

Atherosclerosis-Coronary Heart Disease and the Recent Advancements in the Treatment of Atherosclerosis

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Review Article

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ABSTRACT

[Coronary heart disease](#) is a disorder of the heart usually caused by a condition called atherosclerosis. Atherosclerosis is one of the major and most frequent causes of Heart arrest. Atherosclerosis is the disease which affects the large arteries and it is the condition in which development of plaque occurs inside these arteries. This causes the narrowing of arteries. Plaque is made of fatty substances, cholesterol, cellular waste products, calcium and fibrin (a clotting material in the blood). Epidemiological studies have exhibited several important risk factors associated with atherosclerosis. Atherosclerotic plaque within the coronary arteries is responsible for [Coronary artery disease](#), [Myocardial infraction](#) and [Acute coronary syndromes](#). Atherosclerosis can lead to serious problems, including heart attack, stroke, or even death. This study mainly discusses the mechanism of development of atherosclerosis in the arteries, their risk factor and the recent advancements to treat the atherosclerosis.

INTRODUCTION

Atherosclerosis is the disease of arteries. The term [Atherosclerosis](#) indicates the formation of fibrofatty lesions in the intimal lining of the arteries such as the coronary arteries, the aorta and the large arteries that supply the brain. Arteries are the blood vessels that carry oxygen-rich blood to your heart and other parts of your body. It is the basic cause of all deaths in the western world [1-7]. The risk factor is unchangeable in aged individuals, men and family history of premature coronary heart disease. Men are at greater risk than are premenopausal women, because of the protective effects of natural oestrogens. The presence of hyperlipidemia is the major risk factor for atherosclerosis [8-14]. In patients with hypertension, High blood pressure is a major risk factor for atherosclerosis which creates more mechanical stress on the vessel endothelium. Chronic kidney disease can increase your risk. The causes of atherosclerosis have not been determined with certainty. Atherosclerosis is the leading cause of illness and death in USA and many of the developing countries [15-18]. [Open access journals](#) provide more visibility and accessibility to the readers in gaining the required information. It provides free and unrestricted access of knowledge via internet, which accelerates the scientific discovery. Open access explores the scholarly publishing, spread knowledge and allow the knowledge to be built upon. [Peer reviewed journals](#) publish high quality articles after it has been subjected to multiple critiques by scientists or scholars in that particular field [19-22].

The societies are mainly meant for enhancement of Science and technology. We can approach many of the scientists and professionals through societies. The main aim is to expand its services and support to scientists and thereby making people to understand and gain knowledge of different emerging innovative technologies. In order to create awareness of atherosclerosis associated coronary heart disease among the people, group of professionals, scientist, physicians and consultants unite to form a society or an organization. The major societies like [European Society of Cardiology](#) is another international society which mainly focused in improving advancements in treatment, care and diagnosis and promoted education relating to prevention and treatment of cardiovascular disease [23-29]. [National Heart Forum of UK](#) is an organization which mainly aimed in conducting mission which mainly involved in reducing the risks of coronary heart disease. It also promotes researches in the field of [cardiovascular diseases](#). [United Heart Foundation of USA](#) promotes the education and activities relating to the prevention and treatment of cardiovascular disease through the development of cardiovascular health knowledge and practice [29-34]. [Nigerian Cardiac Society](#) of South Africa is associated with Omics thereby endorsing the scientific events conducted in the field of Cardiology. [Mongolian society for Pediatric cardiology](#) has attained to

create a vision for the development of diagnosis and treatment methods for the treatment of children's heart disease [35-44]. It also trained many Pediatric cardiologists. [The Cardiac Society of Australia and New Zealand](#) is involved in promoting the recent advances in the diagnosis and treatment of cardiovascular diseases. These societies mainly worked together to reduce the risk of [heart disorders](#). The society enabled in bringing awareness of heart disorders and helped in understanding the prevention and treatment of cardiovascular disorders [45-52].

[Atherosclerosis: Open Access](#) is the Journal which provides knowledge and information on different aspects of Atherosclerosis and Coronary Atherosclerosis severity, [Renal atherosclerosis](#), [Carotid Stenosis](#), Cerebral atherosclerosis, Thoracic Aortic Atherosclerosis and intracranial atherosclerosis [53-58]. [Journal of Clinical & Experimental Cardiology](#) is an open access Journal which explores the concepts related to Aortic Valve Replacement, Angiogenesis, Arrhythmia management, Angiography and [Cardiac Catheterization](#). The annual conferences - [Atherosclerosis and Clinical Cardiology](#) which is held during July-2016 at USA explored the research work on Atherosclerosis which is one the major cause for heart failure. This conference mainly focused on Coronary artery atherosclerosis, atherosclerosis therapeutics, hypertension, atherosclerosis aneurysm and how the plaque hardens and narrows the arteries [58-65].

[International Journal of Cardiovascular Research](#) aims to publish the reliable source of information on current research and discoveries and mainly focuses on all topics of Cardiology and Cardiovascular medicine. [Journal of Cardiovascular Diseases & Diagnosis](#) is [peer reviewed](#) journal gives a emphasis to Ventricular Arrhythmia, Acute Myocardial Infarction, Congenital heart disease, valvular heart diseases, Atrial Fibrillation, Valve Replacement, heart failure, Stroke and all types of cardiovascular disorders etc. [65-74]. [Cardiovascular Pathology: Open Access](#) an international [peer-reviewed scholarly journal](#), which published the papers across the world on coronary artery disease as a Special edition in its Volume 4 [74-79].

[Cardiovascular Pharmacology: Open Access](#) Journal studies improve the knowledge and provide cutting-edge research strategies for the development of new therapeutics. [International Journal of Cardiovascular Research](#) is a leading provider of information on cardiovascular diseases and novel methods of treatment followed [79-66]. The above mentioned Open access journals on cardiology are the peer-reviewed journals that maintain the quality and standard of the journal content, reviewer's agreement and respective editor's acceptance in order to publish an article [87-96]. These journals ensures the barrier-free distribution of its content through online open access and thus helps in improving the citations for authors and attaining good [journal impact factors](#) [97-99].

