Crimson Publishers
Wings to the Research

Mini Review

Diabetes, Obesity and Atherosclerosis: Three Buds of One Stem MS-X

Nimai Chand Chandra*

Department of Biochemistry, All India Institute of Medical Sciences, Patna, India

Abstract

Metabolic Syndrome-X (MS-X) represents a medleybolome of several metabolic disorders from the angles of physiological, biochemical, clinical and metabolic anarchy. Diabetes, obesity and hypertension are the major medico-clinical concerns in 21st century both for developed and developing world. A great number of reports in last decades and recent past from various angles to control the pathology of MS-X have been published [1-9]. Exclusively, catching of diabetes in obese subjects is a unique feature in this disturbed metabolome. In human obesity the insulin resistance and type-2 diabetes are most often inter-linked. The feedback regulatory mechanism of hyper leptinemia is failed in human obesity [10,11]. On the other hand, hyperleptinemia develops insulin resistance. The (Figure 1) shows the metabolic interlink and dependency that reels between insulin and leptin.

Keywords: Diabetes; Metabolic syndrome; Insulin; Atherosclerosis

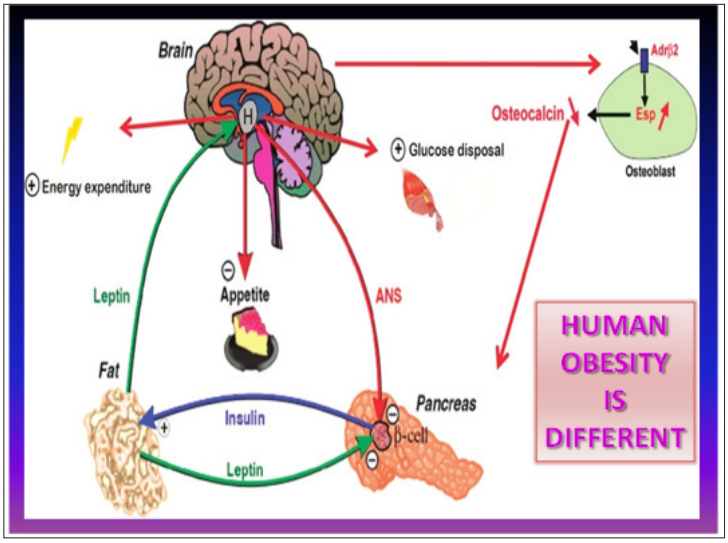
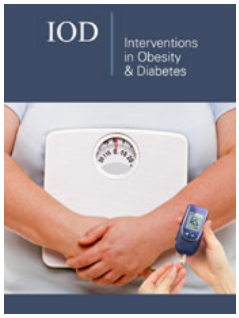


Figure 1: Metabolic interlink and dependency that reels between insulin and leptin.

Introduction

Ideally insulin and leptin signaling share a common route and ditch each other depending on their surge in their affected physiological state. As a result, insulin and leptin resistances are simultaneous phenomena and no matter to induce other while the one is precipitated. Thus, the preponderance of running obesity and type-2 diabetes hand to hand is deeply expected. The (Figure 2) shows the common signaling road of both the ligands. Report shows that obesity reduces tyrosine phosphorylation of insulin receptor [12]. This affects insulin signaling and hence initiates insulin resistance. On the other hand, report also shows an association of insulin and LDL receptors [12-15] and this association keeps LDL receptor non-functional [12-15] making the system prone to vessel LDL accumulation. Yadav et al. has shown a decrease of LDL receptor mRNA level with increase of leptin concentration as well as two receptor association [14]. Repressed LDL receptor will reduce LDL clearance from blood vessels and the receptor-complex will keep receptors non-functional with concomitant

ISSN: 2578-0263



***Corresponding author:** Nimai Chand Chandra, Department of Biochemistry, All India Institute of Medical Sciences, Patna, India

Submission: August 02, 2019

Published: September 16, 2019

Volume 3 - Issue 2

How to cite this article: Nimai Chand Chandra. Diabetes, Obesity and Atherosclerosis: Three Buds of One Stem MS-X. 3(2). IOD.000559.2019.
DOI: 10.31031/IOD.2019.03.000559

rise of LDL in blood vessels. Increase of LDL in blood vessels will initiate hyperlipoproteinemia related atherosclerotic propensity which can also drag hypertension and cardiovascular impairments [16,17]. Thus, these three metabolic disorders viz. diabetes, obesity and atherosclerosis are the outcomes of impaired metabolic stem.

