ISARCON-2016
29th Annual Conference

Organized By:
INDIAN SOCIETY FOR
ATHEROSCLEROSIS RESEARCH

Venue: Knowledge Hub, Annexe Building,
Aster Medcity, Kochi, Kerala

21-23 OCTOBER 2016

We’ll Treat You Well™
Organizing Committee

Patron : Dr. Azad Moopen, Chairman And Managing Director, Aster DM Healthcare
Chairman : Dr. Harish Pillai, CEO, Aster Medcity & Cluster Head - Kerala, Aster DM Healthcare
Vice -Chairman : Dr. V Narayanan Unni, Chief of Medical Services, Aster Medcity
Organizing Secretary : Dr. Anil Kumar R, Lead Senior Consultant, Aster Cardiac Sciences, Aster Medcity
Scientific Committee Chair : Dr. Geetha Philips, Senior Consultant, Internal Medicine, Aster Medcity
Scientific Committee co-chair : Dr. Anjaly K Kale, Senior Consultant, Diagnostic Pathology, Aster Medcity
Cultural Committee Chair : Dr. S. Mayadevi Kurup, Senior Consultant, Gynaecologist / Obstetrician, Aster Medcity

Members :

Dr. G N Ramesh, Asso. Senior Consultant, Gastroenterology, Aster Medcity
Dr. Manoj P Nair, Senior Consultant, Cardiac Surgery, Aster Medcity
Dr. Vijay Jayakrishnan, Senior Consultant, Radiology & Interventional Radiology, Aster Medcity
Dr. Boby Varkey Maramattom, Consultant, Neurology, Aster Medcity
Dr. Sajan Koshy, Senior Consultant, Paediatric Cardiac Surgery, Aster Medcity
Dr. Jacob Baby, Consultant, Pulmonology, Aster Medcity
Dr. Anil S R, Senior Consultant, Paediatric Cardiology, Aster Medcity
Dr. Raja Sekhar Varma, Consultant, Cardiology, Aster Medcity
Dr. Sunil Shivadas, Consultant, Cardiology, Aster Medcity
Dr. Praveen Sreekumar, Consultant, Cardiology, Aster Medcity
Dr. Viju Joseph Abraham, Senior Specialist, Cardiovascular Thoracic Surgery, Aster Medcity
Dr. George Varghese, Senior Specialist, Cardiovascular Thoracic Surgery, Aster Medcity
Dr. Krishna Sarin, Senior Specialist, Cardiology, Aster Medcity
Dr. Abel George, Assistant Manager, Cardiac Sciences, Aster Medcity
Basil Baby, ISARCON Executive
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Message from Chairman, Aster DM Healthcare

Dear Delegates,

It is very kind of you to come to Kochi to attend the ISARCON 2016. With the aging population in India, Atherosclerosis has become one of the most important focus areas for research, to prevent non-communicable morbidity & mortality. With over one billion population, we have the unique opportunity to see enormous number of cases. It is important that the documentation leading on to research is carried out so that we can go deeper and find solutions. For this it is very important that clinicians transform themselves into researchers and conquer the frontiers of knowledge in healthcare.

I hope that the 3 day conference shall be an avenue for this transformation and wish all the best for the conference.

Best Regards,

Dr. Azad Moopen
Chairman And Managing Director
Aster DM Healthcare
Message from CEO, Aster Medcity

On behalf of Aster Medcity and Aster DM Healthcare institutions in Kerala, let me extend a warm welcome to all the faculty and delegates of ISARCON 2016. The theme of the event ‘From bench to Bedside: From Clinicians to Researchers’ is quite apt in the context of a renewed focus within our country to support qualitative research with a view to innovate and introduce cost effective services that will contribute to better clinical outcomes. With a rapidly booming economy and changing lifestyle, the dramatic increase in Non communicable diseases, especially Cardiovascular diseases are posing a grave threat to the general health of our country. We hope that collaborative events like ISARCON will result in more insights into the etiology and pathogenies of the disease and help in pushing boundaries for the care of all our patients.

Aster Medcity is a living symbol of the audacity of Vision that aims to provide the best possible clinical care in a serene ecosystem that is typical of God’s own country. Though an infant institution, we have cumulative knowledge bandwidth of several decades thanks to the outstanding clinical faculty that is the heart of this program. All of us are delighted to have you in our midst and wish you 3 days of excellent interactions and learning.

Best regards,

Dr. Harish Pillai
CEO, Aster Medcity & Cluster Head - Kerala,
Aster DM Healthcare
Message from the President, ISAR

Dear Members,

I am greatly privileged and honored to be the President of the ISAR. Indeed, I am delighted to note that Dr Anil Kumar R, Lead Consultant Cardiologist is gracious enough to organize the 29th Annual conference of Indian Society for Atherosclerosis Research from 21st Oct-23rd Oct 2016 at Aster Medcity, Kochi.

The Indian Society for Atherosclerosis Research (ISAR) was founded in 1987. The aim of the society is to bring all eminent scientist and researchers engaged in this area on a common platform to work together on various facts of atherosclerosis. It is my proud privilege to be associated with this society from 1998. I served the society in various capacities and always tried to contribute to the growth of this prestigious society. On behalf of ISAR, honorary membership has been conferred to many eminent scientists working in India and abroad on atherosclerosis, a great honor for our society. To optimally utilize the incompletely tapped potential of our young investigators and encourage them to take part in the deliberations in large numbers, state chapters have been offered since last year and so far two state chapters have been added in the ISAR family (Delhi and Bihar). It shall be our endeavor to see that more states of our country have chapters of ISAR. Tremendous advances have been made in the various fields of medicine and I am happy to note that we are striving to keep abreast of them. The theme of the conference “From Bench to Bedside: From Researchers to Clinicians” will highlight the newer developments in diagnosis and management of cardiac disorders. The eminent experts of the field will enlighten the audience and pave way for future research and affordable patient care.

I convey my best wishes to the Organizing committee and wish the conference a grand success.

Prof. S B Sharma
President- ISAR
Message from the Secretary, ISAR

Dear Friends,

Greetings from Indian Society for Atherosclerosis Research!

I am happy to note that the 29th Annual Conference of the Indian Society for Atherosclerosis Research is being held during October 21-23, 2016 at Aster Medcity, Kochi, Kerala under the kind auspices of Dr. Anil Kumar as Organizing Secretary.

In its three decades of existence, the Society has firmly established itself as a multi-disciplinary society having unique blend of biochemists, molecular biologists, pathologists, cardiologists, cardiovascular scientists, epidemiologists, pharmacologists, medicinal chemists, and vascular surgeons with a common aim of encouraging the research activities both in the basic sciences and in the clinical fields of experimental atherosclerosis and cardiovascular diseases.

It is a proud moment for all of us to gather once again in this academic fest and interact with fellow members, distinguished Faculty and budding researchers from all over the country and abroad. It is our endeavor to bring in a rich feast of academics, research and clinical practice into this scientific meeting.

The theme of the conference is: "From Bench to Bedside: From Researchers to Clinicians". The carefully designed scientific program is bound to satisfy the academic zeal of the attendees and leave them with great memories of God’s own country.

I congratulate every member of the organizing team for their hard work in bringing the conference to actuality and wish everyone a great time during their stay in Kochi.

Long live ISAR!

Dr. Amitesh Aggarwal
Secretary- ISAR
Message from Treasurer, ISAR

The Indian Society for Atherosclerosis Research (ISAR) has been steadily marching ahead. It is a proud feeling that we are organizing the 29th Annual Conference of our society from 21st to 23rd October, 2016 at Aster Medcity, Kochi. The progressive growth of ISAR society has been made possible due to the inspiration and guidance of our enterprising and devoted visionary members who have helped to build and nurture this society.

It is a matter of contentment for me that we have been able to file the society's Income tax return for the first time this year. I take this opportunity to extend my special thanks to Prof S K Verma for obtaining the PAN card without which we would not have been able to reach this far.

I take this opportunity to congratulate Dr Anil Kumar, Organizing Secretary, and other members in the organizing committee of ISARCON–2016, for their hard work and dedication in mobilizing resources as well as organizing this conference. Further, it is my request that we stay committed towards our society and also disseminate information regarding our society, its goals and activities among our peers so that our society grows not only in numbers but is also enriched with learned colleagues.

With best wishes and extending warm welcome to all.

Dr. Jagriti Bhatia  
Treasurer- ISAR
Message from Organizing Secretary- ISARCON 2016

I feel very privileged to have been given the opportunity to organize ISARCON-2016 at Aster Medcity, Kochi, Kerala. The theme of the conference is “From bench to bedside: From researchers to clinicians”. This is intended to bring the researchers and clinicians on the same platform and discuss the way forward to solve the epidemic of atherosclerosis. The ISAR executive has been very proactive in guiding the organization of this conference. The conference is being held at Aster Medcity and the administration has been very kind in extending all support. The faculty are experienced scientists, researchers and clinicians. I hope you all enjoy the academic and cultural experience of this conference.

I welcome you all to ISARCON -2016.

Dr. Anil Kumar R
Organizing Secretary- ISARCON 2016
Message from Scientific Committee Chair- ISARCON 2016

Dear Colleagues,

A great deal of effort and meticulous planning has gone into the preparation of the scientific programme of ISARCON 2016. Dr. Anil Kumar and his team have tried to ensure that each participant goes back with a good understanding of evolution of atherosclerosis in man, risk profiles and therapeutic targets. 19 free paper sessions have been included which shows enthusiasm in research. The scientific committee sincerely hopes that each participant will benefit.

We sincerely hope you will enjoy your stay in our beautiful state. “God's own country- Kerala”. We also plan to regale you with the beautiful cultural program and food of our state.

Best Wishes,

Dr. Geetha Philips
Chair- Scientific Committee
ISARCON 2016
List of Speakers- ISARCON 2016

INTERNATIONAL FACULTY

1. **BOBBY V KHAN**  
   Executive Director, Atlanta Vascular Research Foundation  
   Saint Joseph’s Translational Research Institute, Atlanta, USA

2. **DORIAN O HASKARD**  
   Professor of Cardiovascular medicine, National Heart and Lung Institute  
   Imperial College, London, UK

3. **SAMPATH PARTHASARATHY**  
   Associate Dean for Research  
   Florida Hospital Chair in Cardiovascular Sciences  
   Professor of Medicine  
   University of Central Florida College of Medicine, Florida, USA

4. **SHOBHA GHOSH**  
   Professor of Medicine and Physiology  
   Department of Internal Medicine  
   VCU Medical Center  
   Richmond, USA

NATIONAL FACULTY

1. **ANIL S R**  
   Interventional Pediatric Cardiologist, Aster Medcity, Kochi

2. **ANJALI ARORA**  
   Senior Consultant Incharge, Hyperlipidemia Prevention Clinic  
   Dept of Cardiology, Sir Ganga Ram Hospital, New Delhi

3. **ANNIE ABRAHAM**  
   Professor & Head, Department of Biochemistry  
   Thiruvananthapuram

4. **BIJU POTTAKKAT**  
   Additional Professor and Head, Department of Surgical Gastroenterology,  
   Jawaharlal Institute of Post Graduate Medical Education and Research (JIPMER),  
   Puducherry

5. **BOBY VARKEY MARAMATTOM**  
   Consultant  
   Neurology & Interventional Neurology, Aster Medcity, Kochi
6. BRIAN PINTO  
Chief of Cardiology at Holy Family Hospital  
Mumbai

7. CHANDRASEKHRAN KARTHA  
Honorary Distinguished Professor, Molecular Medicine & Disease Biology  
Rajiv Gandhi Center for Biotechnology  
Trivandrum,

8. GANESAN KARTHIKEYAN  
Department of Cardiology  
All India Institute of Medical Sciences  
New Delhi, India

9. GEEVAR ZACHARIAH  
Consultant Cardiologist,  
Mother Hospital, Trichur, Kerala

10. JOSE PERIYAPURAM  
Dr. Jose Chacko Periappuram,  
HOD & Senior Consultant Cardiac Surgeon  
Lissy Hospital, Kochi, Kerala

11. JAISON T M  
Specialist Cardiologist.  
Aster Clinic.  
Bur Dubai. Dubai

12. KANCHANA MALA K  
Assistant Professor,  
Medical College Hospital and Research Center  
SRM University, Potheri, Chennai

13. LISSY K KRISHNAN  
Scientist G, Thrombosis Research Unit, Department of Applied Biology,  
Sri Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala

14. M E YEOLEKAR  
Senior Consultant & Professor of Internal Medicine,  
K.J.Somaiya Medical College and Hospital, Mumbai

15. M S LATHA  
Professor and Director, School of Bioscience, Mahathma Gandhi University, Kottayam

16. MAHADEV DIXIT  
Chief Cardiac Surgeon, Aster CMI Hospital, Bangalore
17. MAHADEVAN RAJARAM  
Consultant Cardiologist and Imaging Specialist, Chennai

18. MANOJ P NAIR  
Senior Consultant, Cardio Vascular Thoracic Surgery, Cardiac Sciences, Aster Medcity, Kochi

19. NALINI NAMASIVAYAM  
Professor, Department of Biochemistry and Biotechnology  
Annamalai University

20. PARUL GOYAL M.D  
Associate Professor, Biochemistry,  
PGIMER- Dr RML Hospital, New Delhi

21. PRIYAMVADA P S  
Associate Professor of Nephrology, Jawaharlal Institute of Medical Education and Research (JIPMER), Puducherry

22. RAKESH GOPAL  
Head of Cardiology and Consultant Cardiologist, Aster MIMS, Calicut, Kerala

23. RITU SINGH  
(President Elect ISAR), Department Of Biochemistry, Lady Hardinge Medical College & S.S.K.Hospital, New Delhi

24. RONNIE MATHEW  
Head of Cardiology and Senior Interventional Cardiologist  
Lissy Hospital, Ernakulam, Kerala

25. SADHANA SHARMA  
Head of Dept. of Biochemistry  
AIIMS, Patna

26. S SANDHYAMANI  
Professor & Head, Department of Pathology,  
Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram – 695011.

27. SANTHOSH SATHEESH  
Professor and Head of Cardiology, JIPMER, Puducherry

28. SEBASTIAN V J  
Consultant Cardiologist,  
City Centre Clinic,  
Dubai
29. SHRIDHAR DWIVEDI  
Senior Consultant Cardiologist,  
National Heart Institute,  
East of Kailash, New Delhi

30. SMITHA TRIPATHI  
Associate Professor  
Department of Biochemistry  
Lady Hardinge Medical College, New Delhi

31. SREEKANTH K  
Professor of Biochemistry  
Sree Gokulam Medical College & Research Foundation,  
Thiruvananthapuram, Kerala

32. SUMAN BALA SHARMA  
(President- ISAR)  
Director-Professor, Dept of Biochemistry  
University college of Medical Sciences, Delhi

33. SUNIL ROY T N  
Consultant Interventional Cardiologist  
Belhoul Speciality Hospital, Dubai

34. SURENDRRA KUMAR VERMA  
Prof of Pathology  
JIPMER  
Puducherry

35. VIJAY JAYAKRISHNAN  
Senior Consultant  
Interventional Neuroradiology, Aster medcity, Kochi

36. WAHID ALI  
Associate Professor  
P.G Department of Pathology  
King George's Medical University
10:00 AM : REGISTRATION

**Hall A**

11:00 AM : **Session 1- Epidemiology**

1. **Evolution of atherosclerosis in Man**
   Dr. V J Sebastian

2. **50 years of South Asians abroad (2016 update): effects of cardiometabolic health here and there**
   Dr. Bobby V Khan

3. **Metabolic syndrome: prevention in current scenario**
   Dr. Anjali Arora

4. **Is Coronary artery disease increasing in Kerala?**
   Dr. Geevar Zachariah

5. **Childhood obesity & Atherosclerosis**
   Dr. Anil S R

01:00 PM : LUNCH

02:00 PM : **Presidential Address**
   Prof. Suman Bala Sharma

02:15 PM : **P A KURUP Oration**
   Prof. Undurti N Das
   “Bioactive lipids for arresting and/or reversing the development of atherosclerosis: The good, the bad and the ugly”

02:45 PM : **Session 2- Risk Profiles in Atherosclerosis**

1. **Diabetics or Tobacco: which is a greater risk in Indian Perspective**
   Dr. S Dwivedhi