MECHANISMS OF THE PROCESS BY WHICH ATHEROSCLEROSIS OCCURS

Early assessment of atherosclerotic lesions is an important diagnostic goal in order to decrease the coronary artery siases burden. An article entitled [Clinical Review of Current Techniques of Magnetic Resonance Imaging of Atherosclerosis](#) described various vulnerable plaque features and current MRI techniques for detecting atherosclerosis and conclude that MRI is best suited for detecting early plaque lesions [100-106].

Endothelial cell injury: The injury to endothelial vessel layer is the initial factor development of plaque formation. The possible causes for injury of the endothelial vessel layer are 1) exposure of endothelium to any toxic substances, which results in the damage eg: use of tobacco [107-116]. 2) Due to mechanical stress associated with hypertension 3) Immune mechanisms and 4) Hyperlipidemia also play an active role in the pathogenesis of the atherosclerotic lesion. [Frequency dispersion on the vessel wall - Primary reason of atherosclerosis](#) by Merab Beraia and Guram Beraia [117-129].

Lipoprotein deposition: When the endothelium is injured or disrupted, lipoprotein molecules can gain entry where they are then modified by oxidation (via free radicals or oxidizing enzymes) or glycation (diabetics) [130-136]. This modified lipoprotein (modified LDL) is inflammatory and able to be ingested by macrophages creating "foam cells" causing a "fatty streak" in the arterial wall. An article entitled "[Atherosclerosis and Rheumatic Diseases](#)" discussed the role of inflammation in the pathophysiology of atherosclerosis and has given better knowledge in understanding of atherosclerosis as an inflammatory disease [137-146]. c lacus

Recent advancements in the treatment of Atherosclerosis

[Jan Fedacko](#) of Slovakia is an expert in the field of prevention and treatment of the atherosclerosis diseases.

A. Common approaches:

1. Usage of HDL: To boost the HDL cholesterol role which acts as ally against heart disease. One trial drug eg. Torcetrapib – this is HDL raising trail drug [147-150].

This raised concerns that may be it's not the right kind of HDL. All forms of HDL are not good.

2. Anti inflammatory:

Inflammation plays a major role for the formation of plaque and subsequent plaque rupture, which finally leads to heart attack [151-160].

Statins has anti-inflammatory effects which help in preventing plaque rupture and also have property of lowering LDL cholesterol [161-173].

Still we need to find a good therapy or the drug which specifically prevent the inflammation or rupture of the artery wall, by attacking root causes. The lowering of low-density lipoprotein cholesterol by statin therapy has been discussed in the article- [Lipid-lowering strategies and reduction of coronary heart disease risk in primary care](#) written by Ersin Ekpinar.of USA [174-183].

B. Immunotherapeutics approaches:

1. Lipid based vaccines: This therapeutic approach mainly deals with inhibition of atherosclerotic lesion formation [183-192].

2. Based on Epitopes of oxidised LDL: The different epitopes of oxidised LDL is an effective tool for the modulation of the immune response to OxLDL. These epitopes of oxidised LDL induce atherogenic immune responses [193-196]. Most of studies concluded that this therapeutic approach reduces the atherosclerosis.

3. Heat Shock proteins: Autoimmunity to heat shock proteins is one element in [atherosclerosis](#) induced immune responses. Repeated mucosal administration of Mycobacterium HSP60/65, both orally and nasally, inhibited atherosclerotic lesion formation in LDL-receptor-deficient mice [197-200].

CONCLUSION

Atherosclerosis is considered as a heart disease, although it can affect any part of the body. We have discussed the mechanism of the process by which Atherosclerosis occurs, but still needs a progress in the discover of the exact and actual mechanism of action. The approaches like lowering LDL by blocking the effect of PCSK9, and a strategy of treating atherosclerosis showed promising effects in reducing the residual risk that even remains after current therapy. In recent days, the scientists and researchers traced new approaches by introducing therapeutic targets for the immunoregulation of atherosclerosis. To find right balance between efficacy and safety will probably require a more number of trials to assess a variety of drug mechanisms to treat Atherosclerosis.