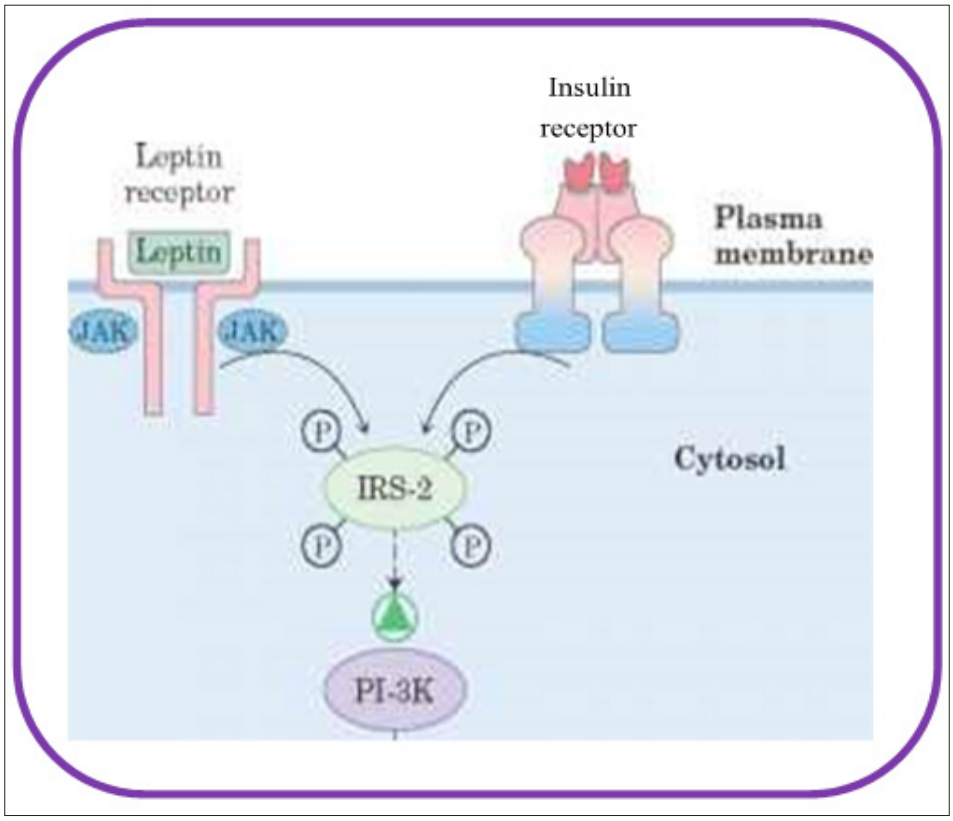


Figure 2: The common signaling road of both the ligands.

Conclusion

All these three metabolic disorders viz. diabetes, obesity and atherosclerosis have an impact on developing stress. This is mediated through another receptor known as oxidized-LDL-receptor-1 or LOX-1. Deposited LDL in the blood vessel will be spontaneously oxidized and the oxLDL (oxidized LDL) generated, will induce a vicious cycle for generating more and more pro-inflammatory molecules through interaction with its cognate receptor LOX-1 [18,19]. These pro-inflammatory molecules are stress generators and atherosclerotic profounder(s). So, this chain of impairments of multiple pathogenesis with initial induction of one metabolic disorder is a link process to create a medleybolome and ostensibly to call Metabolic-X-disease. So one should keep in mind that prevention is better than cure, once got entrapped by 'Syndrome X'. Among many others, aging is a preponderance factor for precipitating Metabolic-X-syndrome.

