-3 fatty acids and that has no omega-3 fatty acid prevented the development atherosclerosis by 46% and 69% respectively. SDG prevented the development of atherosclerosis by 73% and this effect was associated with reduction in bad cholesterol and the levels oxygen radicals and an increase in the levels of good cholesterol. Flax lignin complex prevented the development of atherosclerosis by 34% and this effect was associated with reduction in blood levels of bad cholesterol and oxygen radicals, and increase in the blood levels of good cholesterol. Flaxseed oil did not prevent the development of atherosclerosis.
- ii. Slowing of progression of atherosclerosis: In subjects who already have atherosclerosis, the potential benefits of flaxseed and its components or any drug would be if they slow the progression of atherosclerosis and/or regress the already developed atherosclerosis. Dr. Prasad has shown that flax lignin complex slows the progression of atherosclerosis by 31% and this associated with its antioxidant activity. SDG slows the progression of atherosclerosis.
- iii. Regression of Atherosclerosis. Regression of atherosclerosis means that the drug reduces the already developed atherosclerosis. SDG and flax lignin complex regressed atherosclerosis.

II. Hypertension:

Dr. Prasad reported that SDG is a very long acting blood pressure lowering agent and this effect is mediated through guanylate cyclase enzyme and through inhibiting angiotensin converting enzyme (ACE). Other ACE inhibitors are in the market for the treatment hypertension.

III. Angiogenesis(formation of new blood vessels) in the heart:

Heart attacks occurs when the blood vessels of the heart is narrowed or blocked. Any drug which can regenerate new blood vessels would protect the heart from damage. We have shown that SDG compound generated new blood vessels in the heart and

hence protected the heart from injury after blockage of the arteries of the heart. We have also shown that SDG reduces the remodeling of heart after the heart attack.

IV. Diabetes :

Incidence of diabetes is very high in Saskatchewan and Canada, and worldwide. It is very high, especially in aboriginal people in Canada. The complications of diabetes include, heart disease (heart attack, chest pain), stroke, neuropathy (nerve damage), nephropathy (kidney damage), retinopathy (eye damage), and foot damage (foot ulcer, amputation). Oxygen radicals have been implicated in the development of diabetes. Dr. Prasad investigated the effects of SDG (flaxseed component) on type 1 and type 2 diabetes. He showed that SDG treatment prevented the development of type 1 diabetes by 75% and this effect was associated with reduction in the oxygen radicals. SDG prevents the development of type 2 diabetes by 73-75% and delays the development of diabetes.

Outcome of studies on flaxseed and its components:

A. Benefits :

Flaxseed and its components would be of value in (as)

- a. the prevention, slowing of progression and regression of atherosclerosis, heart attack, stroke and peripheral vascular diseases.
- b. Prevention and treatment of hypertension (high blood pressures).
- c. Prevention and treatment diabetes. The use of flaxseed and its compounds in families with a history of diabetes would prevent the development of diabetes and its complications. It will be of great value for the prevention of diabetes in First Nation people where diabetes is very rampant.
- d. lowering bad cholesterol and raising good cholesterol.
- e. an antioxidant like vitamin, ETC.

B. Patents: Dr. Prasad was granted EIGHT PATENTS (5 USA and 4 Canadian patents) for his work on the medical uses of flaxseed and its components.

C. FDA (Food and Drug Administration) of USA and Health Canada (Canada's Natural Health Products Directorate) Approval:

FDA and Health Canada have approved BeneFlax^R (Flax Lignin Complex compound) as sole therapeutic, nutraceuticals or adjuvant therapy for hypercholesterolemia, atherosclerosis, heart disease, stroke, hypertension, and diabetes and as an antioxidant in 2007.

D. Commercialization and Royalty:

Archer Daniel Midland (ADM) has signed a contract to produce and market the products as nutraceuticals and pharmaceuticals. FDA approval was granted in 2006 and ADM launched marketing in 2007. The royalty was paid to the University of Saskatchewan and the discoverer (Dr. Prasad).

SIGNIFICANCE OF THIS STUDY

This new discovery has three benefits: Patient health, social impact and economic impact.