REFERENCES

1. Esther SerranoPertierra, et al. Lysophosphatidylcholine Induces Vascular Smooth Muscle Cell Membrane Vesiculation: Potential Role in Atherosclerosis through Caveolin-1 Regulation. *J Proteomics Bioinform.* 2014;7:332-339.
2. Kunal Mahajan. Interleukin-18 and Atherosclerosis: Mediator or Biomarker. *J Clin Exp Cardiol.* 2014;5:352.
3. Marcello Camici, et al. Obesity and Increased Risk for Atherosclerosis and Cancer. *Intern Med.* 2014;4:154.
4. Kunal Mahajan. Microparticles in Atherosclerosis: Biomarkers of Disease. *J Clin Exp Cardiol.* 2015; 5:356.
5. Maya Mattar, et al. Atherosclerosis and Rheumatic Diseases. *Rheumatology (Sunnyvale).* 2015;1000147.
6. Paola C Roldan. et al. Aortic Atherosclerosis in Systemic Lupus Erythematosus. *Rheumatology.* 2014;S5-006.
7. Camici M, et al. Obesity and Increased Risk for Atherosclerosis and Cancer. *Intern Med.* 2014;4: 154.
8. Hadi NR, et al. Effect of Vildagliptin on Atherosclerosis Progression in High Cholesterol–Fed Male Rabbits. *J Clin Exp Cardiol.* 2013;4:249.
9. Bolli G, et al. Efficacy and tolerability of vildagliptin vs. pioglitazone when added to metformin: a 24-week, randomized, double-blind study. *Diabetes Obes Metab.* 2008;10: 82-90
10. Jahaira Lopez Pastrana, et al. Regulatory T Cells and Atherosclerosis. *J Clin Exp Cardiol.* 2012;S12-002.
11. Suowen Xu. Rock the Rock of Atherosclerosis. *J Vasc Med Surg.* 2013;1:e101.
12. Chiharu Kishimoto and Zuyi Yuan. The Role of Fcγ Receptors in Myocardial Diseases and Atherosclerosis. *J Clin Cell Immunol.* 2012;S10: 004.
13. Najah R Hadi, et al. Monteleucast and Zileuton Retard the Progression of Atherosclerosis via Down Regulation of the Inflammatory and Oxidative Pathways. *J Clin Exp Cardiol* 2013;4:250.
14. Manchanda SC, et al. Reversal of Early Atherosclerosis in Metabolic Syndrome by Yoga – A Randomized Controlled Trial. *J Yoga Phys Ther* 2013;3:132.
15. Roever L, et al. Insulin Resistance, Type 2 Diabetes and Atherosclerosis. *J Diabetes Metab.* 2014;5:464.
16. Jacek Jawien. Mouse Experimental Models of Atherosclerosis in Pharmacology. *J Clin Exp Cardiol.* 2011;S1-001.
17. Maya Mattar, et al. Atherosclerosis and Rheumatic Diseases. *Rheumatology (Sunnyvale)* 2015;1000147.
18. Wagner Ramos Borges, Andre Mauricio Souza Fernandes, Andre Rodrigues Duraes, Roque Aras Junior and Joao Lima, Subclinical Atherosclerosis in Non-dialysis Chronic Renal Patients. *J Cardiovasc Dis Diagn* 2015;3: 189
19. Roever L, et al. Insulin Resistance, Type 2 Diabetes and Atherosclerosis. *J Diabetes Metab* 2014;5:464
20. Kunal Mahajan. Interleukin-18 and Atherosclerosis: Mediator or Biomarker. *J Clin Exp Cardiol* 2014;5:352
21. Kunal Mahajan. Microparticles in Atherosclerosis: Biomarkers of Disease. *J Clin Exp Cardiol* 2015;5: 356.

22. Turiel M, et al. Strategies for Early Identification of Atherosclerosis in Systemic Autoimmune Disease. *J Cardiovasc Dis Diagn.* 2014;2: 167
23. Patel A. Does the Role of Angiogenesis Play a Role in Atherosclerosis and Plaque Instability? *Anat Physiol* 2014;4: 147.
24. Marcello Camici, et al. Obesity and Increased Risk for Atherosclerosis and Cancer. *Intern Med* 2014, 4: 154.
25. Paul BhamraAriza. The Assessment and Management of Coronary Artery Disease in Patients with HIV. *J AIDS Clin Res.* 2014;5: 283
26. Ames PRJ, et al. Atherosclerosis in Primary Antiphospholipid Syndrome: Summary of Clinical and Pathogenic Evidence. *J Clin Exp Cardiol.* 2014;5:293
27. Rogil J and Torres DA. AMD and Atherosclerosis: Physiopathogenic Similarities and Possible Therapeutics. *J Clin Exp Ophthalmol.* 2012;3: e111
28. Jahaira Lopez, et al. Regulatory T Cells and Atherosclerosis. *J Clin Exp Cardiol.* 2012;S12-002
29. Alessandro Mauriello and Giuseppe Sangjorgi. Inflammation and Atherosclerosis: Evolving Concepts Leading the Development of New Therapies. *J Metabol Syndro.* 2012;1:e106
30. Chiharu Kishimoto and Zuyi Yuan. The Role of Fcγ Receptors in Myocardial Diseases and Atherosclerosis. *J Clin Cell Immunol.* 2012;S10: 004.
31. Paula Blair and Pasquale Maffia. Revisited Role of B Cells in Atherosclerosis. *Pharm Anal Acta.* 2012;3:174.
32. Kim YH, et.al. Biased Agonism of G Protein-Coupled Receptors: A Potential Therapeutic Strategy of Cardiovascular Diseases. *Cardiovasc Pharm Open Access.* 2016;5:192.
33. Alam MA. Methylenetetrahydrofolate Reductase Gene Polymorphisms and Cardiovascular Diseases. *Cell Dev Biol.* 2016;5:172.
34. Altura BM, et.al. Genotoxic Effects of Magnesium Deficiency in the Cardiovascular System and their Relationships to Cardiovascular Diseases and Atherogenesis. *J Cardiovasc Dis Diagn.* 2016;S1:008.
35. Afroz R, et.al. Honey-derived Flavonoids: Natural Products for the Prevention of Atherosclerosis and Cardiovascular Diseases. *Clin Exp Pharmacol.* 2016;6:208.
36. Maksimovich IV. Transcatheter Cerebral Revascularization in the Treatment of Atherosclerotic Lesions of the Brain. *Brain Disord Ther.* 2016;5:209.
37. Mohri T, et al. Factors Affecting Recurrence of T1 and T2 Tongue Cancer Undergoing Intraoral Resection. *Otolaryngology.* 2016;6:224.
38. Berezin. Are Endothelial Cell-Derived Microparticles Predictive Biomarkers in Cardiovascular Diseases? *Atheroscler open access.* 2016;1:e101.
39. Zafar R. A New Insight into Pathogenesis of Cardiovascular Diseases: Stress Induced Lipid Mediated, Vascular Diseases. *J Cardiovasc Dis Diagn.* 2015;3:206.
40. Askari R, et.al. Quinine Syncope Diagnosed by Life Vest. *Clin Exp Pharmacol.* 2015;5:172.
41. Abd-Elbaky AE, et.al. Associations of Serum Omentin and Apelin Concentrations with Obesity, Diabetes Mellitus Type 2 and Cardiovascular Diseases in Egyptian Population. *Endocrinol Metab Synd.* 2015;4:171.
42. Zafar R. An Insight into Pathogenesis of Cardiovascular Diseases. *J Cardiovasc Dis Diagn.* 2015;3:197.
43. Refaat B, et.al. Islamic Wet Cupping and Risk Factors of Cardiovascular Diseases: Effects on Blood Pressure, Metabolic Profile and Serum Electrolytes in Healthy Young Adult Men. *Altern Integr Med.* 2014;3:151.
44. Vasco VRL, et al. Hunting the Risk NPY and ACE Polymorphisms as Predictors of Cardiovascular Diseases: Case Report and Review of the Literature. *Intern Med.* 2014;S11:004.
46. Greco OT, et al. Cardiomyopathy and Cell Therapy: Ejection Fraction Improvement and Cardiac Muscle Mass Increasing, after a Year of Bone Marrow Stem Cells Transplantation, by Magnetic Resonance Image. *J Stem Cell Res Ther.* 2013;S6:008.
47. Charkha N, et.al. Estimating Risk of Mortality from Cardiovascular Diseases using Negative Binomial Regression. *Epidemiol.* 2013;3:127.
48. Alawieh A, et.al. Metabolomics in Cardiovascular Diseases: Biomarkers Quest. *J Data Mining Genomics Proteomics.* 2013;S2:e001.
49. Hanefeld M, et.al. The Metabolic Syndrome and Cardiovascular Diseases: An Update of Medical Treatment. *J Metabolic Synd.* 2014;3:160.
50. Dave MB. Pioglitazone: A Better Choice of Drug in the Pre-diabetic Patients with High Risk of Cardiovascular Diseases. *J Diabetes Metab.* 2014;5:447.
51. Skultetyova D, et al. The Impact of Blood Pressure on Carotid Artery Stiffness and Wave Intensity in Patients with Resistant Hypertension after Renal Sympathetic Denervation. *J Hypertens.* 2014;3:157.
53. Ritu M and Manika M. Blood Homocystiene and Lipoprotein (A) Levels, Stress and Faulty Diet as Major Risk Factors for Early Cardiovascular Diseases in Indians. *J Cardiovasc Dis Diagn.* 2014;2:163.
54. Han J, et.al. Stem Cell Therapy in Cardiovascular Diseases: The Reparative Mechanisms of Mesenchymal Stem Cells for Myocardial Infarction Treatment. *J Cell Sci Ther.* 2014;5: 167.
55. Patel NKJ, et al. Metabolic Syndrome and its Impact on Cardiovascular Diseases. *J Metabolic Synd.* 2014;3:142.