2. **Reducing the Cardiovascular Risk: Lessons from SPRINT**
   Dr. M E Yeolekar

3. **Serum Ferritin in Acute coronary syndrome**
   Dr. Parul Goyal

03:45 PM : TEA BREAK

04:00 PM : **Session 3- Newer Therapeutic Targets**

1. **Newer concepts in cholesterol lowering**
   Dr. T M Jason

2. **Newer Oral Anticoagulants**
   Dr. Brian Pinto

3. **Cardioprotective effect of gardenia**
   Dr. M S Latha

05:30 PM : HIGH TEA

06:00 PM : INAUGURATION

07:00 PM : CULTURAL PROGRAM

08:00 PM : DINNER
DAY 2 - 22 October 2016, Saturday

Hall A
09:00 AM: Session 4- Pathogenesis
1. Humoral immunity to modified lipoproteins – a window on atherosclerosis?
   Prof. Dorian O. Haskard
2. Atherosclerosis: Delineating novel underlying mechanisms and developing nanoparticle based therapeutics
   Prof. Shobha Ghosh
3. Role of vascular inflammation and modification of LDL in ischemic heart disease
   Prof. Ritu Singh
4. Molecular and cellular changes of Coronary Artery Diseases
   Prof. Sreekanth

11:00 AM: Session 5- Mechanisms of Atherosclerosis
1. Study of Insulin Resistance and Endothelial function in cases of Metabolic Syndrome in Delhi
   Dr. Smita Tripathi
2. Cystatin C: Significance in Cardiovascular Disease
   Dr. Sadhana Sharma
3. Pathology of Carotid Artery Disease: spectrum of lesions encountered at SCTIMST
   Dr. Sandhyamani

12:30 PM: AMAR SHYAM Oration
Prof. Ganesan Karthikeyan
Cardiovascular research: “Make in India”

01:00 PM: LUNCH

02:00 PM: Session 6- Newer Concepts in atherosclerosis
1. Venous atherosclerosis in the mesenteric circulation
   Dr. Biju Pottakkat
2. Atherosclerosis and cellular senescence
   Prof. Surender Verma
3. Scope of bio engineered Small diameter vascular graft for blood vessel substitution
   Dr. Lissy K Krishnan

03:30 PM: Session 7- Tangential approaches in atherosclerosis
1. Innovative advances for detection & control of atherosclerosis
   Prof. Santhosh Satheesh
2. Cardiovascular miRNA: Novel tool for diagnostic and therapeutic biomarker
   Dr. Wahid Ali
3. Infective aetiology of atherosclerosis
   Prof. Mahadev Dixit

04:30 PM: Session 8- Atherosclerosis: Special Scenarios
1. Coronary ectasia in atherosclerosis - A distinct manifestation
   Dr. Sunil Roy
2. What is new in Neuroatherosclerosis?
   Dr. Bobby Varkey
3. Diabetic Dyslipidemias-newer management strategies
   Dr. Rakesh Gopal
4. Statins in chronic kidney diseases
   Dr. Priyamwada P S
Hall B

Free Papers

11:00 AM : Session A
1. Prashanth B V :- A study of Telomere dysfunction in hypertensive Patients with Dyslipidemia
2. Sampath Parthasarathy :- Carotid Atherosclerosis and Alzheimer’s Disease
3. Mohd Tasleem :- Variant of HCN4 gene and ACE-2 enzyme level implicated in cardiac conduction disorders :
4. Anu Iris :- Lipoprotein (a) gene polymorphism in Coronary Artery Disease
5. Rachna Agarwal :- Meta-analysis of Apolipoprotein E Polymorphism in the patients with Alzheimer’s disease
6. Kailash Chandra :- Ameliorating effects of chicory (Cichorium intybus L.)-supplemented diet against oxidative stress and type 2 diabetes mellitus in HFD/STZ treated rats

02:00 PM : Session B
7. Balasubramanian :- Leptin regulates cholesterol metabolism in alcoholic liver disease
8. Latheef Kasala :- “Polymorphisms in MTHFR, IL-6 and ICAM-1 genes is associated with an increased risk of coronary artery disease in South-Indian population”
9. Limi Elizabeth Mathew :- Anti-atherogenic effect of Betulinic acid and Fluvastatin on Type II Collagen induced Arthritis
10. Ankur Chikara :- The effect of Atorvastatin therapy on Serum Vitamin-D levels
11. Lakshmanan Vennila :- Chlorogenic acid attenuates myocardial infarction induced by isoproterenol: Electrocardiographic, biochemical and anti-apoptotic study.

04:00 PM : Session C
13. Ashok Kumar :- Vitexin protects cardiomyocytes by inhibiting ER Stress induced apoptosis in Myocardial Infarction – An In vivo study.
15. G. Sowjenya :- Importance of Platelet Aggregation and Antiplatelet Resistance in Post PCI Patients: A Critical Marker for Atherosclerosis Progression.
17. Chitra Pushpan :- Njavara rice bran oil promote the regression of atherosclerosis via inhibition of proinflammatory signaling pathways in hypercholesterolemic rabbits.
18. Manju Krithivasan :- Leptin–Adiponectin Ratio as a better surrogate marker of obesity and related cardiometabolic dysfunction.
19. Poorva Bhargava :- In vivo cardio-protection by Kaempferol in an experimental model of myocardial ischemia– reperfusion injury

05:30 PM : ISARCON Executive Meeting (Venue: Seminar Hall)
06:00 PM : GENERAL BODY MEETING
07:00 PM : DINNER
08:00 AM  :  Researchers and Clinicians Collegium Meeting :: Ideas for the Future  
(Venue : Hall B)

Hall A
09:00 AM  :  L.H.M.C Oration:  
Prof. Shridhar Dwivedhi  
"Indian phenotype of obesity"

09:30 AM  :  Session 9- Kurup Memorial Symposium on  
Atherosclerosis Research
1. 30 years of atherosclerosis research: an end to antioxidant controversy  
Dr. Sampath Parthasarathy
2. Mechanistic insights into the protective efficacy of zingerone against ethanol-induced hepatotoxicity in rats: Impact on hyperlipidemia, oxidative stress, inflammation and fibrosis.  
Dr. Nalini Namasivayam
3. SIRT1-CAV1- PRMT1 axis as a potential target against endothelial dysfunction  
Dr. Kanchana
4. Advances in Nanotechnology - Special focus to Atherosclerosis  
Dr. Annie Abraham

11:00 AM  :  Session 10- Imaging Atherosclerosis
1. Invasive imaging in Atherosclerosis  
Dr. Ronnie Mathew
2. MRI Imaging in cardiac atherosclerosis  
Dr. Mahadevan
3. Advances in Neuroimaging in Atherosclerosis  
Dr. Vijay Jayakrishnan

12:00 PM  :  PIONEEERING LECTURES
1. Atherosclerosis in the transplanted Heart  
Dr. Jose Periyapuram
2. Cyclophilin A is a promoter of atherosclerosis in hyperglycemic conditions:  
Dr. Chandrasekharan Kartha
3. Aortic Aneurysm : Hybrid Therapy  
Dr. Manoj P Nair

Hall B
10:30 AM  :  Award Session
1. Haritha K :: Balaji Endowment Medal  
"Modulation of VEGF activity by ADP Ribosylation: Role of PARP16"
2. Piyush Jain :: Sri Venkateswara Cardiac Research Medal for Clinical research on Atherosclerosis & Allied Aspects.  
"Effect on Aspirin Therapy on Lipoprotein (A) levels in Coronary Artery Diseases (CAD):
3. Narendra Kumar :: Lord Sreenivasa of Seven Hills Gold Medal  
"Cardiovascular risk factors in subjects with prehypertension"

01:00 PM  :  VALEDICTORY SESSION
01:30 PM  :  LUNCH
L 1. Evolution of Atherosclerosis

Dr. V J Sebastian
Consultant Cardiologist, City Centre Clinic, Dubai

According to World Health Organization every 2 seconds, one person dies from cardiovascular disease somewhere in the globe. In spite of tremendous advancement in management of cardiovascular disease and aggressive public education programs emphasizing importance of lifestyle changes, cardiovascular disease is continuing as the leading cause of morbidity and mortality globally accounting for more than 20% of the deaths.

The available data from India is more alarming. Though there is remarkable regional differences in lifestyle and risk factors, 35% of all the deaths in India are due to cardiovascular disease. It is alarming to note that the number is increasing every year and more and more young people suffer from cardiovascular disease.

The well-known risk factors, genetic and environmental, like diabetes; hypertension; hyperlipidemia; smoking; obesity; and physical inactivity along with stress continue to be major challenge for practicing clinicians.

It is always believed that rapid changes in lifestyle and influence of the affluence have led to development of atherosclerosis. It was considered as a result of modern living.

In March 2013, the leading public media including BBC, CNN, Wall Street, and Reuters reported fatty arteries may not be just a curse for modern unhealthy living, referring to the Horus study. The researchers examined 137 mummies of 4 cultures and geographical regions spanning over 4000 years and found robust evidence of atherosclerosis. There was no static significant difference between the four populations. These 137 mummies came from ancient Egypt, ancient Peru, Southwest America, and Alaska. CT scan was used to confirm arterial calcification and thereby evidence of atherosclerosis. They found probable or definite atherosclerosis in 34% of the mummies. These changes were seen in various vascular beds namely aorta, femoral and popliteal arteries, carotid arteries, and coronary arteries.

The study had shown that there are robust evidence of atherosclerosis in different ancient cultures with varying lifestyles, diet, and genetics across a wide geographical distance and very long span of 4000 years of human history.

These findings suggest that our understanding of causative factors of atherosclerosis is incomplete and it could just be inherent to the process of human aging. There could be known traditional risk factors like infection, inflammation, smoke inhalation, gene environment interplay, or other undiscovered risk factors. We would have no answer until we have further studies.

L 2. 50 years of South Asians abroad (2016 update): effects of cardiometabolic health here and there

Dr. Bobby V Khan
M.D., Ph.D.  Professor of Internal Medicine, University of Central Florida; Executive Director, Atlanta Vascular Research Foundation, USA

Public health estimates indicate that India accounts for approximately 50% of the world’s heart disease burden, despite having less than 20% of the world’s population. There are an estimated 30 million diaspora from the South Asian Subcontinent—nearly 35 percent live in North America and Western Europe. The South Asian population is very diverse— with multiple cultural and ethnic differences in lifestyle management. Few markers define the complex mechanisms of why the atherosclerosis burden is so high (and early) in this population. There are very few standards and guidelines in the screening and management of this population. This may be attributed to an underlying genetic predisposition to metabolic syndrome, elevated Lp(a) levels, hypertension, and cardiomyopathy. Along with the high consumption of rice, there has been a dietary shift towards increasing consumption of fat and starch. Increased tobacco use, alcohol use, and higher stress contribute as well. Multiple well-conducted studies have investigated and vascular disease burden in the urban and rural Indian population based on socio-economic status. Determining this activity in human clinical populations provides a significant challenge because of the normally intrusive nature of investigation that may be amenable to animal studies that precludes similar experimentation in humans. However, through the use of noninvasive, quality controlled techniques and laboratory analysis, considerable data can be obtained to create and establish translational studies in cardiovascular disease. The role of high resolution ultrasound, utilized widely on a global basis, provides a considerable degree of information that is safe, affordable,
convenient, and highly reproducible. Additionally, the measurement of biomarkers (primarily via blood or urine samples) and its correlation to the vascular biology of atherosclerosis also provides the convenience and safety to human subjects. The presentation will provide a background (plus past and current data) which in turn results in a broadened understanding and comprehension of the pathophysiology of atherosclerosis in the human clinical population.

L 3. **Metabolic Syndrome: Prevention In The Current Scenario**

**Dr. Anjali Arora**  
Senior Consultant & Incharge, Hyperlipidemia Prevention Clinic, Dept of Cardiology, Sir Ganga Ram Hospital, New Delhi - 110060

Factors leading to the metabolic syndrome are well known. The clustering of the risk factors point to susceptibility of adipose tissue disorders (like abdominal obesity). These factors may be genetic, racial, ageing and endocrine disorders. These often lead to medical conditions like fatty liver, Nonalcoholic steatohepatitis (NASH), polycystic ovarian syndrome, cholesterol gallstones and insulin resistance.

With dyslipidemia and central obesity, South Asians are more prone to coronary artery disease in comparison with Africans and Europeans.

One of the first presentation before all contributing factors leading to metabolic syndrome is obesity.

Obesity, the most common cause of insulin resistance, is associated with a decreased number of receptors often leading to postreceptor failure. While adiposity and insulin resistance are related, they are not necessarily synonymous.

In Indians, guidance for lifestyle modification in the prevention clinic is being recommended at 18 years in young adults.

The approach to prevention should start earlier than the clinical presentation. Overweight should be one of the salient markers in a patient of any age to intervene and counsel. Basic three modes have to be dealt with (A) Weight control through physical and psychological help; (B) Correct nutrition involving control of fat intake, monitoring of lipids, prediabetic status and insulin resistance. Just getting a blood sugar is of no value. A complete panel involving HbA1c, Insulin levels along with blood sugar (FBS & PPBS) to evaluate diabetes mellitus is a must. As similar is a complete lipid panel, currently stressing on HDL-C; (C) and lifestyle modification, at the prevention clinic, would help in preventing development of Metabolic syndrome.

The primary focus should remain on the individual metabolic risk factors. More the aggregation of underlying risk factors, greater should be the emphasis on aggressive lifestyle therapy and drug management to prevent the onset of metabolic syndrome and cardiac disease.

L 4. **Vital role of guanidium derivative in the management of post prandial hyperglycemia and risk of CVD**

**Dr. Suman Bala Sharma**  
Director-Professor, Department of Biochemistry, University College of Medical Sciences, Delhi University, Delhi 110095

Currently, there is renewed interest in plant-based medicines and functional foods modulating physiological effects in the prevention and cure of diabetes and obesity. Recently, considerable research has been focused on postprandial hyperglycemia apart from fasting glycemic control because it doubles the risk of death from cardiovascular disease. Therefore, natural compounds showing improvement in post prandial hyperglycemia via alpha-glucosidase and alpha-amylase inhibition from plant sources offer an attractive strategy for the control of type 2 diabetes. This study highlights the novel antidiabetic compound isolated and purified from aqueous extract of germinated Glycine max seeds. The compound contains guanidine groups and has been designated as Glynide (patent filed) which was found to be beneficial in controlling both fasting and post prandial hyperglycemia by showing salutary effects on glycemic index and inhibition of alpha-glucosidase and alpha-amylase. Postprandial hyperglycemia is characterized by hyperglycemic spikes that induce oxidative stress which increases the risk of atherosclerosis in diabetics. Glynide improves insulin signalling through activation of insulin receptor tyrosine kinase. It also increases the disposal of glucose by skeletal muscle tissue through modulation in GLUT4 expression and its translocation to the plasma membrane. Glynide also showed significant antioxidant activity as well as potential in correcting dyslipidemia in STZ+NAD induced diabetic rats. Safety evaluation study in normal rats treated with glynide reveals that it produces no signs of hypoglycemia and it is non-toxic in nature.
L 5. Childhood Obesity

Dr. Anil S R
Senior Consultant, Interventional Pediatric Cardiologist, Aster Medcity, Kochi

Childhood obesity is a serious problem globally with a trend to affect the developing world as well. The effects of pediatric obesity are increasingly being seen, and long-term complications are to be anticipated. Obesity is the most common cause of abnormal growth acceleration in childhood. Obesity in females is associated with an early onset of puberty and early menarche. The effect of obesity on male pubertal maturation is more variable, and obesity can lead to both early and delayed puberty. Many of the complications of obesity seen in adults appear to be related to increased accumulation of visceral fat. It has been proposed that subcutaneous fat may be protective against the adverse effects of visceral fat. Males typically accumulate fat in the upper segment of the body, both subcutaneously and intra-abdominally. In females, adiposity is usually subcutaneous and is found particularly over the thighs, although visceral fat deposition also occurs. Gender-related patterns of fat deposition become established during puberty and show significant familial associations. Childhood obesity impacts all the major organ systems of the body. It is associated with established risk factors for cardiovascular diseases and accelerated atherosclerotic processes, including elevated blood pressure (BP), atherogenic dyslipidemia, atherosclerosis, metabolic syndrome, type II diabetes mellitus, cardiac structural and functional changes and obstructive sleep apnea. There are no reliable means for assessing childhood and adolescent visceral fat other than radiologically. Noninsulin-dependent diabetes is being seen more commonly in the pediatric population. Diabetes and impaired glucose tolerance are noted particularly in obese children with a family history of diabetes. In this situation, a glucose tolerance test may be indicated, even in the presence of fasting normoglycemia. Hypertriglyceridemia and low high-density lipoprotein–cholesterol levels are the primary lipid abnormalities of obesity and are related primarily to the amount of visceral fat. Low-density lipoprotein–cholesterol levels are not typically elevated in simple obesity. The offspring of parents with early coronary disease tend to be obese. Very low-density lipoprotein and intermediate-density lipoprotein particles, which are small in size, may be important in atherogenesis but they cannot be identified in a fasting lipid panel. The propensity to atherogenesis cannot be interpreted readily from a fasting lipid panel, which therefore should be interpreted in conjunction with a family history for coronary risk factors.