- A. Patients health: The use of flaxseed and its components would improve the health of patient by preventing the development of certain diseases and slowing the progression and regressing the disease.
- B. Social impact: The morbidity and mortality associated with the heart disease, stroke, hypertension, and diabetes their complications will be reduced/ prevented. This will reduce the burden of illness to the society, and the overall health care costs, and permit these individuals to return to work place and be productive members of the society.
- C. Economic impact: The economic impact is very high. Firstly, the demand offlaxseed and its components will increase which will require an increase in flaxseed production and hence an increase in employment in rural areas of flax growing provinces like Saskatchewan, Alberta and Manitoba, and help the economy.. This will bring value-added economic benefits to the flax growers of Canada and improve the rural economy. Secondly, prevention and cure of these diseases with flaxseed and its components will markedly reduce the health care costs, social and economic burden to society.

2. PHASE INVARIANT SIGNATURE ALGORHYTHM FOR EARLY DETECTION, LOCALIZATION AND QUANTIFICATION OF ISCHEMIC HEART DISEASE

Ischemic heart disease is due to blockage of the artery supplying the heart. Ischemic heart disease results in chest pain, heart attack and heart failure. When individual gets chest pain, it already too late. I wanted to develop an equipment which could detect ischemic heart disease much earlier than common electrocardiogram (ECG). Normal ECG is recorded at 60 cycles. There are lots of information available when recorded at very high frequency. In collaboration with an engineer, a machine called Phase Invariant Signature Algorhythm (PISA) was developed. This concept uses high frequency electrocardiogram (5-12 kilohertz). The graphic representation of the characteristic properties of cardiac system processed by PISA is called PISA signature and is straight line in healthy heart. Any ischemic or infection gives spikes locked to particular phase of ECG. Healthy heart has phase-invariant signature but diseased heart has variant signature. This machine can detect ischemic heart disease much earlier than normal ECG, biochemical markers and histology. I went to Wadsworth Medical center, UCLA for one year on sabbatical leave to test this machine in patients with ischemic heart disease. I tested this machine on more than 100 patients. This is a noninvasive method for detection of ischemic heart disease at a very early stage, quantification and localization of ischemic heart disease. This concept has been tried in USA and Sweden

We published – papers. We obtained Canadian Copyright(302414/321) in early nineteen eighty. The concept was licensed to a company in USA.

This device will allow the physicians to detect the ischemic heart disease much earlier – early enough to start treatment before the condition worsened. It will the save the life and prevent complications and related

misery. It will reduce the health care cost reduce the socio-economic cost. locally , nationally and worldwide.

3. sRAGE, A PREDICTOR OF RESTENOSIS FOLLOWING IMPLANTATION OF STENT IN THE BLOCKED CORONARY ARTERY

Chest pain and heart attack (ischemic heart disease) is due to narrowing and/or blockage of coronary artery supplying the blood to the heart. One of the treatment of the ischemic heart disease is to put a permanent stent (tube) in the blocked artery or arteries to allow the blood to circulate unobstructed to the heart muscle. This is a minimally invasive procedure to relieve chest pain, improve prognosis and minimize or stop heart attack without having to undergo heart surgery and is called Percutaneous Transluminal Coronary Angioplasty (PTCA). The problem with this procedure is that the blood vessels get blocked again with time and this is called restenosis. Restenosis is a major adverse outcome for long –term success after stent implantation. The restenosis is very high with a kind of stent called bare metal stent. Presently there is no technology available for predicting restenosis in patients who undergo stent implantation. His laboratory developed a marker which can tell which of the patients undergoing stent implantation will develop restenosis after stent implantation. He showed that a low levels of a chemical called soluble receptor for advanced glycation end products (sRAGE) in the blood before stent implantation can predict the development of restenosis. This (sRAGE) biomarker will predict which patient undergoing stent implantation will develop restenosis following stent implantation.

SIGNIFICANCE: Firstly, this prediction will allow the physicians/cardiologists to treat the patient with agents that increases the levels sRAGE and decrease the levels of advanced glycation end products (AGEs) before and after stent implantation. the treatment will reduce/prevent the development of restenosis. Secondly, this prediction will allow the cardiologists to select type of stent where restenosis is less common but side effects and costs are greater than bare metal stents.

This type of decision making process will reduce the incidence of restenosis following stent implantation and associated health care costs, suffering and other social and economic burden to the society.

He received an US patent for this discovery in 2013.