56. Soejima H, et al. The Changes of Biomarkers by Telmisartan and their Significance in Cardiovascular Outcomes: Design of a Trial of Telmisartan Prevention of Cardiovascular Diseases (ATTEMPT-CVD). *J Clin Trials*. 2014;4:162.
57. White HS, et.al. Mechanisms of Action of Human Aldehyde Dehydrogenase Bright Cells in Therapy of Cardiovascular Diseases: Expression Analysis of Angiogenic Factors and Aldehyde Dehydrogenase Isozymes. *J Stem Cell Res Ther*. 2011;S1:001.
58. Lavoie M, et.al. Blood Glutathione Peroxidase Activity in Relation with the Risk of Cardiovascular Diseases in Obese Women. *J Diabetes Metab*. 2011;2:136.
59. Maramao F, et.al. Radiotherapy-Chemotherapy Related Heart Diseases in Surgical Setting. *J Clin Exp Cardiol*. 2016;7:444.
60. Zhou Y, et.al. Clinical Trials Using Cell-based Therapy in Ischemic Heart Diseases - A Decade's Efforts. *J Vasc Med Surg*. 2015;3:174.
61. Maduagu ATL, et.al. Prevalence of Coronary Heart Diseases Risk Factors in Adults Population Living in Nigeria's Largest Urban City. *J Nutr Disorders Ther*. 2015;5:153.
62. Cen J, et.al. Study on the Features of Coronary Artery Atheromatous Plaque for Patients with Impaired
63. Glucose Tolerance when Applying Intravascular Ultrasound. *Cardiovasc Pharm Open Access*. 2016;5:177.
64. Munesh T, et.al. Acute Cardiorespiratory Decompensation in a Child with Nephrotic syndrome with Bronchial Asthma: Is it Exaggeration of Bronchial Asthma? *Clin Pediatr*. 2016;1:104.
65. Chelo D, et.al. Challenges of Surgical Management of Childhood Cardiac Diseases in Sub-Saharan Africa, Experience of a Pediatric Cardiology Unit in Yaounde, Cameroon. *Int Ped Res*. 2016;1:103.
66. Ibraimov AI. Chromosomal Q-Heterochromatin Polymorphism in Patients with Alimentary Obesity. *Biol Med*. 2016;8:275.
67. Mustapha C. Giant Submandibular Duct Calculus: A Case Report. *Surgery Curr Res*. 2015;6:253.
68. Refaat B, et.al. Islamic Wet Cupping and Risk Factors of Cardiovascular Diseases: Effects on Blood Pressure, Metabolic Profile and Serum Electrolytes in Healthy Young Adult Men. *Altern Integr Med*. 2014;3:151.
69. Vasco VRL, et al. Hunting the Risk NPY and ACE Polymorphisms as Predictors of Cardiovascular Diseases: Case Report and Review of the Literature. *Intern Med*. 2014;S11:004.
70. Greco OT, et al. Cardiomyopathy and Cell Therapy: Ejection Fraction Improvement and Cardiac Muscle Mass Increasing, after a Year of Bone Marrow Stem Cells Transplantation, by Magnetic Resonance Image. *J Stem Cell Res Ther*. 2013;S6:008.
71. Charkha N, et.al. Estimating Risk of Mortality from Cardiovascular Diseases using Negative Binomial Regression. *Epidemiol*. 2013;3:127.
72. Alawieh A, et.al. Metabolomics in Cardiovascular Diseases: Biomarkers Quest. *J Data Mining Genomics Proteomics*. 2013;S2:e001.
73. Kpadonou TG, et al. Preliminary Results of a Cardiac Rehabilitation Program in Patients with Compensated Heart Diseases in Sub-Saharan Africa (Benin): A Pilot Study. *Int J Phys Med Rehabil*. 2013;1:160.
74. Sauza-Sosa JC. Torsades De Pointes Induced by Levofloxacin in an Unknown Long QT Syndrome *Cardiovasc Pharm Open Access*. 2016;5:191.
75. López MES, et al. Association of the Presence of the IS6110 Gene and the Polymorphisms of the Receptor of the Bactericide P2X7 (A1513C and -762 C/T) in Mexican Patients with Takayasu's Arteritis and Tuberculosis. Is the Vasculitis A Manifestation of Extrapulmonary Tuberculosis?. *J Vasc*. 2016;2:109.
76. Yajun Gu, et.al. Early Subclinical Biomarkers in Onco-Cardiology to Prevent Cardiac Death. *Cardiovasc Pharm Open Access*. 2016;5:183.
77. Lamin V, et al. Endothelial Denudation of Isolated Human Internal Mammary Artery Segments. *Cardiovasc Pharm Open Access*. 2016;5:180.
78. Alawieh A, et.al. Metabolomics in Cardiovascular Diseases: Biomarkers Quest. *J Data Mining Genomics Proteomics*. 2013;S2:e001.
79. Elio G, et al. LOX-1 and its Implications on Cardiovascular Diseases a Possible New Perspective Target on Atherosclerosis. *J Clin Exp Cardiol*. 2013;4:232.
80. Izumi Y. Therapeutical Potential of Microvesicles in Cardiovascular Diseases. *J Genet Syndr Gene Ther*. 2012;3:e107.
81. Nishant T, et.al. Pharmacogenomics- Personalized Treatment of Cancer, Diabetes and Cardiovascular Diseases. *J Pharmacogenomics Pharmacoproteomics*. 2011;2:107.
82. Srilatha B. High Risk Factors of Cardiovascular Diseases in Type 2 Diabetes. *J Diabetes Metab*. 2011;2:164.
83. Loh LC, et.al. Undiagnosed COPD in Patients with Established Cardiovascular Diseases: Prevalence,
84. Symptoms Profiling and Functional Status. *J Pulmonar Respirat Med*. 2011;1:107.
85. Aronow WS. 2015 American Heart Association/American College of Cardiology/American Society of
86. Hypertension Guidelines on Treatment of Hypertension in Patients with Coronary Artery Disease. *J Hypertens*. 2015;4:e113.
87. Sinan UY. The Cardiac Related Thrombocytopenia. *J Hematol Thrombo Dis*. 2015;3:216.
88. Hassebo MFH, et.al. Correlation between P Wave Dispersion, QRS Duration and QT Dispersion in Hospital

