

BRNS Major project

Sanction Number: 2013/35/7/BRNS dt 01/04/2013

Period 2013-2017

Total amount: Rs 31,75,145/-

Title: Adrenergic receptor subtype functional correlation in the brain and pancreas of high fat simple carbohydrate fed C57BL/6J mice: Implications in metabolic syndrome

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Project Executive summary:

We developed a mouse model for Metabolic Syndrome (MetS) by feeding High Fat Simple Carbohydrate (HFSC) diet. A detailed profiling of adrenergic receptors of pancreas, hypothalamus and brainstem has shown that the adrenergic receptors are severely affected during the onset and progression of MetS. The gene expression studies in pancreas has shown the upregulation of α_{2A} and β_3 by 1.4 and 11.6 fold and downregulation of α_{1A} , α_{1D} , α_{2B} , α_{2C} , and β_1 by 5 months of feeding HFSC diet. Upregulation of β_2 adrenergic receptor by 1.4 fold and downregulation of α_{1A} , α_{1B} , α_{1D} , α_{2A} , α_{2B} , α_{2C} , β_1 and β_3 in hypothalamus after 5 months of feeding HFSC diet. In contrast to this, all the adrenergic receptors except α_{1B} were upregulated in brainstem after five months of feeding HFSC diet. This is the first study that has attempted a detailed profiling of nine adrenergic receptors in pancreas, hypothalamus and brainstem of MetS model. Studies on second messenger c AMP and its down stream modulator p-CREB has confirmed the derailment in signaling of adrenergic receptors in MetS. Further studies are needed to establish if this derailment in signaling is due to post transcriptional or post translational modifications of adrenergic receptors during onset and progression of MetS.

Accomplishments of the project:

- Procured Vibratome & AC for lab
- Trained One Ph.D student and 19 M.Sc students
- Over 10 paper presentations both national (including Indian Science Congress 2017) and international (including Conference at France).
- 7 publications in peer reviewed National and International journals

List of publications in peer reviewed journals:

1. D'Souza S.S and Abraham A. A systematic study of biochemical profile during the induction and development of an animal model for Metabolic Syndrome IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) e-ISSN: 2278-3008, p-ISSN:2319-7676. 9(1):109-113, 2014. www.iosrjournals.org
2. Fernandes S, Severes A, Kudnekar T, Alisha F.C, Naik D.R, Dias P.E, D'Souza S.S and Abraham A. High fat simple carbohydrate-fed male Wistar rats: a useful model to study metabolic syndrome. Current Science, 108(6),1157-1165, 2015.(Impact factor:0.843)
3. Roy N and Abraham A. A Study of Adrenergic Receptors in the Brain Stem of C57BL/6J Mice Fed with High Fat Simple Carbohydrate Diet. Journal of Biomedical Reports. 2(1): 12-17, 2016.
4. Roy N and Abraham A. Primer designing and In-silico PCR for α 1Adrenergic receptors. International Journal of Latest Trends in Engineering & Technology. 7(4): 25-30, 2016.
5. Swarnalatha BN, Abraham A. Design Of Primer For Thyrotropin Releasing Hormone Of Mus MusculusC57BL/6J for qRT-PCR. International Journal of Latest Trends in Engineering and Technology Special Issue SACAIM 2016, pp. 31-36. e-ISSN:2278-621X
6. Smruthi G Prabhu, Sulakshana Karkala, Neena Roy, Serena D'Souza and Asha Abraham. *Juglans regia* Seeds have Effects on Platelets and Peripheral Fat Deposition in the Aorta and Heart of C57BL/6J Mice Fed with Normal and High Fat Simple Carbohydrate Diet. Current Nutrition & Food Science, Vol 12 (4): 264-271, 2016 ISSN: 1573-4013,
7. Swarnalatha BN, Roy N, Gouda M.M, Moger R and Abraham A. High Fat Simple Carbohydrate diet intake induces Hypothalamic –Pituitary -Thyroid axis dysregulation in C57BL/6J mice. Communicated to Applied Physiology, Nutrition, and Metabolism.