4. AGEs/sRAGE a universal biomarker/risk factor for diseases

The concept was that low levels of sRAGE in the blood is a biomarker of the diseases. Dr. Prasad, however, has reported that it is not the low blood levels of sRAGE but the elevated level of the ratio of AGEs/sRAGE is the universal biomarker/risk marker of the diseases such as ischemic heart disease, diabetes, chronic kidney disease, etc. This concept is being accepted by the research community.

B. EXCEPTIONAL DEDICATION TO SERVICE TO THE CITY OF SASKATOON, PROVINCE OF SASKATCHEWAN, CANADA AND INTERNATIONALLY

1. Academic service:

Dr. Prasad was full professor in the department of physiology, college of medicine, University of Saskatchewan from 1973 to 1997. During that period, he taught medical

students, residents, and did research. He received **Preclinical Teacher of the year Award twice from medical students for excellence in teaching**. Twenty-eight students received MSc. and PhD degree under his supervision. One student received BSc. degree in Medicine under his supervision. He supervised 13 post-doctoral fellows, 9 clinical research fellows, 3 visiting professors from china and Russia and 1 medical student from UK. He published 250 full length papers in refereed journals, 32 book chapters and 234 abstracts. He gave 135 invited presentations in national and international conferences . He co-edited a large Textbook of Angiology(1362 pages) in 2000 for the benefits of physicians, cardiologists, cardiovascular surgeons, interns and residents, medical; students, and other allied health professionals. Royalty from the book was donated to the International College of Angiology.

2. Academic and other services after retirement in 1997:

He retired as professor emeritus in 1997. The followings are his achievements after his retirements. Since 19 years, he is still doing research, training graduate students, mentoring clinical researchers, and doing some teaching. After retirement , he has published 93 full length papers in refereed journals and 20 book chapters, co-edited a large Textbook of Angiology (1362 pages) and gave 59 invited presentations internationally. Six students received MSc./PhD degree under his supervision. He served on the advisory committee of 10 MSc./PhD students and supervised 2 post-doctoral fellows. He was external examiner for 13 MSc./PhD students. He was granted 10 USA and Canadian patents for his scientific discoveries. He got USA and Canadian FDA approval for flaxseed compound for health benefits. After his retirements he received 10 prestigious awards for academic achievements and service to the community worldwide. He is still serving the International College of Angiology in the capacity of Chairman of the Board of Directors and Consulting editor of International journal of Angiology. He is still doing research at the University of Saskatchewan and in collaboration with a heart surgeon at the Yale University School of Medicine, New Haven , Connecticut , USA. I do not know anybody serving the academic community for 19 years without any remuneration. This is highly praiseworthy.

3. International service which brings name to Saskatoon, province of Saskatchewan, Canada

- a. Dr. Prasad has served in numerous international organizations, including International College of Angiology, American College of angiology, and International Academy of Cardiology. His extensive and quality service in International College of Angiology is very praiseworthy. International College of Angiology (ICA) is a nonprofit organization comprised of cardiologists, cardiac and thoracic surgeons, internists, vascular surgeons, organ transplant surgeons, neurologists, nephrologists, interventional radiologists, anesthetics and basic scientists from all over the world. He joined the ICA in 1974 and became its vice-president in 1988. He worked very hard with Professor John B. Chang, adjunct Clinical Professor of Albert Einstein college of medicine, New York and chairman board of directors of ICA to improve the status of the ICA. He was the key member of the ICA. He became President and member of the board of directors of the ICA in in 1995. He stayed as president for two years and remained member of the board of directors till 2015. He became chairman of the scientific committee in 1995 and remained in that position till 2015.

He became the Chairman of the Board of Directors of ICA in 2015. He has been the Chairman of the John B. Chang Research Achievement award and young investigator award committee since 1996.. He was very much involved in the establishment of a new journal called International Journal of Angiology (IJA). First he was the senior editor of the editorial board of the IJA and then became the consulting editor of the IJA. He worked hard to improve the stature of the ICA and IJA.

Based on his excellence in academic career, research and service to the International College of Angiology, the ICA honored him with following four distinguished awards.

- I. **Professor John B. Chang Research Achievement Award** for excellence in research and scholarly activity at the 27th Annual World Congress of ICA in Helsinki, Finland, 1995.
- II. **Distinguished Service Award** for significant contributions in cardiovascular medicine, and valuable long-term service to International College of Angiology for promotion of research, education and health, at 50th Annual World Congress in Innsbruck, Austria, 2012.
- III. **Professor Kailash Prasad Oration Lecture** was established by International College of Angiology to honour Dr. Prasad. This lecture is given annually at the Annual World Congress of ICA.
- IV. **Lifetime Achievement Award** was presented by International College of Angiology in recognition of exceptional accomplishment in the field of research, promotion of education, , service to the International College of Angiology, humanity, leadership, and inspiration to younger generation of physicians at the 58th Annual World Congress in Prague, Czech Republic, 2016.