89. Events in Cases of Acute Coronary Syndrome. *J en Pract.* 2015;3:196.
90. Kruk M, et al. Impact of Selection Criteria on Outcomes of Antithrombotic Trials in Acute Coronary Syndromes. *J Clin Trials.* 2015;5:220.
91. Madan T, et.al. Endovascular Intervention in Chronically Occluded Inferior Vena Cava with Modified Sharp Recanalization Technique. *J Clin Case Rep.* 2015;5:512.
92. Mahmood H, et.al. Relation of Cholesterol Level to Dietary Fat Intake in Patients of Ischemic Heart Disease. *Cardiol Pharmacol.* 2015;4:141.
93. Bolognesi M. The Importance of the Electrocardiogram (Ecg) in the Setting of Sports Pre-Participation Screening. *J Clin Case Rep.* 2014;4:e136.
94. Sadiq N. Transhepatic Approach for Device Closure of Secundum Atrial Septal Defect in Patient with Interrupted Inferior Vena Cava. *Cardiol Pharmacol.* 2014;3:120.
95. Shukla AN, et.al. The Prevalence of Hypertension: Role of Hereditary in Young and Obesity in all. *J Hypertens.* 2014;3:156.
96. Bolognesi M and Prutkin JM. Sudden Cardiac Death in a Female Triathlete: Complexities of Risk Stratification. *Intern Med.* 2014;4:161.
97. Lucas A, et.al. Women in Cardiology: The X Factor and the Heart of Medicine. *J Clin Exp Cardiol.* 2014;5:e134.
98. Gupta PN, et.al. Endomyocardial Fibrosis and the Prothrombotic State: From Hypercoagulability to Protein C Deficiency. *J Blood Disord Transfus.* 2013;5:187.
99. Kshemada K, et.al. Forensic Sciences and Growth of Cardiology. *J Forensic Res.* 2013;5:e115.
100. Brieke A, et.al. Management of Calcineurin Inhibitors-Related Chronic Kidney Disease in Cardiac Transplantation. *J Cardiovasc Dis Diagn.* 2013;1:117.
101. Cambe J, et al. Clinical Review of Current Techniques of Magnetic Resonance Imaging of Atherosclerosis. *J Vasc Med Surg.* 2015;3:227.
102. Ninkovic VM, et al. Predictors of In-Hospital Mortality in Patients with Acute Inferior Infarction of the Left Ventricle Accompanied by Right Ventricular Infarction when Treated with Percutaneous Coronary Intervention. *J Clin Exp Cardiol.* 2013;4:253.
103. Buttrick P. TAVR: Is The Glass Half Empty or Half Full? A Non-Interventional Cardiologist's View of a New Technology. *J Cardiovasc Dis Diagn.* 2013;1:e102.
104. Olimulder MAGM, et al. Relationship between Framingham Risk Score and Left Ventricular Remodeling after Successful Primary Percutaneous Coronary Intervention in Patients with First Myocardial Infarction and Single-Vessel Disease. *J Clin Exp Cardiol.* 2013;4:241.
105. Roberto B. Cryptogenetic Cerebral Ischemia and Spongious Atrial Septum. A New Culprit? *J Clin Case Rep.* 2012;2:233.
106. Philipp S, et al. Induction of Hypoxia Inducible Factor Rather than Modulation of Collagen Metabolism Improves Cardiac Function and Reduces Left Ventricular Hypertrophy after Aortocaval Shunt in Rats. *J Clin Exp Cardiol.* 2013;4:227.
107. de Gregorio C. Preparticipation Screening of Young Athletes: Why Still Open Questions on Performing an Electrocardiogram? *J Clin Exp Cardiol.* 2013;3:e117.
108. Philipp S, et al. The Appraisal-Trial: Evaluating RESTEN-MPTM in Patients with Bare Metal Stent De Novo Native Coronary Artery Lesions. *J Clin Exp Cardiol.* 2012;3:218.
109. Kpadonou TG, et al. Preliminary Results of a Cardiac Rehabilitation Program in Patients with Compensated Heart Diseases in Sub-Saharan Africa (Benin): A Pilot Study. *Int J Phys Med Rehabil.* 2013;1:160.
110. Sauza-Sosa JC. Torsades De Pointes Induced by Levofloxacin in an Unknown Long QT Syndrome. *Cardiovasc Pharm Open Access.* 2016;5:191.
111. López MES, et al. Association of the Presence of the IS6110 Gene and the Polymorphisms of the Receptor of the Bactericide P2X7 (A1513C and -762 C/T) in Mexican Patients with Takayasu's Arteritis and Tuberculosis. Is the Vasculitis A Manifestation of Extrapulmonary Tuberculosis?. *J Vasc.* 2016;2:109.
112. Yajun Gu, et.al. Early Subclinical Biomarkers in Onco-Cardiology to Prevent Cardiac Death. *Cardiovasc Pharm Open Access.* 2016;5:183.
113. Lamin V, et al. Endothelial Denudation of Isolated Human Internal Mammary Artery Segments. *Cardiovasc Pharm Open Access.* 2016;5:180.
114. Demir M and Demir C. Mean Platelet Volume is Increased in Patients with Atrial Septal Aneurysm. *J Clin Exp Cardiol.* 2012;3:200.
115. Tarcin O, et.al. Glycemic Profiles and Their Diagnostic Value among Inpatients in a Cardiology Clinic. *Endocrinol Metab Synd.* 2012;S5:005.
116. Elio G, et al. LOX-1 and its Implications on Cardiovascular Diseases a Possible New Perspective Target on Atherosclerosis. *J Clin Exp Cardiol.* 2013;4:232.
117. Ali SA. Use of Smokeless Tobacco in Medical Students and Hypertension. *Occup Med Health Aff.* 2016;4:240.