Probable mechanisms of obesity-related hypertension include insulin resistance, sodium retention, increased sympathetic nervous system activity, activation of the renin–angiotensin–aldosterone system and altered vascular function. Obesity in early life promotes atherosclerotic disease in vascular structures such as the aorta and the coronary arteries. Neglecting childhood and adolescent obesity will compromise the cardiovascular health of the pediatric population and is likely to result in a serious public health crisis in future. Obstructive sleep apnea with daytime somnolence is a common problem in obese adults. Pediatric studies suggest that obstructive sleep apnea occurs in approximately 17% of obese children and adolescents. Weight reduction and lipid lowering therefore are an important part of therapy.

L 6. Diabetes or tobacco which is greater health risk in Indian perspective

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Diabetes and its major complication atherosclerosis has been known to Indian clinicians since 500 BC. However, tobacco was introduced to India by Portuguese in 16th century. Both have been blamed for current pandemic of non-communicable diseases like coronary artery disease, hypertension, obesity, cancers and chronic lung conditions etc. Much of above problems are linked to diabetes and/or tobacco directly or indirectly. Estimated number of people suffering from diabetes in India is 130 million (60 million diabetes and 70 million prediabetes). On the other hand number of tobacco users in India are 275 million (100 million smokers 175 million smokeless tobacco users).

South Asians countries face a peculiar situation because tobacco is consumed in various forms like bidi smoking, cigarette smoking, hookah smoking, in chewing forms along with betel quid and also consumed as gutka, pan–masala and several other tobacco mixed flavored preparations now. Such a situation this does not happen in western countries where smoking is the principal form of tobacco habit. It is because of this multiple forms of tobacco use in India that we have protein health problems associated with tobacco usage. In terms of comparative mortality About a million Indians die on account of diabetes while 900,000 and 350,000 Indians die due to smoking and SLT. More common health issues related to tobacco use among Indian population are different types of oral, throat, nasopharyngeal and lung cancer in addition to other common vascular and lung diseases associated with smoking. Tobacco and diabetes both accelerate ageing. Tobacco users look ten years older biologically than their corresponding chronological age. It is therefore, pertinent to know very clearly which among them carries greater health risk to Indians - diabetes or tobacco?
Reducing the Cardiovascular Risk: Lessons from SPRINT

Background: The aim in reducing atherosclerotic cardiovascular risk has been one of the foremost strategies in dealing with complications related CAD to. It is known that multiple risk factors act additively and synergistically to compound the cardiovascular risk. Several scores have been devised over the globe under the auspices of Associations and Societies in the field of Hypertension–Cardiology, Diabetes and Kidney diseases. It is for the respective country and its treating community to identify and enforce the guidelines that offer maximum benefits. The NPCDCS had been initiated in several districts of the states in the Indian Union. A sound Diabetes control and the associating Dyslipidemia are priorities. However it is necessary to consider other parameters for treatment(systolic blood pressure) as available from International Trial Data.

Material: SPRINT from 100 Medical Centers and clinical practices recruited 9361 patients over the age of 50 and SBP 130 mm Hg or Higher and at least one additional cardiovascular disease (CVD) risk factor. Framingham Risk score for 10 year CVD risk => 15%. The BP treatment protocol was deliberately flexible. The drug formulary was sufficiently broad to provide many choices – Chlorthalidone 12.5 -25mg per day was the thiazide type diuretic of choice ; Amlodipine was the CCB of choice for the trial.

The primary hypothesis was whether CVD composite event rate was lower in intensive compared to standard treatment. The trial was stopped early, due to benefit, after median follow up 3.26 years. The major conclusion was: incidence of primary outcome (composite of CVD events) 25% lower in Intensive compared to Standard group and all cause mortality reduced by 27%.

The implications and utility in Indians, as extrapolated, is highlighted.

Cardiovascular disease is the leading global cause of death, accounting for 17.3 million deaths per year. Majority of these deaths occur in low and middle income Nations. Age specific C.V.D. mortality has been steadily decreasing in the developed world. The reduction in mortality in the U.S has been correlated to the reduction LDL cholesterol level in the general population. This has been achieved through lifestyle change and drug therapy mainly by Statin group of drugs. Statins have been proven to be effective in lowering LDL cholesterol significantly and reducing C.V.D events and mortality in primary and secondary prevention trails. Trials have also proven that for LDL treatment goals the lower is better. There is a sizable population whose LDL levels do not reach the goal on maximum tolerated dose of Statins. There is also a small percentage who cannot tolerate Statins at all.

PCSK-9 inhibitors are a new group of drugs found to be very effective in lowering LDL cholesterol in Statin treated as well as Statin intolerant patients, thus helping many more to reach the target LDL levels. PCSK-9 is a protein discovered in 2003 and its gene is located in Chromosome1. Naturally occurring gain of function mutation of this gene was identified to cause familial hypercholesterolema in a family study in France in 2003. Loss of function mutation leading to 28% lower LDL levels with 88% reduction CHD has been identified in population studies in US in 2006. These people with very low LDL levels of even 30 mgms were otherwise healthy.

In the liver the LDL receptor on the cell surface is responsible for removing LDL particles from the blood stream. When PCSK 9 binds to the LDL receptor the receptor is broken down in the lysosome and can no longer be available to remove LDL from blood. Gain of function of PCSK 9 gene will cause reduction in LDL receptors and increase serum LDL levels. Thus PCSK 9 became a biologic target for drug discovery to reduce LDL cholesterol. This has been achieved by developing monoclonal antibodies to PCSK-9 which makes it non functional. There are two types available for clinical use. Alirocumab and Evolocumab are approved for use in US, UK, Europe and Gulf Nations for fortnightly or monthly subcutaneous injections. LDL reductions of 50 to 60 percent has been achieved with this treatment in Statin treated as well as Statin intolerant patients. Side effects are mainly injection site reactions, muscle pains, flu like symptoms and neurocognitive disorders.

At present, since long term prospective trial results on the clinical benefits and side effects are not yet available these are indicated for secondary prevention or primary prevention in high risk patients only.

Newer Concepts In Cholesterol Lowering

Dr. T M Jaison
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Cardiovascular disease is the leading global cause of death, accounting for 17.3 million deaths per year. Majority of these deaths occur in low and middle income Nations. Age specific C.V.D. mortality has been steadily decreasing in the developed world. The reduction in mortality in the U.S has been correlated to the reduction LDL cholesterol level in the general population. This has been achieved through lifestyle change and drug therapy mainly by Statin group of drugs. Statins have been proven to be effective in lowering LDL cholesterol significantly and reducing C.V.D events and mortality in primary and secondary prevention trails. Trials have also proven that for LDL treatment goals the lower is better. There is a sizable population whose LDL levels do not reach the goal on maximum tolerated dose of Statins. There is also a small percentage who cannot tolerate Statins at all.

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Reducing the Cardiovascular Risk: Lessons from SPRINT

Professor Dr. M E Yeolekar
Senior Consultant Physician, K J Somaiya Medical College & Hospital, Ayurvedhar, Eastern Express Highway, Sion, Mumbai- 400 022

Background: The aim in reducing atherosclerotic cardiovascular risk has been one of the foremost strategies in dealing with complications related CAD to. It is known that multiple risk factors act additively and synergistically to compound the cardiovascular risk. Several scores have been devised over the globe under the auspices of Associations and Societies in the field of Hypertension–Cardiology, Diabetes and Kidney diseases. It is for the respective country and its treating community to identify and enforce the guidelines that offer maximum benefits. The NPCDCS had been initiated in several districts of the states in the Indian Union. A sound Diabetes control and the associating Dyslipidemia are priorities. However it is necessary to consider other parameters for treatment(systolic blood pressure) as available from International Trial Data.

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The implications and utility in Indians, as extrapolated, is highlighted.
L 9. Serum Ferritin in Acute Coronary Syndrome

Dr. Parul Goyal
Dept. of Biochemistry, PGIMER- Dr RML Hospital, New Delhi

Objectives: Serum ferritin levels are known indicators of body iron stores. The aim of this study was to investigate the role of serum ferritin in acute coronary syndrome (ACS).

Methods: In a case-control study, we evaluated 55 patients of ACS who presented in Cardiology Department and underwent coronary angiography and angioplasty at PGIMER-Dr RML Hospital, New Delhi. 60, age and sex matched, healthy adults were taken as control group. All subjects had given written informed consents. Blood samples were taken on day 1 at the time of presentation just before angiography, for measuring serum ferritin, serum iron, total iron binding capacity (TIBC) and lipid profile. For statistical analyses, chi-square test, Student’s t-test, one-way ANOVA, and the logistic regression were used.

Results: Serum ferritin levels were significantly higher (P < 0.001) in patients of ACS as compared to the control group. Similarly serum Cholesterol, Triglycerides and LDL levels were significantly higher (P < 0.001) in patients of ACS. There was also a significant correlation between serum ferritin and serum lipid levels in ACS patients.

Conclusion: High levels of serum ferritin, were associated with CAD. Furthermore, it can be considered to be a strong and independent risk factor in the development of atherosclerosis.

Keywords: Iron, Ferritin, Coronary Artery Disease, Coronary Angiography.

L 10. Humoral immunity to modified lipoproteins- a window on atherosclerosis?

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Oxidative or allosteric modification of low density lipoprotein creates a variety of neoepitopes that enable recognition by humoral components of immune system, including immunoglobulins, complement and C-reactive protein. Whether or not this is beneficial or detrimental for the development and progression of atherosclerosis has been controversial. On the one hand, humoral immunity provides a means for debris disposal that may protect macrophages from foam cell formation. On the other hand, participation of humoral immunity in acute inflammation may exacerbate tissue injury. The talk will start by reviewing the evidence from in vitro and preclinical models for homeostatic versus pathogenic roles of antibodies in atherosclerosis. Recent data will then be presented on the capacity of immunoglobulins to predict freedom from adverse cardiovascular events in patients. Finally, data will be shown illustrating the potential of antibodies against oxidised LDL for the molecular targeting of atherosclerosis for diagnosis and/or therapy.

L 11. Atherosclerosis: Delineating novel underlying mechanisms and developing nanoparticle based therapeutics

Prof. Shobha Ghosh
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Current therapeutic strategies for atherosclerotic cardiovascular disease focus on reduction in plasma cholesterol either by restricting intake (by dietary modification or use of inhibitors of intestinal cholesterol absorption such as Ezetimibe) or by reducing de novo cholesterol biosynthesis (by Statins). The rationale is to reduce the influx of cholesterol into the macrophages and its accumulation as cholesteryl esters (CE) thereby reducing foam cell formation and plaque progression. No therapy is currently available to enhance the removal of accumulated CE from existing plaque i.e., plaque regression. Such a strategy is crucial to reduce the burden of existing disease in addition to preventing the progression targeted by the current therapeutics. Our earlier research has demonstrated the role of enhanced free cholesterol (FC) removal from arterial plaque-associated macrophage foam cells and the final elimination of cholesterol from the body via the liver in attenuating Western diet-induced atherosclerosis. These studies clearly identify tissue-specific over-expression of CE-hydrolase (CEH), the rate limiting enzyme in the generation of FC from intracellular CE, as a potential therapeutic target. While CEH mediated hydrolysis of CE stored in macrophage foam cells generates FC for ApoA1 or HDL-dependent efflux through ABCA1/G1, hepatic CEH cooperates with HDL receptor SR-BI and facilitates the hydrolysis of HDL delivered CE generating FC that is finally removed from the body either by direct secretion into bile or following conversion to bile acids. These pre-clinical animal studies establish the concept and pave the way to develop novel strategies to enhance the expression of CEH (either by inducing transcription or by delivery of an exogenous gene in the hope to reduce atherosclerotic disease burden). Very limited knowledge is
Role of vascular inflammation and modification of LDL in ischemic heart disease with and without Diabetes Mellitus

Cardiovascular disease is an epidemic in India with ischaemic heart disease having one of the highest burden worldwide. Research supports the concept that in atherosclerosis, inflammation and dyslipidemia manoeuvre a vicious circle in atheroma formation. Direct and indirect crosstalk between the cells within the nascent plaque, dyslipidemia and inflammation complemented by the increase in risk factors of atherosclerosis lead to atheroma development and outcome.

Aims and objectives:
1. To evaluate levels of glycated LDL and oxidized LDL in acute myocardial infarction (AMI) and stable ischaemic plaque in patients with and without Diabetes Mellitus (DM)
2. To study levels of Paraoxonase 1 and superoxide dismutase (SOD) levels in patients of AMI with or without DM
3. To study markers of vascular inflammation (TNF-α, NF-κB, Insulin and MMP-9).
4. To correlate the above parameters

Material and Methods:
100 patients of acute Myocardial infarction (AMI) within 24 hrs of event with and without DM and 150 patients of angiographically proved atherosclerosis with or without Diabetes mellitus were enrolled after informed consent and inflammatory markers (TNF-α, NF-κB, Insulin and MMP-9)as well as modified LDL markers (glycated and oxidized LDL) and oxidative marker Paraoxonase 1 were assessed. The methodology included ELIZA, automated assays on AU480 automated Beckmann analyser and Chemiluminescence assays on ACCESS Beckman analyser.

Results: Levels of Glycated LDL were found to be significantly elevated (p<0.004) in AMI cases with DM (5.6±1.1 ng/ml) as compared to Control with DM (4.8±0.9 ng/ml). We found significantly elevated OxLDL levels in cases as compared to controls. Serum PON1 concentration was found to be reduced in cases as compared to controls having P <0.001. Serum levels of TNF-α, NF-κB, Insulin and MMP-9 were significantly raised in cases of CAD.

Discussion: Vascular inflammation superimposed on the deposited modified LDL is the proposed pathogenesis of ischaemic heart disease. Oxidation of the LDL particle depends on oxidation of the protein and/or fatty acids. Small dense LDL is also more susceptible to glycation even in non-diabetic people. A linking element between Diabetes and cardiovascular complications could be the excess production of reactive oxygen species and hyperglycemia, resulting in increased in oxidant available on the regulation of human CEH gene; our laboratory has reported the presence functional LXR response elements on the proximal promoter. However, adverse hepatic effects (increased lipogenesis) preclude the systemic use of LXR ligands. Similarly, while tissue-specific transgenic expression of CEH in macrophages or liver is feasible in pre-clinical animal models, viral vector based gene therapy in humans have significant limitations. Dendrimer nanoparticles (DNPs) have recently emerged as an excellent non-viral gene delivery platform and we have demonstrated successful delivery and expression of genes using DNPs. It is hypothesized that “functionalized nanoparticle based delivery of activators of CEH expression (e.g., LXR ligands) or CEH expression vector driven by specific promoter to macrophages or liver will enhance CE mobilization from lesion associated macrophage foam cells and increase final hepatic elimination of HDL derived cholesterol leading to plaque regression” (See Figure for more details). In addition, the validated DNPs developed for delivery can also be used for developing non-invasive imaging techniques by changing the core cargo to a contrast enhancing agent to facilitate early detection/diagnosis. Data will be presented to demonstrate successful development of functionalized nanoparticles for specific delivery to plaque associated macrophages (mannose functionalized DNP) and hepatocytes (Galactose functionalized DNP) in vivo with minimal toxicity. Specific delivery of LXR ligand using mannose-functionalized DNP to plaque associated macrophages enhanced removal of CE and reduced plaque burden with no effect on lipogenic genes in the liver. Galactose-functionalized DNP, on the other hand, successfully delivered CEH expression vector to the hepatocytes and enhanced CEH activity. Effects of DNP-mediated gene delivery on the development and/or regression of diet-induced atherosclerosis is currently under investigation.
products via multiple processes forming oxidized and glycated products. The molecular alarm signals send by dysfunctional endothelium and modified LDL deposition are decoded by specific blood immune cells (monocytes, T lymphocytes, neutrophils, mast cells) and by the resident vascular cells, that respond by initiating a robust inflammatory process, in which the cells and the factors they secrete hasten the atheroma development and thrombogenesis.