He was vice-president of the American College of Angiology for 4 years. He has been very much involved in the International Academy of Cardiology. He was a member of the Substance Abuse Committee of the American Society of Clinical Pharmacology and Therapeutics. He had been member of the International scientific advisory committee for conferences in other countries. He has been chairman and co-chairman of scientific session in national and international conferences. Member, Saskatoon Health Oasis, 1999-2005..

Member, Saskatoon Tri-Hospital Cardiac Rehabilitation Program, 1998-2000

He has been member of the editorial board of 9 medical journals. He has been a member of 12 national and international medical societies.

His services to these organizations were very much appreciated by these organizations.

b. Public and Community Service:

I gave public presentations and TV interviews on the following occasions.

Annual Meeting of Flax Growers Western Canada. Topic: Flax in Health Research (video). January 11, 1999.

Annual Meeting of Flax Growers Western Canada. Topic: Uses of Flaxseed and its Components. January 1997.

CBC-TV: Vitamin and garlic and cardiovascular diseases.

CBC-TV: Flaxseed and SDG in prevention of hypercholesterolemic atherosclerosis.

French Language Network of CBC TV has a 15 minute broadcast of Flaxseed Lignans (SDG) on hypercholesterolemic atherosclerosis on Feb. 2, 1997.

Live interview on CBC Radio, Windsor station on Aug. 12, 1996 on Medical Uses of Flaxseed and its Lignans (SDG).

Saskatoon Tri-Hospital Cardiac Rehabilitation Program; Coronary Artery Rehabilitation Group Education Program. Topic: "Antioxidants in the Prevention and Treatment of Cardiovascular Disease".

University to the People Program Series, Midtown Plaza. Topic: "Role of Garlic and Other Antioxidants in Preventing Heart Disease", February 14, 1995.

Therapeutic Update '94. Topic: "Antioxidant Therapy", June 9, 1994.

University to the People Program Series, Midtown Plaza. Topic: "Prevention of Side Effects of High Blood Cholesterol by Vitamin E and Garlic", October 19, 1993.

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Dr. Prasad is very well known for his accomplishments in science and service nationally and internationally. His national and international reputation brings name to Saskatoon, Saskatchewan, and Canada.

C. Honours and Awards:

Dr. Prasad received 45 honours and awards including:

- 1) **Lifetime Achievement Award** was presented by International College of Angiology in recognition of exceptional accomplishment in the field of research, promotion of education, service to International College of Angiology, humanity, leadership, and inspiration to younger generation of physician at the 57th Annual World Congress held in Jakarta, Indonesia, Oct.2, 2015.
- 2) **Earned D.Sc. degree Award** by University of Saskatchewan of Saskatchewan, Saskatoon Saskatchewan, Canada, June, 2015.
- 3) **Prime of Life Achievement Award** by University Saskatchewan Retirees Association, September 22, 2014. This award recognizes the achievements and recognitions after formal retirement from the University of Saskatchewan.
- 4) **Bharat Gaurav Award (Pride of India Award) and Certificate of Excellence** was presented to Dr. Kailash Prasad by Dr. Bhisma Narain Singh, former Governor of Tamilnadu and Assam , and the Honourable Mr. Rajeeb Shukla, minister for parliamentary affairs government of India, in recognition for his contributions and

dedication to worthy causes and his life-time achievements representing India as an expatriate at the ceremony held at the Global Friendship Day, sponsored by the India International Friendship Society, on January 9th, 2014.