119. Stoicescu M. The Risk of Sudden Decrease of Severe Arterial Hypertension . J Clin Exp Cardiol. 2016;7:460.
120. Chauhan R, et al. Hypertension and the Aged. J Gerontol Geriatr Res. 2016;S5:002.
121. Pagano D, et al. Portal Hypertension Model in Pigs. J Clin Exp Transplant. 2016;1:e101.
122. Aberha M, et al. Prevalence and Factors Associated with Anxiety among Patients with Hypertension on Follow Up at Menelik- II Referral Hospital, Addis Ababa Ethiopia. J Psychiatry. 2016;19:378.
123. Trailokya A. Will Azilsartan - An Eight ARB Bring Paradigm Shift in Hypertension Management Practices in India? Cardiovasc Pharm Open Access. 2016;5:189.
124. Li M, et al. To Live Long, Eat Less Salt: Salt Intake Reduction Promotion and Hypertension Control in China. Health Care: Current Reviews. 2016;4:169.
125. Soltani HM, et al. The Effect of Fasting During Ramadan on Blood Pressure in Patients with Controlled and Mild Hypertension. J Hypertens. 2016;5:227.
126. Berezin AE. Is Elevated Circulating Galectin-3 Level A Predictor of Pulmonary Artery Hypertension Development and Progression? Clin Med Biochemistry Open Access. 2016;2:114.
127. Manolis A. Erectile Function in Cardiovascular Disease and Hypertension: the Role of Nebivolol . J Hypertens. 2016;5:226.
128. Lv Y, et al. Non-Hypersplenism Causes of Peripheral Cytopenias in Patients with Cirrhotic Portal Hypertension: A Review. J Hypertens. 2016;5:223.
129. Li X, et al. Angiotensinogen M235T, β 2 Adrenergic Receptor Arg16Gly and Aldosterone Synthase C-344T Gene Polymorphisms and Essential Hypertension among Han Population Living at High Altitude in China. J Hypertens. 2016;5:222.
130. Abdel-hamid ER, et al. Association of Angiotensin Converting Enzyme Gene Polymorphism and Possible High Risk Factors with Essential Arterial Hypertension in Egyptian Patients. Mol Biol. 2016;5:165.
131. EL-Adawy NM, et al. Fibroblast Growth Factor-23: A Possible Cause of Pulmonary Hypertension and Left Ventricle Hypertrophy in Hemodialysis Patients. J Clin Exp Cardiol. 2016;7:449.
132. Feyh A, Bracero L, et al. Role of Dietary Components in Modulating Hypertension. J Clin Exp Cardiol. 2016;7:433.
133. Guney F, et al. Intracranial Hypertension in Behcet Disease: A Case Report. J Clin Case Rep. 2016;6:748.
134. Bogari DF, et al. The Prevalence of Hypertension in Endodontic Clinics: A Pilot Study. Dentistry. 2016;6:370.
135. Silva RP, et al. Who is the Patient with Suspected White Coat Hypertension? J Clin Exp Cardiol. 2016;7:428.
136. Aissa S, et al., Prognosis Evaluation of Pulmonary Endarterectomy for Chronic Thromboembolic Pulmonary Hypertension. J Pulm Respir Med. 2016;6:328.
137. Li H. Hypertension Management in Primary Care in China: Still a Long Way to Proceed. J Gen Practice. 2016;4:238.
138. Mattar Met, et al. Atherosclerosis and Rheumatic Diseases. Rheumatology (Sunnyvale) 2015;5:147.
139. Tsabang N, et al. Comparative Study of Epidemiological and Anthropological Aspects of Diabetes and Hypertension in Cameroon. Forest Res. 2016;5:165.
140. Dash SK, Kulkarni V, Sahoo RK, Macherla G, Ravikiran M Idiopathic Pulmonary Hypertension Induced Thrombocytopenia - A Case Report. J Pulm Respir Med 6:322.
141. Huckabay L, et al. Hypertension in a Low-income and Homeless Community Sample. J Community Med Health. 2016;6:399.
142. Gonzalez-Aguirre AJ, et al. Transjugular Liver Biopsy in a Multiple Myeloma Patient with Hepatomegaly, Portal Hypertension and "Miliary" Liver Lesions: A Case Report. J Gastrointest Dig Syst. 2016;6:390.
143. Kamal I, et al. Kidneys: The Victim Of Hypertension: Review. J Nephrol Ther. 2016;6:231.
144. Mussa BM, et al. Prevalence of Hypertension and Obesity among Emirati Patients with Type 2 Diabetes. J Diabetes Metab. 2016;7:638.
145. Viggiano A, et al. Anti-Hypertensive Treatments and Hypertension- Associated Hypoalgesia Evaluated by Auto-Algometry. J Anesth Clin Res. 2015;6:589.
146. Bos AJG, et al. Comparing the Prevalence and Drug Treatment Rates of Diabetes, Hypertension and Dyslipidemia between Japan and Brazil, using 2013 National Health Surveys. J Clin Diabetes Pract. 2015;1:103.
147. Yunfu Lv, Han XY, Gong X, Gu W, He C, et al. Analysis of Peripheral Blood Cells Due to Adults Posthepatic Cirrhotic Portal Hypertension and Their Postoperative Prognosis. J Hypertens (Los Angel) 4:210.
148. Al-Hamdan NA. Isolated Systolic Hypertension among Adults in Saudi Arabia: Prevalence, Risk Factors, Predictors and Treatment - Results of a National Survey. Epidemiology (sunnyvale). 2015;5:206.
149. Lerman MJ, et al. Post Kidney Transplant Refractory Hypertension and Bilateral Native Nephrectomy. J Kidney. 2015;1:107.
150. Safdar Z, et al. Circulating Aldosterone Levels and Disease Severity in Pulmonary Arterial Hypertension. J Pulm Respir Med. 2015;5:295.