L 13. Molecular and cellular changes of Coronary Artery Diseases

Dr. Sreekanth K Sivaraman
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Coronary artery diseases (CADs) are complex in origin with plaque formation and inflammatory changes. There are several factors which trigger pathologic, angiographic and aneugenic changes in the vessel wall as well as in the cardiomyocytes. The inflammatory molecules acting at the smooth muscles like TNF, oxidized LDL, Macrophages, MMPs, ILs etc are mainly involved in the transformation and proliferation of smooth muscle cells during and after the plaque formation. Other than the proinflammatory cytokines, there are micro and macro molecules associated with pathophysiological changes of plaque formation and subsequently in plaque rupture. Necrosis or cell death observed during or after an infarction is again the effect of cellular response to various molecules generated during atherosclerotic plaque progression. During the complications of heart diseases different types of cell death such as apoptosis, necrosis and autophagy can occur in myocardium which contribute to further pathological complications of CADs in general. This process involve mitochondria and associated signaling molecules. Even oxidative stress play a major role to trigger the signals for cellular damage and degradation of genetic materials by various mechanisms. This study is mainly focusing on the involvement of various factors in the pathogenesis at the molecular level in coronary artery diseases and also their involvement in cardiac cell death during the course and pathogenesis of CADs. Pharmacological and genetic inhibition of necrotizing factors may reduce the inflammatory process via delaying the programmed cell death and can improve the cardiac function up to some extent. Though there are some translational applications experimentally done, the implications of the changes and their application in the treatment of CADs are gaining potential attention to reduce the complications of CADs.

L 14. Study of Insulin Resistance and Endothelial function in cases of Metabolic Syndrome in Delhi

Dr. Smita Tripathi
Lady Hardinge Medical College, New Delhi

Background: The metabolic syndrome is a constellation of clinical risk factors and is associated with insulin resistance and causes endothelial dysfunction by activating innate immune inflammatory pathways. Endothelial dysfunction is characterized by an impaired endothelium-dependent vasodilatation, a reduced arterial compliance and an inability to serve its normal physiologic and protective mechanisms. It is characterized by a reduction of the bioavailability of vasodilators, in particular, nitric oxide (NO), whereas endothelium-derived contracting factors (ET-1) are increased.

Objective: Our present work aims to study markers of endothelial dysfunction and calculate insulin resistance in patients fulfilling the definition of metabolic syndrome and to compare the results with healthy controls. Also we aim to see any correlation in the study parameters which may throw light on the etiopathogenesis of cardiovascular morbidity.

Methodology: A hospital based observational, case-control study was conducted. It included 46 cases of metabolic syndrome (according to International Diabetes Federation-2006 criteria) attending medicine OPD of a tertiary care hospital of New Delhi and 47 healthy volunteers. The study was ethnically cleared by hospitals’ ethical committee. Sampling was done in the study population after obtaining a written informed consent from them. Routine chemistries including fasting plasma glucose level were done for all subjects. Plasma insulin levels, Endothelin-1 (ET-1) and Nitric oxide (NO) were also estimated. Insulin resistance and sensitivity was assessed using HOMA-IR. Appropriate statistical tests were applied using SPSS.

Results: The results of the study are expressed as Mean± Standard error of Mean. The mean fasting plasma Insulin level was significantly high among cases [11.7 ± 1.7 mU/L vs 6.93 ± 0.6mU/L, (p<0.05)]. The mean value of HOMA-IR was significantly high among cases [5.3 ± 1.2 vs 1.3 ± 0.1, (p<0.001)]. The mean plasma NO level was significantly high among cases [22.5 ± 2.9 µmole/L vs 14.1 ± 2.5 µmole/L, (p<0.05)]. The mean plasma Endothelin-1 (ET-1) level was significantly high among cases [(8.6 ± 0.6 pg/mL vs. 5.0 ± 0.3 pg/dL (p<0.001)]. On applying Pearson’s correlation in cases, significant positive correlation was seen in Insulin and NO levels (p value <0.05, r=0.348) whereas no significant correlation was seen in between Insulin and EN-1. The regression analysis in cases, Insulin as the constant and NO levels as dependent variable confirmed association of the two parameters (Standardized coefficient beta=0.348, t=2.4, p value<0.05).
MicroRNAs: A role player in Atherosclerosis

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MicroRNAs (miRNAs) are known to regulate gene expression at post transcriptional and translation levels. Dysregulation in miRNAs expression are implicated in many pathological conditions. Various studies presently have implicated their role in the normal physiology as well as pathology of vascular endothelial cells (ECs), vascular smooth muscle cells (VSMCs) biology and others, leading to progression of atherosclerosis. miRNAs expression level under different stimuli like shear stress modulates various pathways in endothelial cells, vascular smooth muscle cells, macrophages, etc. that are involved in plaque formation, like expression of vascular cell adhesion molecules-1 (VCAM-1) and lipid homeostasis. Some miRNAs are suggested to be atheroprotective like miR-126 which is found to inhibit the formation of VCAM-1 while others can be pro-inflammatory or atherogenic like miR-21 which favours proliferative phenotype of VSMCs. Newer studies have emerged on the potential use of miRNAs for diagnostic and prognostic purpose as miRNAs are found in plasma. These can be used as biomarkers as their interaction with plasma lipids, proteins, etc. make it more stable. Techniques are developing for the possible use of miRNAs for therapeutic purpose either as mimicking agents or as antagonists. Problem lies in the fact that a single miRNA may regulate expression of many genes or a single gene is regulated by many different miRNAs. However, other strategies to address the same may be explored for their potential use in medicine.

Pathology of Carotid Artery Disease: spectrum of lesions encountered at SCTIMST over 30 years

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The carotid artery is a major musculo-elastic artery in the neck, providing blood to the important organ, the brain, besides the face and scalp. Diseases of the carotid artery are common, resulting in ischemic or hemorrhagic stroke. At SCTIMST, aneurysms were very common till the mid-1990s and after that virtually disappeared except for an occasional case. While idioptathic aorto-arteritis (Takayasu’s disease) and syphilis were seen to be the cause for aneurysms in some cases, most of the aneurysms were owing to moderate to marked mucoid vasculopathy and no atherosclerosis. Since the mid-1990s, increasing numbers of occlusive disease of the carotid artery were encountered. These were predominantly owing to mucoid vasculopathy, with occlusion due to myxomatous and fibro-mucoid plaques. In the last 15 years, the occlusive lesions in many cases showed features of transitional vascular disease with atherosclerosis superimposed on mucoid vasculopathy and only an occasional case showing features of atherosclerosis alone. Thus there was a transition in the nature of the occlusive lesions from myxomatous and fibro-mucoid plaques to atherosclerotic fatty plaques during this period. Calcification was common to both fibro-mucoid and atheromatous plaques. Complications such as plaque erosion, intra-plaque hemorrhage and dissection were associated with increased deposition of abnormal proteoglycans in myxomatous and fibro-mucoid plaques. Proteoglycans in the plaque and in the media of the artery appear to increase the propensity for such sequelae. Hence there is a need to identify the presence and degree of proteoglycan deposition in the vessel wall and plaque.
Venous atheroma in mesenteric circulation in Portal hypertension

Portal hypertension is a vascular disease with pathological changes in vascular structures and functions of extrahepatic portal system, systemic as well as pulmonary circulation. The pathological changes of vasculopathy in portal hypertension include remodelling of arterialized visceral veins, intimal injury of visceral veins and destruction of contractile structure in visceral arterial wall. The mechanisms of vasculopathy in portal hypertension may be attributed to the changes of hemodynamics in portal system, immune response, gene modulation, vasoactive substances, and intrahepatic blood flow resistance. Portal hypertension can cause visceral hyperdynamic circulation, and the development and progression of visceral vasculopathy, while visceral vasculopathy can promote the development and progression of portal hypertension and visceral hyperdynamic circulation in turn. Damage to the intima in patient with portal hypertension results from increased portal pressure and blood flow. It has been reported that phenotype of vascular smooth muscle cells changes from normal constrictive to synthetic type due to increased cytokine, growth factor, shearing force, oxygen stress. The expression of constrictive proteins in vascular smooth muscle cells is inhibited, and excessive extra-cellular matrix is produced and migrates into subintima. In the splenic and gastric coronary veins of cirrhotic patients, proliferative intima, extensive thrombi adhering to the venous wall, mimicking arteriosclerosis plaques accompanied with hypertrophy of smooth muscle cells, and thickened muscle fibers of veins with increase in extracellular matrix have been reported. In a study assessing varicose great saphenous veins (VGSV) and diseased splenic veins (DSV) it was found that under high hydrostatic pressure conditions, the number of vasa vasorum increased in the wall of both VGSV and DSV. Splenic vein had a higher number while great saphenous vein had a higher average cross sectional area of vasa vasorum. However, both showed same ultrastructural changes in endothelium.

Most studies so far on pathological changes in venous wall associated with portal hypertension have been reported on cirrhotic patients. We analysed our data on 123 cases of non cirrhotic portal hypertension and found myxoid degeneration with atheroma formation of splenic vein wall, venous wall thickening & medial hypertrophy in around 80% cases. Thrombosed splenic vein was found in 18% cases. Splenic artery also showed medial hypertrophy in 90% cases.

L 17. Venous atheroma in mesenteric circulation in Portal hypertension

Dr. Biju Pottakkat
Professor of Surgical Gastroenterology, Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Puducherry

Portal hypertension is a vascular disease with pathological changes in vascular structures and functions of extrahepatic portal system, systemic as well as pulmonary circulation. The pathological changes of vasculopathy in portal hypertension include remodelling of arterialized visceral veins, intimal injury of visceral veins and destruction of contractile structure in visceral arterial wall. The mechanisms of vasculopathy in portal hypertension may be attributed to the changes of hemodynamics in portal system, immune response, gene modulation, vasoactive substances, and intrahepatic blood flow resistance. Portal hypertension can cause visceral hyperdynamic circulation, and the development and progression of visceral vasculopathy, while visceral vasculopathy can promote the development and progression of portal hypertension and visceral hyperdynamic circulation in turn. Damage to the intima in patient with portal hypertension results from increased portal pressure and blood flow. It has been reported that phenotype of vascular smooth muscle cells changes from normal constrictive to synthetic type due to increased cytokine, growth factor, shearing force, oxygen stress. The expression of constrictive proteins in vascular smooth muscle cells is inhibited, and excessive extra-cellular matrix is produced and migrates into subintima. In the splenic and gastric coronary veins of cirrhotic patients, proliferative intima, extensive thrombi adhering to the venous wall, mimicking arteriosclerosis plaques accompanied with hypertrophy of smooth muscle cells, and thickened muscle fibers of veins with increase in extracellular matrix have been reported. In a study assessing varicose great saphenous veins (VGSV) and diseased splenic veins (DSV) it was found that under high hydrostatic pressure conditions, the number of vasa vasorum increased in the wall of both VGSV and DSV. Splenic vein had a higher number while great saphenous vein had a higher average cross sectional area of vasa vasorum. However, both showed same ultrastructural changes in endothelium.

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L 18. Atherosclerosis and cellular senescence

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Atherosclerosis is classed as a disease of aging, such that increasing age is an independent risk factor for the development of atherosclerosis. Atherosclerosis is also associated with premature biological aging, as atherosclerotic plaques show evidence of cellular senescence characterized by reduced cell proliferation, irreversible growth arrest and apoptosis, elevated DNA damage, telomere shortening and dysfunction. Not only is cellular senescence associated with atherosclerosis, there is growing evidence that cellular senescence promotes atherosclerosis. The pathology of normal vascular aging, the evidence for cellular senescence in atherosclerosis, the mechanisms underlying cellular senescence including reactive oxygen species, replication exhaustion and DNA damage, the functional consequences of vascular cell senescence, and the possibility that preventing accelerated cellular senescence is a therapeutic target in atherosclerosis shall be discussed.
L 19. Potential of bioengineered small diameter vascular graft for replacement of diseased blood vessel and to facilitate atherosclerosis research

Lissy Krishnan
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When the interventional cardiology is unsuccessful and patients face with cardiovascular complications, coronary by-pass surgery becomes the treatment option. For replacement of coronary arteries, the ‘Holy Grail’ is autologous vessels harvested from saphenous vein or internal mammary artery. However, availability of suitable vessel in sufficient dimension is often a concern. To solve the scarcity, principles of engineering sciences and biological sciences is applied and bioengineered functional blood vessel is fabricated in vitro. The major components used for blood vessel bioengineering are: (i) degradable polymer scaffold to bear the mechanical strength; (ii) differentiated vascular cells to introduce function; and (iii) bioreactor to condition the vessel during in vitro bioengineering process. Currently, many different natural, synthetic and hybrid scaffolds have been developed and validated to have sufficient physicochemical properties and degradation rates to suit blood vessel construction. Different stem cell sources have been identified to use as autologous tissue to construct patient-specific blood vessel. This presentation focuses on the development of small diameter blood vessel using biodegradable, FDA approved poly ε-caprolactone hybridized with fibrin & growth factors to serve as a biomimetic scaffold. Circulating endothelial and smooth muscle progenitor cells (EPC &SMPC) were differentiated into endothelial cell (EC) and smooth muscle cell (SMC) to provide cell layers for the fabricated vessel.

The etiology and progression of atherosclerosis is not well-understood due to lack of good in vitro and in vivo models to study the disease process. Our study proposes use of bioengineered small diameter blood vessel to delineate the underlying causes of disease initiation and progression. The advantages are that the normal endothelial lining in the constructed blood vessel could be exposed to physiological and pathological condition under different hemodynamic conditions. The endothelial dysfunction may be studied under different conditions at molecular and cellular level. This presentation includes one such example where endothelial cells in the lumen produce nitric oxide (NO) upon exposure to different shear stress conditions. Also the effect of released NO on the SMCs lined towards the external surface of the bioengineered vessel is demonstrated. The results suggests that the prospect of employing bioengineered and functional small diameter blood vessel for understanding etiology of atherosclerosis process is high. Different physiological, pathological biochemical environment and flow conditions may be simulated which will have definite advantages as compared to currently used 2-dimensional culture system and laminar flow applied to study the effect of shear stress.

L 20. Cardiovascular miRNA: Novel tool for diagnostic and therapeutic biomarker

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Cardiovascular diseases (CVDs) have now become the leading cause of mortality in India. 30 million heart patients are residing in India, where 14 million are in urban areas and 16 million in rural areas. More than 80% of sudden cardiac deaths in the world are caused by atherosclerotic coronary artery disease (CAD), and the remaining 20% of cases are caused by other diseases including congenital heart disease, cardiomyopathies, aortic valve disease, left ventricular hypertrophy and other cardiac disorders. One of the major challenges in cardiovascular disease is the identification of reliable biomarkers in serum/plasma. MicroRNAs (miRNAs) are noncoding, small RNA sequences that regulate gene expression by inhibiting protein translation or inducing target mRNA destabilization. Recently, miRNAs has emerged as a central regulator of many cardiogenic processes and play a role during essential biological processes, such as cell proliferation, differentiation, stress response, apoptosis and tumorigenesis. Besides their intracellular function, recent studies suggested that miRNA can be released by cells and circulate with the blood in a remarkably stable form. This extracellular miRNA stability is due to packaged with lipid vesicles or by being associated with protein or lipoprotein complexes. Although the precise cellular release mechanisms of miRNAs remain largely unknown. These finding have raised the possibility that miRNAs may play a role as diagnostic and therapeutic biomarkers in cardiovascular disease.

Keywords: CVD, CAD, miRNA, Lipoprotein, Biomarker, Serum, Plasma
L 21. Coronary Ectasia in Atherosclerosis- A distinct manifestation. From Pathogenesis to treatment

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Coronary Artery Ectasia (CAE) represent a distinct form of atherosclerotic coronary artery disease, seen in approximately 5% of patients undergoing coronary angiography. Many unanswered questions remain regarding their exact aetiology, prognosis and therapy. The most commonly used angiographic definition of CAE, is the dilatation of coronary artery more than 1.5 times adjacent normal portion of the artery. Incidence of isolated ectasia is 0.2%. More than half of CAE are due to coronary atherosclerosis, but occasionally they are related to other pathological entities like connective tissue disorders and the Kawasaki disease. Recent studies have documented the association of CAE with the presence of aneurysms in other vascular beds probably owing to a common underlying pathogenic mechanism. The specific causative mechanisms of abnormal dilatation in CAE are unknown. The histopathological characteristics are similar to coronary atherosclerosis and it is hypothesized that the origin of CAE to the vascular endothelium and the biological properties of the arterial wall. Another mechanism, proposed focuses on the system of metalloproteinases, which are actively involved in the proteolysis of the extracellular matrix proteins. Disturbances in blood flow filling and washout are an inherent characteristic of CAE. They represent the direct result of inappropriate coronary dilatation. The clinical presentation and the long-term cardiac complications are mostly associated with the severity of the coexisting atherosclerotic coronary artery disease. There is a scarcity of data adequately addressing the medical management of patients with CAE. Previous studies based on the significant flow disturbances within the ectatic segments, suggested chronic anticoagulation as main therapy. But this treatment has not been prospectively tested. The role of combined antiplatelet therapy with the addition of ADP inhibitors are also being used but not yet evaluated in prospective randomized studies. Nitrates, by causing further coronary vasodilatation, have been shown to exacerbate myocardial ischemia and are discouraged in patients with isolated CAE. For patients with coexisting obstructive lesions and symptoms or signs of significant ischaemia, percutaneous and surgical coronary vascularization can safely and effectively be used. The introduction of genetic studies, new non-invasive modalities and the systematic testing of modern antiplatelet and vasoactive medications, may offer significant means of improving their prognosis in the future.