- 5) **Distinguished Service Award from International College of Angiology** for significant contributions for cardiovascular medicine and valuable long term service to International College of Angiology to promote research, education and health. 54th Annual Congress, Innsbruck, Austria, Sept 14-16, 2012.
- 6) **Prof. Kailash Prasad Oration Lecture established by International College of Angiology (ICA)** at 49th Annual World Congress, ICA, Vancouver, July 20-24, 2007.
- 7) **Ken Bowman Life-Time Research Achievement Award for Excellence in Cardiovascular Research**, Institute of Cardiovascular Sciences, St. Boniface General Hospital Research Centre and Faculty of Medicine, University of Manitoba, Canada, November 7, 2008.
- 8) **Saskatchewan Centennial Medal from the Government of Saskatchewan** for excellence in research and technology. This medal recognizes individuals who have made significant contributions to the Province of Saskatchewan. February 17, 2006.
- 9) **Golden Wheel Award for excellence in science and technology** – from Rotary Club of Saskatoon, 2005.
- 10) **Innovation Award for creation of new technology for uses of flaxseed and its components** - from University of Saskatchewan and Innovation Place, 2003.
- 11) **John B. Chang Research Achievement Award for excellence in research and scholarly activity** at 27th World Congress of International College of Angiology in Helsinki, Finland, 1995.

SUMMARY OF CURRICULUM VITAE

Name: Kailash Prasad

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College of Medicine
University of Saskatchewan
107 Wiggins Road
Saskatoon SK S7N 5E5 CANADA
Phone: 306 966-6539
Email: k.prasad@usask.ca

Home Address: 358 Assiniboine Drive
Saskatoon, SK
S7K 3Z2, Canada

Citizenship: Canadian

Academic Credentials:

Degrees: B.Sc. (Distinction) – Patna University India, 1952
M.B.B.S. (Hons) – Bachelor of Medicine and Bachelor of Surgery; Bihar University, India, 1957
M.D. – Delhi University, India, 1961. This is specialization degree after M.B.B.S.
Ph.D. – University of Alberta, Canada, 1967
D.Sc. (earned) – University of Saskatchewan, Canada, 2015

Fellowships:

F.I.A.C.S. - Fellow of the International Academy of Cardiovascular Sciences, 2002
F.R.C.P. C - Fellow of the Royal College of Physicians of Canada, 1996
F.A.C.A. - Fellow of American College of Angiology, 1980
F.A.C.C. - Fellow of American College Cardiology, 1976
F.I.C.A. - Fellow of International College of Angiology, 1974

Academic Appointments:

- Professor Emeritus, Dept. of Physiology, 1997 – present.
- Adjunct Professor, Dept. of Medicine, 2000-2005
- Associate Member, Dept. of Medicine, 1994-2000
- Associate Member, Dept. of Pathology, 1991–2001

- Acting Head, Dept. of Physiology, July, 1987 – June 1988
- Visiting Professor, Division of Cardiology, Wadsworth Medical Center, UCLA, U.S.A., July 1980-June 1981
- Professor of Physiology, 1976-1997
- Associate Professor, Physiology, 1973-1976
- Associate Professor, Pharmacology, Univ. of Alberta, 1972-1973
- Assistant Professor, Pharmacology, Univ. of Alberta, 1967-1972

Honors and Awards: Total 45, including:

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- 11) **John B. Chang Research Achievement Award for excellence in research and scholarly activity** at 27th World Congress of International College of Angiology in Helsinki, Finland, 1995.
- 12) **Poster and Oral Presentation Awards for Research** – 22.
- 13) **Pre-clinical Teacher of the Year Award** – twice. (1981, 1989)
- 14) **Research Scholar, Senior Research Fellow, and Research Fellow** from the Canadian Heart Foundation.

Research Supervisor:

- i) Graduate Student Thesis – (Ph.D./M.Sc.) 29
- ii) Post-doctoral Fellow – 13
- iii) Visiting Scientist from Russia and China – 3
- iv) Clinical Research Fellow/Associate – 9
- v) Visiting Student Researcher from UK – 1
- vi) Member, M.Sc. and Ph.D. Supervisory Committee – 21

Research Publications:

- Full length refereed papers – 255
- Congress presentations and abstracts – 232
- Invited symposia/special presentations – 135
- Invited reviews and book chapters – 37
- Book – Co-editor of “Textbook of Angiology”, 1362 pages, 2000
- Research work – incorporated in numerous books
- Books -review – 3

Patents:**Granted**

U.S. patents --6

Canadian patents – 4

Copyright:

1-copyright (granted). Phase Invariant Signature Algorithm (PISA) based on high frequency electrocardiogram has been developed for detection of ischemic heart disease in very early stages and to quantify and locate ischemic damage.