151. Ashoor I. Pediatric Hypertension: A Primer for the Busy Primary Care Provider. *J Nephrol Ther* 5:218.
152. Mutlu E, et al. Comparative Effectiveness of Novokinin, Perindopril and Losartan on Blood Pressure, Adma, NADPH Oxidase and Rho Kinase at Renal Tissue in L-Name and Salt Induced Hypertension. *Clin Exp Pharmacol*. 2015;5:197.
153. Herbert S, and Tulloh RMR. Treatment of Pulmonary Hypertension in Down's Syndrome. *J Genet Syndr Gene Ther*. 2015;6:273.
154. Roever L and Borges ASR. Pulmonary Hypertension and Exercise Training: Evidence Based Studies. *Lung Dis Treat*. 2015;1:e103.
155. Al-Saloos H and Saeed S. Rare Case of Bilateral Superior Vena Cava, Persistent Left Superior Vena Cava Draining to Coronary Sinus, Absent Bridging Vein, Interrupted Inferior Vena Cava with Azygos Vein Continuation to Right Superior Vena Cava, Situs Inversus and Pulmonary Hypertension in a Neonate: A Case Report. *Pediatr Therapeut*. 2015;5:i110.
156. Strażyńska A, et al. The Relationship between Serum Apelin Concentration and Selected Anthropometric Parameters, Serum Lipids and Carotid Intima-Media Thickness in Young Subjects with Primary Arterial Hypertension. *J Metabolic Syndr*. 2015;4:185.
157. Plácido R, et al. Predictors of Functional Capacity in Patients with Pulmonary Hypertension. *J Pulm Respir Med*. 2015;5: 290.
158. Rajekar H. Complication of Cirrhosis Portal Hypertension: A Review. *J Liver* 2015;4:188.
159. Roever L. High-Sensitivity C-Reactive Protein, Hypertension and Stroke: Cause and Effect or Simple Association?. *InternMed*. 2015;5:e102.
160. Sun Y, et al. Pulmonary Arterial Hypertension from Hepatic HHT. *InternMed*. 2015;5:109.
161. Aronow WS. 2015 American Heart Association/American College of Cardiology/American Society of Hypertension Guidelines on Treatment of Hypertension in Patients with Coronary Artery Disease. *J Hypertens*. 2015;4:e113.
162. Jiangyan C, et al. Association among Systolic Blood Pressure Variation, Inflammation and Arterial Rigidity in Essential Hypertension. *J Hypertens*. 2015;4:207.
163. Padda RS, et al. Angiotensin-(1-7): A Novel Peptide to Treat Hypertension and Nephropathy in Diabetes?. *J Diabetes Metab*. 2015;6:615.
164. Rovedder PME, et al. Pulmonary Hypertension and Pulmonary Disorders in Cystic Fibrosis. *Cardiovasc Pharm Open Access*. 2015;4:158.
165. Vadapalli S, et al. Variants of PGIS and PPAR γ in Idiopathic Pulmonary Arterial Hypertension. *J Clin Med Genomics*. 2015;3:130.
166. Srinivasamurthy BC. Burden and Determinants of Hypertension in Rural Pondicherry, India. *J Clin Med Genomics*. 2015;3:127.
167. Nikitin VA, et al. Concor AM Therapy in Patients with Chronic Obstructive Pulmonary Disease and Concomitant Arterial Hypertension. *Biol Med* 2015;7:246
168. Boos CJ, et al. The Effects of Ascent and Descent on Heart Rate and Rhythm at High Altitude. *J Clin Exp Cardiol*. 2016;7:462.
169. Zaidi SN and Collins SM. Orthostatic Stress Induced Changes in Heart Rate Variability, Pulse Transit Time and QRS Duration. *J Bioengineer & Biomedical Sci*. 2016;6:194.
170. Gonsorcik J, et al. Atrioventricular Nodal Reentrant Tachycardia in Transplanted Heart. *J Clin Exp Cardiol*. 2016;7:458.
171. Zhang J, et al. A Comparison of Haemodynamic Effects and Safety between Domestic Levosimendan versus Dobutamine for Hospitalized Patients with Acute Decompensated Heart Failure. *Cardiovasc Pharm Open Access*. 2016;5:186.
172. Berezin AE. Progenitor Endothelial Cell Dysfunction in Heart Failure: Clinical Implication and Therapeutic Target?. *Transl Med (Sunnyvale)*. 2016;6:176.
173. Gabaev DD. How I Reached the Age of 65 with a Congenital Heart Disease and atherosclerosis. *Anat Physiol*. 2016;6:228.
174. Suastika K, et al. Coronary Heart Disease in a Remote Area. *J Clin Exp Cardiol* . 2012;S6:002.
175. Namekata T, et al. Association of Cardio-Ankle Vascular Index with Cardiovascular Disease Risk Factors and Coronary Heart Disease among Japanese Urban Workers and their Families. *J Clin Experiment Cardiol*. 2012;S1:003.
176. Spencer-Hwang R, et al. Female Renal Transplant Recipients Potentially at Increased Risk of Fatal Coronary Heart Disease Associated with Ambient Air Pollutants. *J Clin Experiment Cardiol* . 2011;S6:001.
177. Mehta P, et al. Growth and Tolerability of Healthy Term Infants Fed a New Formula Supplemented with DHA from *Schizochytrium* sp Microalgae. *J Vasc Med Surg*. 2016;4: 267.
178. Berezin AE, et al. Epigenetic Modifications the Development of Different Heart Failure Phenotypes. *J Data Mining Genomics & Proteomics*. 2016; 7:202.
179. Svetikiene M, et al. Successful Treatment of Right Heart Thrombi and Acute Massive Pulmonary Embolism by Repeated Thrombolysis. *J Clin Exp Cardiol*. 2016; 7: 451.