L 22. Statins in Chronic Kidney Disease

Dr. Priyamwada P S
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Chronic kidney disease (CKD) is associated with a high burden of cardiovascular disease and contributes substantially to mortality. The pathogenesis of cardiovascular disease in CKD results from a complex interplay of traditional and nontraditional risk factors. In addition to cardio protective effects, statins are postulated to have reno protective effects as well. But this treatment has not been prospectively tested. The role of combined antplatelet therapy with the addition of ADP inhibitors are also being used but not yet evaluated in prospective randomized studies. Nitrates, by causing further coronary vasodilatation, have been shown to exacerbate myocardial ischemia and are discouraged in patients with isolated CAE. For patients with coexisting obstructive lesions and symptoms or signs of significant ischaemia, percutaneous and surgical coronary vascularization can safely and effectively be used. The introduction of genetic studies, new non-invasive modalities and the systematic testing of modern antiplatelet and vasoactive medications, may offer significant means of improving their prognosis in the future.

L 23. 30 years of atherosclerosis research: An end to antioxidant controversy

Dr. Sampath Parthasarathy

Peroxidation of polyunsaturated fatty acid (PUFA) containing lipids has been known for a long time. Numerous studies have documented that peroxidized lipids as well as products derived from their decomposition, particularly aldehydes, have deleterious biological properties. This concept has been exemplified in the study of atherosclerosis. A plethora of in vitro and animal studies, as well as human epidemiological and correlatory studies have supported the notion that oxidative processes may contribute to the disease process. Yet the negative outcome of human clinical trials with α-tocopherol and other antioxidants has convinced even staunch supporters of the hypothesis to take a step backward and reconsider reasons of their
Mechanistic insights into the protective efficacy of zingerone against ethanol-induced hepatotoxicity in rats: Impact on hyperlipidemia, oxidative stress, inflammation and fibrosis

Endothelial dysfunction (ED) is an established response to cardiovascular risk factors and it is characterized by increased levels of soluble molecules secreted by endothelial cells (EC). Evidence suggest that ED is an independent predictor of cardiac events and that it is associated with a deficiency in production or bioavailability of nitric oxide (NO) and/or an imbalance in the relative contribution of endothelium-derived relaxing and contracting factors. ED can be reversed by treating the cardiovascular risk factors, hence, beyond ambiguity, ED contributes to the initiation and progression of atherosclerotic disease. Majority of the cardiovascular risk factors act by a common pathway, oxidative stress (OS), which is characterized by an imbalance in the bioavailability of NO and reactive oxygen species (ROS). Enhanced ROS, through several mechanisms, alters the competence of EC that leads to ED, reducing its potential to maintain homeostasis and results in the development of cardiovascular disease. Influential mechanisms that have been implicated in the development of ED include (i) the presence of oxidative stress-derived aldehydes, (ii) alterations in the antioxidant-antioxidant system, (iii) increased production of pro-inflammatory cytokines, (iv) decreased production of anti-inflammatory cytokines, and (v) decreased production of anti-apoptotic factors.

L 24. Mechanistic insights into the protective efficacy of zingerone against ethanol-induced hepatotoxicity in rats: Impact on hyperlipidemia, oxidative stress, inflammation and fibrosis

Dr. N Nalini
Professor, Department of Biochemistry and Biotechnology, Annamalai University, Annamalainagar -608002, Tamilnadu

Alcoholic liver disease (ALD) is a collective term for the pathophysiological changes caused by chronic alcohol consumption, which include oxidative stress generation, liver steatosis, inflammatory response, fibrosis and cirrhosis. Alcohol consumption is associated with a number of changes in cell function and the oxidant-antioxidant system. Zingerone (ZO) is a phenolic alkanone, one of the major component of dry ginger root and found in many herbal spices. It has been reported to have several biological properties such as antioxidant, anticancer, antiinflammatory, lipolytic, antimicrobial, radioprotective and radioprotective effects. The present study was focused on evaluating the mechanistic insights into the protective efficacy of zingerone against ethanol-induced hepatotoxicity in rats which is having impact on hyperlipidemia, oxidative stress, inflammation and fibrosis. Male albino Wistar rats were randomized into four groups. Groups 1 and 2 received isocaloric glucose. Liver injury was induced in groups 3 and 4 by administering 30% ethanol (6 g/kg b.w.) for 60 days. In addition, groups 2 and 4 were given zingerone (20 mg/kg b.w.) daily for the last 30 days of the experiment. Ethanol alone administered rats showed a significant increase in the activities of serum liver marker enzymes, lipid profile, lipid peroxidation markers, DNA damage, increased collagen accumulation and also elevated the expression of apoptotic markers (Bcl-2, Bax, Caspase-3, Caspase-9), inflammatory markers (TNF-α, IL-6, iNOS), angiogenic marker (VEGF) signaling molecule (CD14), chemokine (MIP-2) and fibrogenic factor (TIMP) while reducing the activities of the antioxidants and the expression of Nrf2. Zingerone supplementation reversed the ethanol induced alterations in liver marker enzymes, lipid profile, lipid peroxidation markers, antioxidant status, alcohol metabolizing enzymes, fibrosis, the expression of apoptotic, inflammatory, angiogenic, signaling, chemokine and fibrogenic markers. Hence, zingerone can be considered as a good protective agent against alcohol induced hepatotoxicity by suppressing oxidative stress, inflammation, apoptosis and fibrosis.

L 25. Caveolin1/Protein Arginine Methyltransferase1/Sirtuin1 Axis as a Potential Target Against Endothelial Dysfunction

Kanchanamala K
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of elevated levels of the NOS inhibitor, asymmetric dimethylarginine (ADMA) due to augmented enzyme activity of protein arginine methyl transferase-1 (PRMT1); (ii) decrease in NO generation by endothelial nitric oxide synthase (eNOS) uncoupling, or the reaction of NO with free radicals and (iii) impaired post translational modification of protein (PTM) such as eNOS, caveolin-1 (cav1) and sirtuin-1 (SIRT1). However, how these inter-related mechanisms concur to develop ED is unclear. The events that possibly overlay include OS-induced sequestration of SIRT1 to the caveolae facilitating cav1-SIRT1 association; potential increase in lysine acetylation of enzymes such as eNOS and PRMT1 which leads to enhanced ADMA formation; imbalance in acetylation-methylation ratio; diminished NO generation and ED. The focal point here is the interdependent association between cav1, PRMT1 and SIRT1 and the potential strategies to preserve endothelial function with gene- or pharmaco-therapy.

Nanodrug delivery system offers a promising option for developing novel approaches to manage many diseases and have potential to transform current treatment modalities. Atherosclerosis, a leading cause of mortality is a multifactorial disease characterised by oxidative, inflammatory and necrotic processes. The current treatment regime including drug administration and surgery have limitations such as non-specific delivery, limited bio-availability and low efficacy. In this context, our effort focus on synthesising drug delivery platforms such as antibody conjugated drug loaded nanocapsule delivery system for preventing cholesterol induced foam cell triggered atherosclerosis. With this aim, Poly allylamine nanocapsules were synthesized by infiltrating polymer on silica template followed by dissolution of core template by etching. Robinin, a flavonoid extracted from *Vigna Unguiculata*, which has shown hypolipidemic and antiatherogenic effect on cholesterol induced atherosclerosis in our *in vivo* studies was encapsulated to polymeric nanocapsules and characterised. Drug release, cellular uptake, ROS and lipid peroxidation status, gene and protein expression and *in vivo* studies have shown that these biocompatible polymer-drug capsules could be used as a novel therapeutic approach for atherosclerosis.

A similar approach has been made with PVP coated Naringenin nanoparticles to ameliorate high cholesterol induced atherogenesis. Naringenin is one of the naturally occurring flavonoids found in citrus fruits and exerts a wide variety of pharmacological activities. The clinical relevance of naringenin is limited by its low solubility and minimal bioavailability owing to its largely hydrophobic ring structure. Hence, we successfully developed a polyvinyl pyrolidone coated Naringenin nanoparticle (NAR NP) system and effectively characterized its nano scale properties. Detailed molecular mechanistic studies are under way to explore the cellular mechanism of action of NAR NP to devise future therapeutic strategies.

L 26. Advances in Nanotechnology- Special focus to Atherosclerosis

Dr. Annie Abraham
Professor & Head, Department of Biochemistry, University of Kerala, Thiruvananthapuram

Nanodrug delivery system offers a promising option for developing novel approaches to manage many diseases and have potential to transform current treatment modalities. Atherosclerosis, a leading cause of mortality is a multifactorial disease characterised by oxidative, inflammatory and necrotic processes. The current treatment regime including drug administration and surgery have limitations such as non-specific delivery, limited bio-availability and low efficacy. In this context, our effort focus on synthesising drug delivery platforms such as antibody conjugated drug loaded nanocapsule delivery system for preventing cholesterol induced foam cell triggered atherosclerosis. With this aim, Poly allylamine nanocapsules were synthesized by infiltrating polymer on silica template followed by dissolution of core template by etching. Robinin, a flavonoid extracted from *Vigna Unguiculata*, which has shown hypolipidemic and antiatherogenic effect on cholesterol induced atherosclerosis in our *in vivo* studies was encapsulated to polymeric nanocapsules and characterised. Drug release, cellular uptake, ROS and lipid peroxidation status, gene and protein expression and *in vivo* studies have shown that these biocompatible polymer-drug capsules could be used as a novel therapeutic approach for atherosclerosis.

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L 27. Cardio protective effect of Gardenia *gummifera* Linn. f

M S. Latha
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Gardenia gummifera Linn. f. belonging to the family Rubiaceae is a large medicinal shrub with resinous buds. It is traditionally used in conditions of cardiac debility, obesity, lipolytic disorders, bronchitis, neuropathy and splenomegaly. The present study was undertaken to evaluate the *in vitro* and *in vivo* antioxidant and cardioprotective effect of G. gummifera root and the identification of its active phytochemical constituents. Preliminary phytochemical evaluation of the methanolic extract of G. gummifera root (MEGG) revealed the presence of flavonoids, alkaloids, phenolics, glycosides, tannins, steroids, terpenoids and carbohydrates. MEGG exhibited a promising *in vitro* antioxidant activity by DPPH and hydroxyl radical scavenging activity and reducing power assay. *In vivo* antioxidant studies also revealed that MEGG possesses potent antioxidant activity against thioacetamide (TAA) induced oxidative stress in rats. LCMS analysis revealed the chemical composition of the extract and constituents with potent antioxidant and cardioprotective effect. The major compounds identified were erythrodil, lupeol, epicatechin, B- sitosterol, asiatic acid, myricetin, oleanolic aldehyde, vernolic acid, dicaffeoylquinic acid and chlorogenic acid. Toxicological studies revealed the extract administration up to a high dose of 5g/kg did not result in mortality or any other change in behavior. Hence further studies were conducted to establish its cardioprotective properties, especially antiatherogenic activity against high fat diet induced atherosclerosis and cardioprotective potential of MEGG against isoproterenol (ISO) induced myocardial infarction (MI) in rats. The serum and tissue biochemical parameters and
histopathological evaluation together support the cardioprotective efficacy of G. gummifera root. MEGG was fractionated by petroleum ether fraction (PEF), chloroform fraction (CHF), ethyl acetate fraction (ETF) and methanol fraction (MEF). Active fraction of MEGG was PEF, which showed maximum in vitro antioxidant activity, and hence the cardioprotective activity of PEF was further examined by using ISO induced MI models. The levels of serum marker enzymes, lipids, tissue antioxidants, lipid peroxidation products and histopathological studies revealed the protective effect of PEF. LCMS analysis showed the presence of oleanolic aldehyde and vernolic acid. These compounds were reported to possess antioxidant properties. The present study thus concluded based on the findings that G. gummifera root possessed excellent antioxidant and cardioprotective properties. Furthermore, it is demonstrated that MEGG is a promising cardioprotective agent and might be useful clinically after further studies.

Prolonged exposure to hyperglycemia is a major factor in the pathogenesis of atherosclerosis in diabetes. Atherosclerosis accounts for 80% of all deaths among patients with diabetes. Hyperglycemia induces a large number of alterations at the cellular level in vascular tissues and potentially accelerates the atherosclerotic process. Major mechanisms are nonenzymatic glycosylation of proteins and lipids, oxidative stress and protein kinase C (PKC) activation. High glucose can also activate monocytes to secrete proteins which may increase the risk for vascular lesion formation. One such protein is cyclophilin A, an immunophilin which has also been discovered to be elevated in the serum of patients with type 2 diabetes as well as patients with coronary artery disease. Interestingly, various cell types have been described to secrete cyclophilin A into the extracellular space. Release of cyclophilin A by cells such as monocytes may promote vascular inflammation in diabetes.

We have attempted to establish in an invitro cellular model, the ability of cyclophilin A to induce monocyte adhesion to endothelial cells, migration of monocytes as well as formation of foam cells, to explore cellular mechanisms for accelerated atherosclerosis in diabetes mellitus.

We developed an invitro model of monocytes cultured in 20mm glucose (high glucose) equivalent to 360mg/dL of plasma glucose levels. These monocytes were then differentiated into macrophages using PMA and subsequently transform them to lipid laden foam cells using oxidized low density lipoproteins in the presence and absence of cyclophilin A. This cellular model was used to study monocyte to macrophage differentiation, transmigration and foam cell formation. A similar cellular model using siRNA mediated transient elimination of the cyclophilin A gene as well as chemical inhibitors were used to further confirm the role of cyclophilin A in monocyte differentiation and foam cell formation.

We report here two major functions of the cyclophilin A protein based on its intracellular and extracellular activities. Cyclophilin A is secreted from high glucose activated monocytes and can be detected in plasma of patients with type 2 diabetes and associated coronary artery disease. Secondly it accelerates early atherogenesis by increasing monocyte adhesion, transmigration and differentiation into macrophages leading to increased lipid uptake. We found that cyclophilin A up regulates scavenger receptors and increases redox activity as well as levels of proinflammatory cytokines leading to increase in lipid uptake by macrophages.
0 1. Bioactive lipids for arresting and/or reversing the development of atherosclerosis: The good, the bad and the ugly

Dr. Undurti N Das, MD, FAMS, FRSC
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A new concept of treating atherosclerosis to prevent, arrest and/or reverse by selectively delivering bioactive lipids, their respective cDNA clones and genes such that prostacyclin (PGI2), prostaglandin E1 (PGE1), PGI3, nitric oxide (NO), nitrolipids, lipoxins (LXs), resolvins (RSVs), protectins (PTs) and maresins (MRs) content of endothelial cells lining the blood vessels will increase is presented. Increased production or delivery of PGI2, PGI3, NO, LXs, RSVs, PTs, MRs and nitrolipids will lead to prevention, arrest, and/or reversal of even established atherosclerosis. The methods of delivery can be as direct intracellular injection, as liposomal preparations, and/or as coated coronary stents.

0 2. Cardiovascular research: “Make in India”

Prof. Ganesan Karthikeyan
Department of Cardiology, All India Institute of Medical Sciences, New Delhi

Although India is, by some counts, the 9th largest producer of medical research in the world, our per-capita output is small and so is the impact of this body of research. There are many explanations put forward for our poor performance and relate mainly to lack of funding and infrastructure. Increasing funding and building infrastructure are beyond the capabilities of most researchers. But is there anything that individuals like us can do to improve the state of affairs? This talk seeks to present some potential, workable strategies to clinicians and researchers based on our own experience with research into some aspects of rheumatic heart disease, mechanical valve thrombosis and coronary artery disease. Creating a critical mass of clinicians and researchers who are willing to produce high quality, locally relevant research is the essential first step in creating a “culture of research”. Once established, such a “culture” will be self-sustaining, and will ultimately lead to better understanding and improved management of diseases affecting our population.