Drug Approval: FDA (Food and Drug Administration of USA) and Health Canada (Canada Natural Health Products Directorate) Approval of **BeneFlax®** for health benefit. FDA and Health Canada have approved **BeneFlax®** (Flax Lignin Complex compound) as sole therapeutic, nutraceuticals or adjuvant therapy for hypercholesterolemia, atherosclerosis, heart disease, stroke, hypertension, and diabetes and as an antioxidant in 2007. The company (ADM) launched the product in the market in March, 2007.

Present Research Interest:

1. Oxygen radicals in health and disease.
2. PISA method for early detection and quantification of ischemic heart disease.
3. Flaxseed in health and disease.
4. Biomarkers in cardiovascular disease.
5. Atherosclerosis-mechanism and treatment.
6. AGEs-RAGE axis and cardiovascular disease, diabetes, end-stage renal disease and hyperthyroidism

Research Grants:

K. Prasad	\$2,327,900.00
K. Prasad and Co-applicant	\$1,377,336.00
Total	\$3,705,236.00

Most Significant Research Contributions:**1. Oxygen Radicals and Cardiovascular Disease:**

I have been involved with the role of oxygen radicals in the pathophysiology of cardiovascular diseases including heart failure, hypercholesterolemic atherosclerosis, ischemia/reperfusion cardiac injury during cardiopulmonary bypass, hemorrhagic and endotoxic shock and diabetes. My laboratory was the first to report the role of oxygen radicals in the above mentioned condition and the effectiveness of antioxidant in them. These basic researches have clinical applications and have/are being tried in patients with some of these diseases/conditions.

2. Single Cell Electrical Activity of Human Heart:

I have investigated the effects of electrolytes, glucose and other therapeutic agents used in cardiovascular diseases on the single cell electrical activity of human heart to understand the mechanism of cardiac contraction and the beneficial effects of therapeutic agents. These studies have opened new window of opportunities for understanding the mechanism of drug action using electrical activity of human cardiac cell which is better than using animal cardiac tissue. I was the first to report the single cell electrical activity in human heart in 1968.

3. Medical Users of Flaxseed and Its Components:

I have done the research on the flaxseed and its components [oil, secoisolariciresinol diglucoside (SDG) and its metabolites secoisolariciresinol, enterodiols, enterolactone and flax lignan complex] for the last 16 years. Flaxseed and its components have antioxidant activity. SDG and lignan complex have lipid lowering, anti-atherosclerotic, hypotensive and hypoglycemic activity. Flax oil does not affect serum lipid and glucose. Flax seed, SDG and flax lignan complex suppress the development of atherosclerosis but flax oil does not have these effects. Anti-atherosclerosis effect of flax seed is not due to its oil contents but due to its lignan contents. Both SDG and flax lignan complex slow the progression of atherosclerosis, but only SDG produce regression of atherosclerosis. SDG lowers blood pressure and prevent the development of type 1 and type 2 diabetes. I have the first to report the above attributes of flaxseed and its components. The above attributes of flaxseed components would be a value in preventing, slowing of progression and regression of coronary artery disease and diabetes. The morbidity and mortality associated with coronary artery disease, stroke, hypertension and diabetes, and their associated complications would be reduced/prevented. The economic impact of this flax seed research is very high. Firstly, prevention and cure of the above mentioned disease with flax seed components will markedly reduce the health care costs, and social and economic burden to society. Secondly, this development will bring value added economic benefit to flax growers of Canada and will improve rural economic.

I have been granted eight patents on the users of flax seed and its components. Archer Daniel Midland (ADM) has signed contract to produce and market the products as a nutraceuticals and pharmaceuticals. The compound flax seed lignan complex received the FDA approval for health benefit in Sept 2006 and ADM launched the product in the market in March 2007. My work on the flax seed and its components are very well-known worldwide. It has also created a rush on the research in this field.

4. Phase Invariant Signature Algorithm (PISA) for Detection of Incipient Ischemic Heart Disease:

The PISA system which is based on the high frequency of electrocardiogram, was developed in collaboration with Dr. M.M. Gupta to detect ischemia heart disease in the very early stage, and to quantify and localize ischemic injury. This is a non-invasion method. Early detection will help in early treatment and cure and will avoid late complications and social economic burden to the society. This concept has been tried and used in USA and Sweden.