180. Todurov B, et al. Usefulness of Applying Temporary Intracoronary Shunts for Myocardial Revascularization. *Biol Med (Aligarh)*. 2016;8: 302.
181. Firoj KM, et al. Myocardial Protective Effect of Exogenous Creatine Phosphate in Children Undergoing Open Heart Surgery. *J Clin Exp Cardiol*. 2016;7: 450.
182. Mbamalu ON, et al. HPLC Determination of Selected Flavonoid Glycosides and their Corresponding Aglycones in *Sutherlandia frutescens* Materials. *Med Aromat Plants*. 2016;5:246.
183. Alkhatib EA, et al. Multi-Regression Prediction of Metal Partition Coefficients under Various Physical/Chemical Conditions “Design of Experiments As, Cr, Cu, Ni and Zn”. *Hydrolyt Current Res* . 2016;7:241.
184. Sanchez JM, Kurian T, Doshi A, Pieper S Fever Exacerbating Ventricular Fibrillation in Early Repolarization Syndrome. *J Cardiovasc Dis Diagn*. 2016;S1:006.
185. Mumphy CG, et al. Hypoplastic Left Heart Syndrome in a Patient with Fetal Hydantoin Syndrome. *J Neonatal Biol*. 2016;5:217.
186. Kiuchi MG, et al. Effects of Renal Sympathetic Denervation in Comparison to β -Blocker on Heart Rate Control in Hypertensive Patients with Permanent Atrial Fibrillation. *J Clin Exp Cardiol*. 2016;7:439.
187. Scaldaferrri F, et al. Emerging Mechanisms of Action and Loss of Response to Infliximab in Ibd: A Broader Picture. *Biochem Pharmacol*. 2016;5:206.
188. Berezin AE. The Role of Circulating Myeloid-Related Protein Complex Calprotectin in Prediction of Heart Failure with Preserved Ejection Fraction . *J Clin Exp Cardiol*. 2016;7:436.
189. Ilori TO, et al. The Arteriovenous Fistula: An Often Overlooked Precipitant of High Output Heart Failure. *J Clin Case Rep*. 2016;6:751.
190. Watanabe T, et al. Pacemaker Lead Perforation during Right Ventricular Outflow Tract Pacing -Importance of Heart Rotation at Pacemaker Implantation. *J Clin Case Rep*. 2016;6:707.
191. Wang JY, et al. Aortic Dissection Secondary to Mague Ingestion. *J Vasc Med Surg*. 2016;4:256.
192. Wang JY, et al. Acute Myocardial Infarction Secondary to Aortic Dissection. *J Vasc Med Surg* . 2016;4:255.
193. Ahsan S, et al. A Classic Presentation of Lyme Complete Heart Block. *Trop Med Surg*. 2016;4:207.
194. Algazzar AS, et al. Changes in Left Ventricular Global and Regional Longitudinal Strain during Right Ventricular Pacing. *Arrhythm Open Access*. 2016;1:107.
195. Campbell AB, et al. Ventricular Tachycardia in a Patient with Repaired Tetralogy of Fallot. *J Gen Pract*. 2013;1:120.
196. Schmitz G and Rezaie S. Do Elevated Troponins during Supraventricular Tachycardia (SVT) Predict the Presence of Coronary Artery Disease? *Emergency Med*. 2013;3:e132.
197. Porpino SKP, et al. Developing New Organic Nitrates for Treating Hypertension: A Review. *J Hypertens*. 2016;5:232.
198. Chaowu Y, et al. Diastolic Pulmonary Arterial Pressure as a Prognostic Indicator for Closure of Atrial Septal Defect with Severe Pulmonary Arterial Hypertension . *J Hypertens* . 2016;5:231.
199. Nole T, et al. Ethnomedical and Ethnopharmacological Study of Plants Used For Potential Treatments of Diabetes and Arterial Hypertension by Indigenous People in Three Phytogeographic Regions of Cameroon. *Diabetes Case Rep*. 2016;1:110.
200. Zha P, et al. An RN/CHW Exemplar: Managing Hypertension in an Urban Community. *J Comm Pub Health Nurs* . 2016;2:135.