References

1. Chwalba A, Otto Buczkowska E (2014) Metabolic syndrome is the problem in young diabetics? Fam Med Sci 3(4): 2-7.
2. Chwalba A, Dudek A, Otto Buczkowska E (2019) Role of amylin in glucose homeostasis. Austin Diabetes Res 4(1): 1021.
3. Gluvic Z, Zaric B, Resanovic I, Obradovic M, Mitrovic A, et al. (2017) Link between metabolic syndrome and insulin resistance. Curr Vasc Pharmacol 15(1): 30-39.
4. Hocking S, Bonet DS, Milner KL, Greenfield JR, Chisholm DJ (2013) Adiposity and insulin resistance in humans: The role of the different tissue and cellular lipid depots. Endocr Rev 34(4): 463-500.
5. Maheshwari N, Karthikeyan C, Trivedi P, Moorthy NSHN (2018) Recent advances in protein tyrosine phosphatase 1B targeted drug discovery for type II diabetes and obesity. Curr Drug Targets 19(5): 551-575.
6. Otto Buczkowska E, Dryżałowski M (2015) Metabolic syndrome in young patients. Pediatr Endocrinol Diabetes Metab 23(1): 32-36.
7. Prabhakar PK, Sivakumar PM (2019) Protein tyrosine phosphatase 1B inhibitors: A novel therapeutic strategy for the management of type 2 diabetes mellitus. Curr Pharm Des.
8. Rochlani Y, Pothineni NV, Kovelamudi S, Mehta JL (2017) Metabolic syndrome: pathophysiology, management, and modulation by natural compounds. Ther Adv Cardiovasc Dis 11(8): 215-225.
9. Qian S, Zhang M, He Y, Wang W, Liu S (2016) Recent advances in the development of protein tyrosine phosphatase 1B inhibitors for Type 2 diabetes. Future Med Chem 8(11): 1239-1258.
10. Phipps PR, Starritt E, Caterson I, Grunstein RR (2002) Association of serum leptin with hypoventilation in human obesity. Thorax 57(1): 75-76.
11. Considine RV, Sinha MK, Heiman ML, Kriauciunas A, Stephens TW, et al. (1996) Serum immunoreactive-leptin concentrations in normal-weight and obese humans. N Engl J Med 334(5): 292-295.
12. Ramakrishnan G, Beriwal P, Sangam, Chandra NC (2019) Low density lipoproteinemia in obese and type-2 diabetics from association of IR and LDLR. Diabetes Obes Int J 4(1): 000194.

13. Ramakrishnan G, Arjuman A, Suneja S, Das C, Chandra NC(2012) The association between insulin and low-density lipoprotein receptors. Diabetes & Vascular Disease Research 9(3): 196-204.

14. Yadav NK, Arjuman A, Chandra NC (2014) Role of leptin on the expression of low density lipoprotein receptor. Indian J Med Res 140(4): 524-530.

15. Suneja S, Christian Y, Chandra NC (2018) Milieu of diabetes in the 2nd Decade of 21st Century. J Diabetes Metab 9 (9): 1000804.

16. Suneja S, Ramakrishnan G, Tandon N, Chandra NC (2011) Modulation by insulin of the co-localized LDL receptor in normal and type-I diabetic subjects. International Journal of Clinical Medicine 2(3): 231-245.

17. Ross R (1995) Cell biology of atherosclerosis. Ann Rev Physiol 57: 791-804.

18. Arjuman A, Chandra NC (2017) LOX-1: A potential target for therapy in atherosclerosis; an in vitro study. International Journal of Biochemistry and Cell Biology 91(Pt A): 65-80.

19. Arjuman A, Chandra NC (2015) Differential pro-inflammatory responses of TNF-α receptors (TNFR1 and TNFR2) on LOX-1 signalling. Mol Biol Rep 42(6): 1039-1047.