0 3. Tummy out heart fail, tummy in heart hale

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India is currently facing a burgeoning epidemic of obesity amidst its half of the population suffering still from malnutrition. According to a rough calculation about five crore of its adult population is obese. Further, it is said that 15 million Indian children are obese. Approximately 22% of Indian kids are obese. This figure will rise to 70 million by 2025. What is intriguing is the rising prevalence of central obesity which is higher in Indians for any given weight. This makes Indians prone for insulin resistance, diabetes at a much younger age, dyslipidemia characterised by hyperglycemia and low HDL -cholesterol, fatty infiltration of liver, increased carotid intima media thickness (CIMT), vascular calcification reflected by aortic atherosclerosis, not infrequently increased echogenicity of pancreas. Our hypothesis is subjects manifesting central obesity (CO), dyslipidemia and evidence of fatty deposition over liver and/or pancreas, increased CIMT are prone for early onset coronary artery disease (EOCAD). We also aimed to look for some reliable simple clinical marker for central obesity.

Keeping above two aims we studied a total of 260 subjects attending Comprehensive Health Check UP Clinic of National Heart Institute, New Delhi; of which 139 (53.4%) were obese according to their BMI while 156 (60%) had central obesity as defined by waist circumference (females > 85 cms and males > 95 cms). About 118 (45.38%) subjects were obese as well as centrally obese both. Interestingly 38 (24.3%) cardiac patients who had normal weight demonstrated central obesity. This prompted us to undertake to look for some reliable clinical marker to suspect central obesity without resorting to waist measurement at first instance. Sure enough we noted apparent “Tilt in Belt” in males and “Tilt in Cloth line” among females in subjects found to have increased waist length. Further, detail analysis of our cases depicting central obesity we observed significant increased incidence of increased CIMT and fatty cell infiltration of liver. Few cases with grade 2 to grade 3 fatty liver infiltration also demonstrated increased pancreatic echogenicity with concurrent raised HbA1c %. The detail analysis of CIMT, ultrasonographic demonstration of fatty liver/pancreas and its correlation with central obesity vis a vis BMI would be presented. Many of those who had BMI > 28 or waist more than 92 in females and 90 in males had more than two vascular disease more so if they were tobacco users also. Central obesity and tobacco seemed to be deadly combination in our study. It is surmised that the clinical evidence of central obesity/ “Tilt in belt or cloth line” is a simple and cost effective clinical method of predicting future diabetes and EOCAD.
P 1. A Study Of Telomere Dysfunction In Hypertensive Patients With Dyslipidemia

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OBJECTIVES/BACKGROUND: Telomeres are specialized DNA-protein structures located at the ends of eukaryotic chromosomes whose length is progressively reduced in most somatic cells during ageing. Telomere shortening has been demonstrated in patients with coronary heart disease, hypertension, malignancy and diabetes etc. We compared telomere dysfunction in hypertensive patients and correlated it with dyslipidemia.

Methods: The study include 40 male patients of essential hypertension of age 45–65 yrs and equal number of age matched healthy males. We investigated all study subjects after examination for baseline parameters, lipids, telomere length and telomerase activity.

Results: We observed that the hypertensive subjects were more dyslipidemic. The total cholesterol, triglyceride and LDL were higher among hypertensive subjects. HDL was found to be lower in hypertensive patients (table). Mean telomere length was found to be shorter in patients of hypertension (8.17±1.26) as compared to controls (10.47±1.79 kb) (p 0.001). We measured hTERT expression in cases and controls, as an indicator for telomerase activity. The mean ct of cases (-0.18) was lower than controls (16.17). We also found that when telomere length decreases by one unit (one kb) the risk of hypertension increases by 0.384 times (OR:0.384, CI 0.253–0.583). We also observed a positive correlation of telomere length with HDL (r+0.347, p<0.002) and a negative correlation with LDL (r-0.405, p<0.001), total cholesterol(r-0.235, p<0.036) and triglyceride (r-0.415, p<0.001).

LIPID PARAMETERS AMONG CASES AND CONTROLS

<table>
<thead>
<tr>
<th>Lipids Parameters</th>
<th>Cases (n=40)</th>
<th>Controls (n=40)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean ±SD</td>
<td>mean ±SD</td>
<td></td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)*</td>
<td>159 (±20.95)</td>
<td>142.48 (±11.97)</td>
<td>0.001</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)*</td>
<td>132.45 (±22.93)</td>
<td>100.53 (±6.43)</td>
<td>0.001</td>
</tr>
<tr>
<td>LDL cholesterol (mg/dl)*</td>
<td>110.53 (±13.2)</td>
<td>78.95 (±17.7)</td>
<td>0.001</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dl)*</td>
<td>36.60 (±4.32)</td>
<td>40.88 (±6.29)</td>
<td>0.001</td>
</tr>
<tr>
<td>VLDL cholesterol (mg/dl)*</td>
<td>22.75 (±6.21)</td>
<td>18.25 (±3.35)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Conclusion: Shorter telomere length was found in hypertensive patients as compared to healthy controls. There was a positive correlation of telomere length with HDL and a negative correlation with triglyceride, LDL and total cholesterol.

P 2. Carotid Atherosclerosis and Alzheimer’s Disease

Sampath Parthasarathy
College of Medicine, University Of Central Florida

Background: Alzheimer’s disease (AD) is an age related neurodegenerative disorder in the brain. Presence of senile plaques (SP), neurofibrillary tangles (NFTs), loss of neurons and synapses, and altered sensory perception including memory loss delineate AD. However, the cause of AD is not clearly known. Several genetic and non-genetic factors (Oxidative stress) have been implicated in the disease. Of the genes, the apolipoprotein E (apo E), particularly ApoE4 allele is the largest known genetic risk factor of AD. During our studies on (apoE, major cholesterol carrier in the brain) and PON1 (paroxonase 1, reduces oxidative stress), we noted severe atherosclerosis of the carotid and innominate atherosclerosis in aged mice. We hypothesized that the brain of these mice would suffer severe nutritional and oxygen deprivation and suffer vascular and AD related dementia.

Methods: Young (4 months) and aged (14–24 months) ApoE/PON1 double knockout mice were used in the study. Histopathology and immunohistochemistry was used to detect altered pathology. PCR method was used to detect induction of Alzheimer’s markers. Presence of AD pathology was confirmed in the brain tissues of by immunohistochemistry for Aβ
Cardiac conduction disorders (CCD) is a serious and potentially life threatening disorder. It belongs to multiple factors with an alteration of cardiac conduction through the atrioventricular (AV) node, the His-Purkinje system with right bundle branch block (RBBB) or left bundle branch block (LBBB) and widening of QRS complexes. Cardiac conduction disorders are associated with mutational changes in dozens of different ion channel proteins and alteration of electrogenic exchanger. Many gene mutations are involved in CCD. Among these, hyperpolarization activated cyclic nucleotide gated channel 4 (HCN4) gene mutations are important to note in CCD. Angiotensin converting enzyme 2 (ACE-2) is an exopeptidase and its expression is directly involved in cardiac functions. We examine whether the single nucleotide polymorphism (SNPs) of HCN4 gene and level of ACE-2 enzyme contribute to the CCD in Indian subjects. A total number of 388 subjects (Case, n=194 and control, n=194) were selected for the study with 0.05% margin of error. Mutant genotype of both SNPs of HCN4 gene (C1454T and G1439C) was significantly (P<0.05) associated with cardiac conduction disorders in all genetic models (co-dominant, dominant and recessive). Haplotype analysis was also showed that CC, TG of HCN4 gene were significantly (P<0.05) associated with an increased risk of cardiac conduction disorders. Serum ACE-2 level (p<0.0001) was significantly higher in CCD patients. HCN4 gene polymorphism and ACE-2 enzyme level was significantly associated with an increased risk of CCD. Our finding suggests that HCN4 genes might be used as a novel marker in CCD and increased level of ACE-2 enzyme may lead to delineate the mechanism of pathogenesis of cardiac conduction disorders.

**Keywords:** Cardiac conduction disorders (CCD), HCN4, SNPs, ACE-2, Mutant, Haplotype

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**P 3. Variant of HCN4 gene and ACE-2 enzyme level implicated in cardiac conduction disorders**

Mohd Tasleem  
Senior Research Fellow, Dept of Pathology, King George’s Medical University, Lucknow

Cardiac conduction disorders (CCD) is a serious and potentially life threatening disorder. It belongs to multiple factors with an alteration of cardiac conduction through the atrioventricular (AV) node, the His-Purkinje system with right bundle branch block (RBBB) or left bundle branch block (LBBB) and widening of QRS complexes. Cardiac conduction disorders are associated with mutational changes in dozens of different ion channel proteins and alteration of electrogenic exchanger. Many gene mutations are involved in CCD. Among these, hyperpolarization activated cyclic nucleotide gated channel 4 (HCN4) gene mutations are important to note in CCD. Angiotensin converting enzyme 2 (ACE-2) is an exopeptidase and its expression is directly involved in cardiac functions. We examine whether the single nucleotide polymorphism (SNPs) of HCN4 gene and level of ACE-2 enzyme contribute to the CCD in Indian subjects. A total number of 388 subjects (Case, n=194 and control, n=194) were selected for the study with 0.05% margin of error. Mutant genotype of both SNPs of HCN4 gene (C1454T and G1439C) was significantly (P<0.05) associated with cardiac conduction disorders in all genetic models (co-dominant, dominant and recessive). Haplotype analysis was also showed that CC, TG of HCN4 gene were significantly (P<0.05) associated with an increased risk of cardiac conduction disorders. Serum ACE-2 level (p<0.0001) was significantly higher in CCD patients. HCN4 gene polymorphism and ACE-2 enzyme level was significantly associated with an increased risk of CCD. Our finding suggests that HCN4 genes might be used as a novel marker in CCD and increased level of ACE-2 enzyme may lead to delineate the mechanism of pathogenesis of cardiac conduction disorders.

**Keywords:** Cardiac conduction disorders (CCD), HCN4, SNPs, ACE-2, Mutant, Haplotype

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**P 4. Study of Lpa Gene Single Nucleotide Polymorphisms In Coronary Artery Disease**

ANU R I  
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**Background:** Cardiovascular disease mediated by atherosclerosis is a well known global burden on the health and economic fronts. Apart from the traditional risk factors, several nontraditional risk factors have found their niche in the etiopathogenesis of Coronary Artery Disease. Lipoprotein (a) is one such genetic causal factor and a strong biomarker for Premature CAD. Serum Lp (a) levels vary over a wide range in the general population. This is caused by Single Nucleotide Polymorphisms (SNPs) and variable number of Kringle IV2 domain repeats in the LPA gene, located on chromosome 6q 26–27. Of the SNPs, few have been well studied and proved to increase serum Lp (a) values, thus leading to an increased risk of predisposition to development of CAD.

Our study is based on three SNPs: rs3798220, rs1321196 and rs9364564 which have been shown to be associated with higher serum levels of Lipoprotein (a) in various ethnic groups.

**Objectives:** The aim of this study was to assess the relationship between LPA gene polymorphism and Serum Lipoprotein (a) levels in patients with Coronary Artery Disease.
Apolipoprotein E (ApoE) is the primary brain apolipoprotein secreted by astrocytes and is responsible for maintaining cholesterol and phospholipid homeostasis. It plays a central role in AD (Alzheimer’s disease) pathophysiology through Aβ-dependent and Aβ-independent neuropathogenic pathways. Apo E ε4 allele is a known genetic risk factor for AD which predisposes and influences the severity of pathological changes in the brain, thereby modifying the age at onset, but also promotes cognitive decline early in nondemented older people.

**Objectives:**
To review the published evidence on Apo E polymorphism with the susceptibility to AD and frequency of Apo E ε4 genotype (ε4/-) and homozygotes (ε4/4) among patients diagnosed with AD as compared to controls in Indian Population.

**Material & Methods:**
In the present study, MEDLINE was reviewed for articles published till June, 2013 supplemented by citation analysis from retrieved articles to select case control studies. A meta-analysis was performed to demonstrate the association of ApoE gene with VD by random effects to demonstrate models. The association was assessed by odds ratio (OR) with 95% confidence intervals (CI).

**Study Selection:**
Case-control studies, using clinical criteria for AD with Apo E polymorphism determined for allele and genotype in both cases and controls.

**Results:**
A total of 07 studies representing data from 417 AD patients and 651 controls in the Indian population were eligible. ApoE ε2/4, ε3/4 and ε4/4 genotypes as well as ApoE ε4 allele (OR = 5.90, 95% CI: 3.44 – 10.13) were associated with an increased risk AD, whereas, ApoE ε2/3, ε3/3 genotypes and ApoE ε3 allele were found to be marginally significant protective factors for AD. There was no significant difference in ApoE ε2/2 genotype and ApoE ε2 allele frequency in AD and controls. Similarly, in our study frequency of ε4 allele in AD (38.5%) was found to be significantly higher when compared to the population database of other countries. However, research in a larger population is required to strengthen our findings.

**Conclusion:**
From the study, it can be concluded that serum Lp (a) levels were increased in both the groups, with significant higher mean values in patients (p value=0.002). The intronic variant rs1321196 raised serum Lp (a) levels in both cases and control subjects. Yet, no direct correlation was observed between polymorphism and disease. The variant rs3798220 in the exon did not lead to variation in mean levels of serum Lp (a), thus contradicting a multitude of studies providing positive association in different ethnic groups around the world. The intronic variant rs9364564 also did not raise serum Lp (a) levels in either of the two groups. The observed minor allele frequencies of all variants were significantly higher when compared to the population database of other countries. However, research in a larger population is required to strengthen our findings.

**P 5. Meta-analysis of Apolipoprotein E Polymorphism in the patients with Alzheimer's disease**

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**Background:**
Apolipoprotein E (ApoE) is the primary brain apolipoprotein secreted by astrocytes and is responsible for maintaining cholesterol and phospholipid homeostasis. It plays a central role in AD (Alzheimer’s disease) pathophysiology through Aβ-dependent and Aβ-independent neuropathogenic pathways. Apo E ε4 allele is a known genetic risk factor for AD which predisposes and influences the severity of pathological changes in the brain, thereby modifying the age at onset, but also promotes cognitive decline early in nondemented older people.

**Objectives:**
To review the published evidence on Apo E polymorphism with the susceptibility to AD and frequency of Apo E ε4 genotype (ε4/-) and homozygotes (ε4/4) among patients diagnosed with AD as compared to controls in Indian Population.

**Material & Methods:**
In the present study, MEDLINE was reviewed for articles published till June, 2013 supplemented by citation analysis from retrieved articles to select case control studies. A meta-analysis was performed to demonstrate the association of ApoE gene with VD by random effects to demonstrate models. The association was assessed by odds ratio (OR) with 95% confidence intervals (CI).

**Study Selection:**
Case-control studies, using clinical criteria for AD with Apo E polymorphism determined for allele and genotype in both cases and controls.

**Results:**
A total of 07 studies representing data from 417 AD patients and 651 controls in the Indian population were eligible. ApoE ε2/4, ε3/4 and ε4/4 genotypes as well as ApoE ε4 allele (OR = 5.90, 95% CI: 3.44 – 10.13) were associated with an increased risk AD, whereas, ApoE ε2/3, ε3/3 genotypes and ApoE ε3 allele were found to be marginally significant protective factors for AD. There was no significant difference in ApoE ε2/2 genotype and ApoE ε2 allele frequency in AD and controls. Similarly, in our study frequency of ε4 allele in AD (38.5%) was found to be significantly higher when compared to control (10.3%). ε3 allele was more frequent than ε4 allele in AD and control group.

**Conclusion:**
From the study, it can be concluded that serum Lp (a) levels were increased in both the groups, with significant higher mean values in patients (p value=0.002). The intronic variant rs1321196 raised serum Lp (a) levels in both cases and control subjects. Yet, no direct correlation was observed between polymorphism and disease. The variant rs3798220 in the exon did not lead to variation in mean levels of serum Lp (a), thus contradicting a multitude of studies providing positive association in different ethnic groups around the world. The intronic variant rs9364564 also did not raise serum Lp (a) levels in either of the two groups. The observed minor allele frequencies of all variants were significantly higher when compared to the population database of other countries. However, research in a larger population is required to strengthen our findings.