5. Hydroxyl Radical Mediated Acetylcholine-Induced Vasodilation:

My laboratory was the first to report that acetylcholine-induced vasodilation is mediated by hydroxyl radicals. According to the old hypothesis, acetylcholine increases nitric oxide (NO) which stimulates guanylate cyclase to produce cyclic GMP which induces vasodilation. According to our findings, acetylcholine increases NO which combines with superoxide anion to produce hydroxyl radical. This hydroxyl radical stimulates guanylate cyclase to produce cyclic GMP which in turn induces vasodilation. This study has made advancement in the mechanism of vasodilatory action of acetylcholine at the molecular level.

6. Soluble Receptor for Advanced Glycation End Products (sRAGE), Acute Coronary Syndrome and Restenosis Following Percutaneous Coronary Intervention (Post-PCI):

My laboratory has shown that low level of serum soluble receptor for advanced glycation end products (sRAGE) is diagnostic of acute coronary syndrome and that low level of sRAGE is a predictor of post-PCI restenosis. These findings have two clinical implications, i) Individuals with low levels of serum sRAGE are prone to develop acute coronary syndrome. ii) Low serum levels of sRAGE in patient undergoing percutaneous coronary interventions (PCI) are prone to develop restenosis following PCI.

Restenosis is a major adverse outcome for long-term success after stent implantation. Restenosis with bare metal stent implantation is very high (35% – 45%) as compared with drug eluting stent (<10%). These tests will be used for predicting post-PCI restenosis and will help in directing in developing treatment modalities for increasing sRAGE and reducing advanced glycation end products. The data of this invention will allow the cardiologist to select type of stent to be implanted in the patients with coronary artery disease. This type of decision making process will reduce the incidence of restenosis following stent implantation and the associated health care cost, suffering and other social and economic burden to the society.

7. Role of AGEs-RAGE Axis in the pathophysiology of Aortic Aneurysm, Hypertension, End Stage Renal Disease, and Diabetes.

Consulting Works:

1. Cherney industries, Minneapolis, Minnesota (1984 – 1986)
2. Electronic for medicine, Honeywell Canada and USA (1982 – 1983)

Teaching:

1. Medical students since 1958-1997
2. Undergraduate and postgraduate teaching in Pharmacology (1967-1973) and Physiology (1973-2009).
3. Residents and Fellows in Cardiology.
4. School of Public Health

Reviewer of manuscripts: 23 journals

Reviewer of Research and Fellowship applications: National and International granting agencies (6 countries)

External Examiner for Ph.D. Thesis: 22 students

Membership and Fellowship: 18 medical and scientific societies

Member, Editorial board: 8 scientific journals and consulting editor of 1 Journal.

Offices held in International Professional Societies:

- i) **Chairman, Board of Directors**, International College of Angiology (Dec.2015-present)
- ii) **President**, International College of Angiology (1995-97)
- iii) **Member, Board of Directors** – International College of Angiology (1995-present)
- iv) **Vice-president** International College of Angiology (1990-1994)
- v) **Chairman, Scientific Committee** - International College of Angiology (1994-2015)
- vi) **Chairman, John B. Chang Research Achievement award committee**- International College of Angiology (1996-present)
- vii) **Chairman, Poster award committee**, International College of Angiology (1990-2015)
- viii) **Vice-President**, American College of Angiology (1993-1999)
- ix) **Member**, International Scientific Committee of Oxygen radicals and antioxidant biotechnology, Calcutta, India (1993)
- x) **Member International Scientific Committee** for Indian Society of Atherosclerosis Research Conference, Annamalai University, Chidambaram, Tamilnadu, India (2008)
- xi) **Member**, Substance Abuse Committee - American Society for Clinical Pharmacology and Therapeutics (1992-2000)

Offices held in National research organization:

- i) **Medical advisory committee** of Heart and Stroke Foundation of Saskatchewan
- ii) **Scientific officer** Canadian Heart Foundation

Reviewer for National and International research-grant agencies: (8)

Expertise Sought for Critical Appraisal for Candidates for Promotion to Clinical Professor and Professor for other Universities

- i) University of California, Los Angeles
- ii) The Bruce Rapport Faculty of Medicine, Haifa, Israel
- iii) Albert Einstein College of Medicine, New York
- iv) The Hong Kong University of Science and Technology, Hong Kong
- v) University of Manitoba
- vi) University of Newfoundland
- vii) University of Kentucky, Lexington, Kentucky

Audio-visual Tapes Prepared for Teaching: 14 tapes

Guest Lecturer: 5

Public and Community Contributions

Public lectures and television appearances: 12