**P 6. Ameliorating effects of chicory (Cichorium intybus L.)- supplemented diet against oxidative stress and type 2 diabetes mellitus in HFD/STZ treated rats**

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**Objectives:** The study was designed to investigate the hypoglycemic, hypolipidemic and antioxidative properties of an aqueous extract of Cichorium intybus seeds which is widely used in traditional system of medicines for lifestyle disorders.

**Methods:** A 28-days experiment was conducted on 25 young male Wistar rats. The control rats fed a standard corn starch diet. Type 2 diabetes mellitus (T2DM) was induced in rats with high fat diets and the low dose of Streptozotocin (STZ) (35 mg/kg BW). The protective group animals fed an aqueous extract of chicory seeds (200 mg/kg body weight, for 35 days) along with high-fat diets. After induction of type 2 diabetes mellitus, the experimental group rats treated with aqueous extract of chicory (200 mg/Kg BW) and diabetic control group rats treated with a standard drug (metformin- 3 mg/Kg BW). Blood was analyzed for fasting blood glucose, triacylglycerol (TG), insulin, reduced Glutathione (GSH) and catalase on the baseline (during recruitment of rats), after induction of type 2 diabetes mellitus and 28 days after treatment. Oral glucose tolerance test (OGTT) was performed on rats in which the treated group fed orally the chicory extract (200 mg/kg BW) for 10 days.

**Results:** During 4 weeks of treatment, chicory decreased fasting blood glucose, triglyceride, and insulin resistance (HOMA-IR). The concentration of reduced glutathione was increased in the chicory protective as well as treated groups (p < 0.05). The OGTT pattern approximated to normal in chicory-treated diabetic rats. However, the effect of chicory seeds on blood glucose, triglyceride, oxidative markers and insulin resistance (HOMA-IR) in the protective group is much beneficial than a treated group of rats.

**Conclusions:** Chicory appeared to have released the oxidative burden on diabetic rats. Chicory may be useful as a natural dietary supplement for slowing down the pace of diabetes progress and delaying the development of its complications.

**P 7. Leptin regulates cholesterol metabolism in alcoholic liver disease**

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Alcohol induced fatty liver disease is the most common and earliest response to the progression of fibrosis and/or cirrhosis. The mechanism by which ethanol causes fatty liver disease is complex and not fully understood; however, enhanced hepatic lipogenesis has been proposed as an important biochemical mechanism. The purpose of this study was to evaluate the effect of leptin on ethanol induced hepatic cholesterol metabolism in mice.

**Methods:** CD-1 mice (n=10/group) were studied for 45 days. Four groups were studied. 1) control, 2) leptin+control (230g/kg intraperitoneal every alternate day from day 15), 3) alcohol (6.32 g/kg daily by gastric lavage, for 45 days) and 4) alcohol plus leptin (as prior dosing).

**Results:** Compared to control, ethanol supplementation significantly (p<0.05) increased levels of plasma total and ester cholesterol and the activities of the enzymes HMG CoA reductase and cholesterol ester synthase (CES) which were normalized by addition of leptin (p<0.05). Increased SREBP2 protein expression found in ethanol fed mice was also normalised by leptin treatment. The activity of hepatic cholesterol ester hydrolase (CEH) and hepatic protein expression of cholesterol 7 a hydroxylase were significantly (p<0.05) lowered following ethanol supplementation compared to control mice. These features were significantly increased by addition of leptin. Liver histology showed that mice given ethanol had macro and micro vesicular steatosis. However, ethanol + leptin treated liver showed sinusoidal dilatation and no fatty change. Leptin injection in control mice showed mild sinusoidal dilatation and normal hepatocytes.

**Conclusion:** Thus, administration of exogenous leptin to ethanol-supplemented mice markedly decreased the synthesis and increased the catabolism of cholesterol in the liver.

**P 8. Polymorphisms in MTHFR, IL-6 and ICAM-1 genes is associated with an increased risk of coronary artery disease in South-Indian population**

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**Background:** Progression of coronary artery disease (CAD) depends on multiple genetic and environmental factors. Polymorphic variants of genes encoding proteins involved in endothelial dysfunction or pro-inflammatory state may genetically differentiate the human population and determine susceptibility to the disease.
**Methods:** A total of 100 subjects (aged <50 years) were recruited which included 50 CAD patients diagnosed on coronary angiography and 50 healthy controls. This study was approved by the institutional ethics committee of our institute and a written informed consent was obtained from all the study participants. Serum homocysteine, hsCRP, fibrinogen, lipoprotein (a), protein C and S levels were estimated as per the standard laboratory protocols. Mutation analysis of Methylene tetrahydrofolate reductase (MTHFR), interleukin-6 (IL-6) and intercellular adhesion molecule-1 (ICAM-1) genes was done with polymerase chain reaction (PCR) and Sanger’s dideoxy chain termination sequencing method. Patient DNA sequences were compared with normal sequence and further analyzed with the existing normal human genome sequence available from the NCBI database by using Clustal-X (v1.83) tool for multiple sequence alignment.

**Results:** Mean age of the CAD group was 36.6±0.7 years and control group was 34.9±0.7 years (p=0.11). We found a statistically significant elevation of homocysteine, hsCRP and fibrinogen in CAD group (p<0.05). We found a single nucleotide mutation i.e., c.715 C>T (p.222 Ala>Val) in exon-4 of MTHFR in 10% of CAD group. Statistically significant higher homocysteine levels were observed in patients with MTHFR mutation compared with patients without MTHFR mutation (35.8±4.7 µmol/L vs 17.5±7.7 µmol/L, p<0.0001). We observed novel mutations in exon-4 of IL-6 in 13 CAD patients whose hsCRP and fibrinogen levels are significantly higher (p<0.0001 and p=0.017 respectively) when compared to patients without IL-6 mutations. Exon-6 of ICAM-1 gene showed a mutation i.e., c.1402 A>G (p.469 Lys>Glu) in 9 (18%) patients whose hsCRP levels are significantly higher when compared to patients without ICAM-1 mutation (4.27±2.07 vs 1.86±1.98 mg/dl, p=0.002) indicating that this mutation increases the inflammation. Our findings showed that mutations in exon-4 of MTHFR gene (OR: 12.21, 95%CI: 0.66-226.98), exon-4 of IL-6 gene (OR: 36.36, 95%CI: 2.09-631.21) and exon-6 of ICAM-1 gene (OR: 23.12, 95%CI: 1.31-409.15) are associated with an increased risk of CAD in our ethnic subset.

**Conclusion:** Genetic polymorphisms increases the risk of CAD and hence needs to be considered for cardiovascular risk prediction. Mutations of MTHFR, IL-6 and ICAM-1 genes observed in our study appear to be a possible genetic risk factor for premature CAD in South-Indian ethnic population.

**P 9. Anti-atherogenic effect of Betulinic acid and Fluvastatin on Type II Collagen induced Arthritis**

**Limy Elizabeth Mathew**

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**Objectives:** Cardiovascular disease (CVD) is a major problem during rheumatoid arthritis (RA) which leads to morbidity and mortality in RA patients, because inflammation in RA results further blood vessel narrowing which ultimately leads to plaque formation. So the present study emphasizes the combinatorial effect of Betulinic acid, a triterpenoid and fluvastatin, an HMG CoA reductase inhibitor on atherogenesis during arthritis.

**Methods:** Arthritis was induced by bovine type II collagen (CII) dissolved in 0.01 M acetic acid at a concentration of 4 mg/mL and emulsified in equal volume of incomplete Freund’s adjuvant. Betulinic acid (2mg/kg) and fluvastatin (5mg/kg) alone and in combination was administered orally from day 14 to day 60. At the end of 60 days, tissues and blood were isolated for evaluation of biochemical parameters.

**Results:** Anti-inflammatory enzyme activities and oxidative stress were significantly decreased in the peripheral blood mononuclear cells by the administration of both betulinic acid and fluvastatin than alone treatments. Combination therapy was found to be a potential enhancer of the expression of the anti-inflammatory cytokine IL-10 whereas it significantly blocked the expression of TLR-2 and 4, inflammatory markers such as IL-1β, TNF-α, IFN-γ, ICAM, VCAM, E-selectin and nuclear translocation of p65 NF-kappa B in aorta than drug alone treated groups, histopathological datas of aorta also support our findings.

**Conclusion:** So the present study summarizes a combination therapy of betulinic acid and fluvastatin that reduces the risk of both RA and CVD by modulating the expression of various inflammatory mediators through TLR-4 – NF-kB downstream signaling pathway, atherogenic index and oxidative stress in collagen induced arthritis.
P 10. The Effect Of Atorvastatin Therapy On Serum Vitamin-D Levels

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Background: The prevalence of hypovitaminosis D in India has been reported as 90%. Vitamin-D levels less than 21 ng/mL were found to be associated with increased cardiovascular morbidity and mortality. Scanty data is available on effect of statin on vitamin-D level.

Objective: we conducted a study in Indian population on modification of vitamin-D levels by a 40mg/day atorvastatin therapy. In this study baseline serum 25(OH)[hydroxyl]vitamin-D levels between patients who are candidates for atorvastatin therapy and healthy controls were compared. Also the effect of 8 weeks of 40mg/day atorvastatin therapy on 25(OH) vitamin-D levels was assessed in patient group.

Methods: This observational prospective study comprised of two groups (patients vs healthy controls) each consisting of male subjects between 40-70 years of age. Patients who were on atorvastatin were followed for 8 weeks during winters. 25(OH) vitamin-D was estimated by solid phase ELISA. The data obtained was subjected to statistical analysis using Student’s t-tests, Mann-Whitney U tests or χ2-tests (chi-square).

Results: The Hypovitaminosis D prevalence (<30ng/ml) in patients and controls was 25(73.5%) and 19(57.6%) respectively. The median value of serum 25(OH) vitamin-D increased from baseline value of 20.47 ng/ml to 47.09 ng/ml in patients group after 8 weeks of 40mg/day atorvastatin therapy (p<0.001). Actual proportion of patients with serum 25(OH) vitamin-D <20ng/ml, decreased from 50% to 8.8% while the proportion of the patient’s group having safe and desirable serum 25(OH) vitamin-D levels (> 30ng/ml) increased from 26.5% to 76.5% after 8 weeks of atorvastatin therapy.

Conclusions: Vitamin-D deficiency is widely prevalent in India and atorvastatin increases serum 25(OH) vitamin-D levels significantly.

Recommendations: Atorvastatin may be an effective strategy for raising vitamin-D levels especially in Indian population where prevalence of hypovitaminosis D is very high. Further studies involving large cohort comparing various dosage or statins are needed.

P 11. Chlorogenic acid attenuates myocardial infarction induced by isoproterenol: Electrocardiographic, biochemical and anti-apoptotic study

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Objectives: Cardiovascular diseases (CVDs) is the leading cause of death worldwide, ranking first in both developing and developed nations and more than 70% of deaths from CVD are attributable to ischemic heart disease culminating myocardial infarction (MI). This study was deliberated to aspire the effects of chlorogenic acid (CGA) against myocardial infarction (MI) induced by isoproterenol (ISO), in a rat model.

Material Method: Male Albino Wistar rats were pretreated with CGA (40 mg/kg BW, P.O) daily for a period of 19 days. MI was induced by the administration of ISO (85mg/kg BW, s.c), twice at an interval of 24 h (20th and 21stday). At the end of the experimental period (i.e., 22nd day) electrocardiographic, biochemical and apoptotic changes were monitored from control and experimental groups.

Results: A significant alteration in electrocardiographic pattern and a soaring proportion of infarct size with decreased staining (triphenyltetrazolium chloride (TTC) were observed in ISO injected rats. The activities of the serum marker enzymes creatine kinase (CK), creatine kinase-MB (CK-MB), lactate dehydrogenase (LDH) and troponin T and I, a prominent expression of serum isoenzymes LDH 1 and LDH 2 and the levels of plasma total cholesterol (TC), low density lipoprotein-cholesterol (LDL-C), very low density lipoprotein-cholesterol (VLDL-C), triglycerides (TG), free fatty acids (FFA) and phospholipids (PL) were increased and high density lipoprotein-cholesterol (HDL-C) was decreased in ISO-induced rats. Furthermore, ISO−induced rats showed upregulated expressions of myocardial proapoptotic and down-regulated expressions of anti-apoptotic markers. The pre-treatment with CGA significantly prevented the ISO induced alteration in all the above parameters.

Conclusion: The present study showed that treatment of CGA significantly attenuates myocardial infarction induced by ISO.
P 12. Design & Synthesis of Methyl-4-amino-2-hydroxy-4-oxobutanoate (A succinamic acid derivative) for assessing Antidiabetic, Antihyperlipidemic and Antioxidant potential in STZ induced diabetic rats

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Introduction: The anti-diabetic property of E. Jambolana (EJ) is well documented in the literature. Active antihyperglycemic compound (FIIc, a succinamic acid derivative) has been isolated from fruit pulp of EJ (Sharma et al, patent granted). However, the isolation of this natural compound has limitations as EJ is seasonal fruit and its extraction procedure is cumbersome and expensive. To overcome these limitations, our research group has designed and synthesized Methyl-4-amino-2-hydroxy-4-oxobutanoate, a succinamic acid derivative.

Aims and Objectives: Therefore the present was undertaken to study the effect of Methyl-4-amino-2-hydroxy-4-oxobutanoate on fasting blood glucose levels, serum insulin levels, oxidative stress parameters and serum lipid profile.

Materials & Methods: 24 male Wistar rats were taken and diabetes was induced in group B, C and D rats (n = 6 each) by injecting Streptozotocin at a dose of 45 mg/kg of body weight 15 minutes after Nicotinamide at a dose 230 mg/kg body weight intraperitoneally to overnight fasted rats. Methyl-4-amino-2-hydroxy-4-oxobutanoate was given to group C (20 mg/kg) and Metformin to group D at dose of 100 mg/kg of body weight orally for 4 weeks respectively. On 28 day of the experiment, diabetic rats were fasted overnight. The blood was collected from retro orbital plexus for biochemical parameters analysis.

Results & Discussion: STZ induced rats showed increased fasting blood glucose level, serum insulin and lipid levels and oxidative stress. Treatment with Methyl-4-amino-2-hydroxy-4-oxobutanoate for next 28 days revert these changes to near normal levels.

Conclusions: These findings demonstrate that Methyl-4-amino-2-hydroxy-4-oxobutanoate is effective antidiabetic compound. Further experiments need to be done to synthesize the parent herbal compound to establish its role as potent anti-diabetic agent.

P 13. Vitexin protects cardiomyocytes by inhibiting ER Stress induced apoptosis in Myocardial Infarction – An Invivo study

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Myocardial ischemic/reperfusion injury is a leading cause of death worldwide. Endoplasmic reticulum (ER) stress is caused by accumulation of misfolded or unfolded proteins in ER lumen. Activation of Unfolded Protein Response (UPR) which further leads to activation of downstream molecules such as GRP-78, PERK, IRE-1α and ATF-6. In this study, we have investigated the protective role of Vitexin by inhibiting ER stress induced myocyte death in Isoproterenol induced myocardial injury. Vitexin is a bioflavonoid, present in Crataegous species, which exerts anti-oxidant and anti-apoptotic properties in treating various cardiovascular diseases. ER stress marker proteins GRP-78, EIF-2α, CHOP and IRE-1α were analysed by immunoblotting. Further downstream analysis revealed that ER stress induces mitochondria dependent and independent myocyte apoptosis through activation of caspase-9, caspase-3, Bad and inhibition of bcl-2 expressions which was confirmed by western blot analysis. Vitexin significantly limits the ER stress induced cell death via mitochondria dependent and independent manner. On the otherhand, vitexin significantly increased the anti-oxidant enzymes SOD, Catalase, GPx and non-enzymic anti-oxidants such as Vit-C and Vit-E. Elevated levels of serum markers LDH and CK were observed during MI, which were decreased upon treatment with Vitexin. This clearly suggests that, Vitexin protects the myocardium during heart failure by inhibiting ER Stress induced apoptosis.

Key words: Vitexin, ER Stress, Isoproterenol, apoptosis.
P 14. Study of cardiovascular risk in prediabetes as assessed by clinical and metabolic parameters

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Objectives/Background: Objectives of the study are to assess clinical and metabolic parameters in prediabetes as compared to controls as per following background. According to the IDF Diabetes Atlas 2015, 318 million people worldwide, are estimated to have impaired glucose tolerance and is projected to increase to 482 million by 2040. Pre-Diabetes is upcoming identifiable cause of hyperglycemia related complications especially cardiovascular. Assessment of cardiovascular risk is important particularly in prediabetes for early preparation and prevention of future complication.

Methods: Patients with conditions of increased risk for Diabetes as defined by ADA underwent 75 mg OGTT to fulfill the ADA criteria of Pre-Diabetes. Subjects were divided in two groups, normal (n=50) and prediabetics(n=50). For all subjects detailed history, clinical examination and metabolic parameter assessment (including lipid profile and derived parameters) was done. Analysis done using unpaired Student’s t-test for quantitative variables and chi-square/fisher-exact test for qualitative variables and were categorized as significant or non-significant keeping the p-value <0.05

Results: Mean BMI and waist circumference of cases was significantly higher as compared to controls. Among lipid profile parameters TC, LDL was significantly higher in cases. Derived parameters such as TC/HDL-c, LDL/HDL-c, TG/HDL-c, Non-HDL-C were calculated and compared. All derived parameters significantly suggested more atherogenic lipid profile in prediabetes.

Conclusions: Study showed prediabetes leads to derangements in metabolic and clinical parameters including lipid profile and coronary atherogenic lipid risk factors indicate their higher risk for development of atherosclerosis and cardiovascular diseases later on. It is very advisable to introduce lifestyle modifications right from the stage of prediabetes, for delaying the progression to diabetes and to reduce the incidence of CVDs. This may obviate the need for expensive and complicated therapies.

P 15. Importance of Platelet Aggregation and Antiplatelet Resistance in Post PCI Patients: A Critical Marker for Atherosclerosis Progression

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Background: Platelet activation and aggregation plays a pivotal role in the pathogenesis of atherosclerosis process after percutaneous coronary intervention (PCI). Platelet aggregation inhibition through effective antiplatelet therapy is crucial for post PCI patients. Antiplatelet resistance and poor response in those patients is one of the major causes for atherosclerosis progression and stent thrombosis.

Objectives: In the present study we sought to monitor the thienopyridine antiplatelet aggregation and antiplatelet resistance in post PCI patients, by using AggreGuide A-100 Platelet Aggregometer, point of care device developed to monitor platelet aggregation using whole blood sample.

Methods: It is prospective, single-center study, including patients who received thienopyridine antiplatelet drugs after PCI. In these patients platelet aggregation inhibition was evaluated from the whole blood sample using AggreGuide A-100 and expressed in terms of Platelet activity index-PAI (suggestive of platelet aggregation). Patients were labeled as poor responders (or resistant to drug or high on treatment platelet reactivity) if the PAI was more than 5.

Results: A total of 209 patients were enrolled in this study. Among them 54(25.8%) were female and 155(74.2%) were males, 61(29.2%) underwent primary PCI and 148(70.8%) underwent elective PCI. At the discretion of treating physician 73(34.9%), 100(47.8%), 36(17.2%) patients received Clopidogrel, Prasugrel, Ticagrelor respectively. It is found that therapy was ineffective (PAI>5) in 45(21.53%) patients of which 35(16.75%), 8(3.8%), 2(.96%) were in Clopidogrel, Prasugrel, Ticagrelor groups respectively. Cumulatively there was high PAI in females and those who underwent primary PCI. In the clopidogrel group those with additional Cilastazole were having low PAI (p value .022). One (1.4%) patient in clopidogrel group and 8(8%) patients in Prasugrel group were having bleeding complications. Three (4.3%) patients in Clopidogrel group had reinfarction. Antiplatelet therapy was optimised in those with high PAI.

Conclusion: It is found that there is high resistance to antiplatelet drugs (especially Clopidogrel) in these post PCI patients which may cause recurrent cardiac events. Thus monitoring individual’s platelet reactivity and optimising therapy based on it should become a new standard-of-care for patients on antiplatelet therapy.
P 16. Identification of genetic polymorphisms, evaluation On-Clopidogrel platelet reactivity and SYNTAX score in predicting clinical outcomes following percutaneous coronary intervention with drug eluting stent and ST–elevation myocardial infarction in South Indian patients

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Background: Platelet function testing may be used to optimize antiplatelet therapy in high-risk patients, but identification of this subset of patients remains a challenge. High On-Treatment Platelet Reactivity (HTPR) has emerged as a risk factor for Major Adverse Cardiovascular Events (MACE). Genetic polymorphisms play key role in clopidogrel hyporesponsiveness.

Objectives: In the present study we sought to investigate the association between HTPR, gene polymorphism and the Syntax Score(SS) for risk prediction of MACE in patients with ST Elevation Myocardial Infarction(STEMI) undergoing percutaneous coronary intervention(PCI) with drug eluting stent(DES) implantation.

Methods: This prospective, single-center observational study includes 100 consecutive STEMI patients who underwent PCI and treated with clopidogrel. Platelet Activity Index(PAI) was measured before hospital discharge and also at 3rd month follow up. Patients were stratified by the presence of HTPR (PAI≥5) and by tertile of the SS(upper SS tertile≥15). Allele specific polymerase chain reaction for identifying CYP2C19*2, CYP3A5*3, PON1, P2Y12 gene polymorphisms was done. The end point at 9 months follow up was MACE.

Results: High on treatment platelet reactivity PAI ≥5 before hospital discharge had greater rates of mortality than those with PAI<5 (25%vs2.17%; p=0.03). HTPR PAI≥5 done after 3 months had greater rates of MACE and death compared to those with PAI <5 (20.69%vs1.60%; p=0.002 and 13.79%vs0; p=0.006). Patients within the upper tertile of syntax score ≥15 had higher rates of MACE and deaths than those with a SS of <15 (13.63%vs1.78%; p=0.04 and 9.09%vs0; p=0.034). The prevalence of CYP2C19*2 polymorphism was 61%, other gene polymorphisms were absent. CYP2C19*2 was not associated with MACE, 32% of patients with polymorphism have HTPR.

Conclusion: In STEMI patients undergoing PCI treated with clopidogrel, HTPR and high SS were independently associated with increased risk of MACE. There is higher prevalence of CYP2C19*2 polymorphism at 61%.

P 17. Njavara rice bran oil promote the regression of atherosclerosis via inhibition of proinflammatory signaling pathways in hypercholesterolemic rabbits

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Objectives: The aim of the study was to evaluate whether Njavara rice bran oil (NJROBO) extracted from the medicinal rice variety “Njavara” has the capacity to promote atherosclerotic regression in high cholesterol diet (HCD) fed rabbits with established atherosclerosis.

Methods: Male New Zealand white breed rabbits weighing 2.2–2.7 Kg were fed a high-cholesterol diet (HCD) for 90 days and after 90 days HCD was withdrawn and were studied for regression of atherosclerosis with and without administration of NJROBO [100mg/Kg bwt] for another 90 days. After treatment with NJROBO for 90 days, the expressions of ABCA1, TLR-4, CD36, IL-6, TNFα, ICAM-1, VCAM-1, were determined in peritoneal macrophages and aortic endothelial cells. The activity of proinflammatory enzymes, COX, LOX, NOS and PGE2 after treatment period was evaluated in PBMCs.

Results: In the atherosclerotic rabbits under normal regression, the expression of ABCA1 were downregulated and the expressions of TLR-4, CD36, IL-6, TNFα , ICAM-1, and VCAM-1 were significantly upregulated. NJROBO administration suppressed the expression of TLR-4, CD36, IL-6, TNFα, ICAM-1, and VCAM-1 with concomitant increase in ABCA1 expression in macrophages and aortic endothelial cells. The results also demonstrate that treatment with NJROBO repressed the atherosclerotic lesions with a decrease in activity of COX, LOX, NOS and product of COX activation PGE2 in PBMCs. After 90 days of NJROBO administration to hypercholesterolemic rabbits, significant decrease in atherosclerotic lesion formation was observed in the aorta. Decrease in atherosclerotic lesion and lipid accumulation in the aorta observed on NJROBO treatment correlates to the inhibitory effects of inflammatory signaling pathways that inhibit endothelial activation, oxidative damage and the production of PGE2.

Conclusions: These results suggest that NJROBO promotes regression of atherosclerosis and that these effects are due to inhibition of pro-inflammatory signaling that leads to the anti-atherogenic effect.
Leptin-Adiponectin Ratio as a better surrogate marker of obesity and related cardiometabolic dysfunction

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Background: Obesity promotes progression of atherosclerosis by inducing multiple cardiovascular and metabolic derangements such as diabetes, hypertension and dyslipidemia; all of which have high atherogenic potential. Recent studies reported the association of hyperleptinemia and hypoadiponectinemia with cardiometabolic dysfunctions including obesity and metabolic syndrome. So we investigated whether plasma leptin or adiponectin or the balance of these adipokines is associated with cardiometabolic risk factors.

Objective: To estimate serum leptin and adiponectin levels among obese subjects and to assess whether the balance of these adipokines is associated with measures of obesity and related cardiometabolic risk factors.

Methods: 99 obese and 71 non-obese subjects of both gender in the age group of 20-60 were selected. Anthropometric measurements and blood pressure were recorded. BMI, WHR and BF% were calculated. Glucose, insulin and lipid profile, leptin and adiponectin levels were estimated in fasting serum samples. The Leptin-Adiponectin Ratios (LAR) were expressed as the absolute value of serum leptin (ng/ml) divided by the absolute value of serum adiponectin (pg/ml). Homeostasis Model Assessment of insulin resistance (HOMA-IR), insulin synthesis (HOMA-13) and insulin sensitivity (QUICKI) were calculated using standard equations. Comparison between groups was done by independent sample 't' test. Correlations between LAR and other study variables were done using Pearson's correlation coefficient. p values <0.05 were considered statistically significant.

Results: The obese group showed a statistically significant decrease in serum adiponectin (6.28±0.20 vs 11.95±0.55) and significant increase in serum leptin (60.0±4.53 vs 12.0±2.08) and LAR (10.0±0.76 vs 1.4±0.36) when compared with non-obese subjects. LAR showed a strong positive correlation with BMI (r=0.582), waist circumference (r=0.485), body fat percentage (r=0.56), serum insulin (r=0.457), HOMA-IR (0.433) and a negative correlation with QUICKI (r= -0.471).

Conclusion: The Leptin-Adiponectin ratio might be better related to cardiometabolic risk factors than the individual adipokines. The LAR imbalance may be an important mediator of increased risk of developing type 2 diabetes mellitus and cardiovascular diseases associated with abdominal obesity.

In vivo cardio-protection by Kaempferol in an experimental model of myocardial ischemia-reperfusion injury

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Objective: The detrimental effects of restoration of coronary blood flow following an acute myocardial infarction is a major concern as reperfusion predisposes to myocardial injury. Kaempferol (KMP), a naturally occurring polyphenolic compound, present in tea, broccoli, propolis and grapefruit, possesses anti-oxidant, anti-inflammatory, anti-apoptotic, anti-cancer, neuroprotective, cardioprotective and anti-diabetic properties. Therefore in the present study, we aimed to investigate the effect of kaempferol in ischemia-reperfusion (IR) model of myocardial injury in rats.

Design and Method: Male albino wistar rats were used for the study. They were divided into sham, IR-control, KMP-20+IR and KMP 20 per se groups. KMP was administered daily to the rats at a dose of 20 mg/kg intraperitoneally for a period of 15 days. On the 15th day, ischemia was produced by one-stage ligation of left anterior descending coronary artery for 45 minutes followed by reperfusion for 60 minutes. Hemodynamic parameters were recorded and rats were sacrificed after completion of surgery. The heart was excised and processed for biochemical and morphological studies.

Results: KMP pretreatment significantly attenuated IR injury by maintaining cardiac function, normalizing oxidative stress and preserving morphological alterations. Also, there was a decrease in the level of inflammatory markers (TNF-α, IL-6).

Conclusions: KMP protects against IR injury by attenuating inflammation and oxidative stress.
A 1. BALAJI ENDOWMENT MEDAL

Modulation Of Vegf Activity By Adp Ribosylation: Role Of PARP16

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Hypoxia, Inflammation and neovascularization are the important factors that contribute to the complications of atherosclerosis. Previous reports have suggested a complex relationship between neovascularization and atherosclerotic plaque pathology. Plaque angiogenesis is induced by VEGF (Vascular endothelial growth factor), secreted by the macrophages and lymphocytes that binds to the VEGFR-2 (Vascular endothelial growth factor Receptor-2) receptor on the endothelial cells. The biological activity of VEGF is regulated at transcriptional, translational and post translational levels. ADP ribosylation and glycosylation are the two posttranslational modifications which affects the angiogenic potency of VEGF.

A 2. SRI VENKATESWARA CARDIAC RESEARCH MEDAL

Effect Of Aspirin Therapy On Lipoprotein (A) Levels In Coronary Artery Disease (Cad)

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Objectives: Classically CAD was considered a disease of elderly, but recent studies have shown an increased incidence of premature CAD particularly among Asian Indian. Lipoprotein (a) [Lp(a)] has emerged as an independent risk factor for premature CAD but there is limited research on therapy for decreasing the high Lp(a) concentrations. The present study was done to find the effect of 75 mg aspirin on serum Lp(a) concentration in CAD patients after 4 weeks of aspirin therapy.

Methodology: The study group comprised of 25 patients aged 21–60 years with a diagnosis of CAD excluding acute coronary syndrome (ACS) and compared with age and sex matched healthy controls. A baseline estimation of Lp(a) was done initially and subsequently after 4 weeks of 75 mg aspirin therapy daily in the study group. Plasma Lp(a) concentrations were determined by sandwich ELISA technique. As distribution of Lp(a) is highly skewed in population, comparison of the Lp(a) levels between patient & control group was done using Mann-Whitney U test. In patients with CAD, comparison of Lp(a) levels at baseline and after 4 weeks was done using Wilcoxon signed rank test.

Results: The mean Lp(a) in the study group was 39.8±18.5 mg/dl as compared to 15.9±11.3 mg/dl in control group (p<0.001). The frequency distribution of Lp(a) showed that in the control group 72% had Lp(a) level <20 mg/dl as compared to 16% of cases. High Lp(a) levels >30 mg/dl were seen in 68% of cases compared to only 8% of the controls. After 4 week of aspirin therapy the mean Lp(a) level declined from 39.8±18.5 mg/dl to 29.3±20mg/dl (p<0.001). A mean decline of 26.6% of baseline was seen in Lp(a) levels and decline in Lp(a) varied from 0 to 86.6%.

Conclusions: The results show that Lp(a) levels are higher in CAD patients compared to healthy controls and aspirin decreases Lp(a) levels significantly.
A 3. **LORD SREENIVASA OF SEVEN HILLS GOLD MEDAL**

**Cardiovascular Risk Factors In Subjects With Prehypertension**

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**Background:** Hypertension is a risk factor for several atherosclerotic vascular disorders viz. cardiovascular diseases including coronary artery disease, cerebrovascular diseases and aortic dissection, renovascular diseases. Besides, hypertension in itself is associated with other metabolic and phenotypic abnormalities. Recently, even prehypertension has been associated with metabolic and atherosclerotic alterations. However, there is no specific study from India on prevalence of various cardiovascular risk factors in adult subjects with prehypertension.

**Aim:** The present study aimed to study the prevalence of various cardiovascular risk factors in prehypertensive individuals aged ≥18 years.

**Methodology:** One hundred subjects falling in the prehypertension group formed the study population and an equal number of normotensive subjects were taken to act as the comparator group. Cardiovascular risk factors were studied viz. Obesity (BMI), Central obesity (Waist circumference), Dysglycemia, Dyslipidemia, Smoking, Alcohol intake, Family history of hypertension, Lifestyle/ physical activities and Stress/ mental health status. Clustering of risk factors was defined as presence of two or more cardiovascular risk factors in any single individual.

**Results:** In the overall study group, overweight/obesity (51%) was the most frequent abnormality observed, followed by central adiposity (abnormal waist circumference) with 50%, dyslipidemia 43.5%, dysglycemia 38%, sedentary lifestyle 30%, mental stress 26.5%, family history of hypertension 12% and smoking in that order.

Elevated waist circumference was observed in 79% of prehypertensive subjects but only in 21% normotensive subjects. Prehypertensive subjects had greater prevalence of overweight/obesity (75% vs.27%), sedentary lifestyle (46% vs. 14%) and mental stress (35% vs.18%) than normotensive subjects (p<0.05).

Virtually all subjects (99%) in the prehypertensive group had at least one deranged cardiovascular risk factor. 10-year ASCVD risk in prehypertension group was also higher than normotensive subjects.

**Conclusion:** Waist circumference and body mass index are significantly elevated in prehypertensive population as compared to normotensive population. The presence of multiple risk factors in prehypertension subjects stresses on the need for early detection of these patients. Preventive strategies should be targeted at this population subset so that progression to hypertension can be prevented and cardiovascular risk mitigated.
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