iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** VI **Month of publication:** June 2020

DOI: http://doi.org/10.22214/ijraset.2020.6219

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VI June 2020- Available at www.ijraset.com

Influence of Antibiotics on Gut Microbiota and Stroke - A Mini Review

S. Sheik Asraf[1], K. Jyothi[2]
[1, 2]*Department of Biotechnology, School of Bio and Chemical Engineering, Kalasalingam Academy of Research and Education, Krishnankoil.*

Abstract*: *Commensal gut bacteria can alter the immune system of human beings and can cause disease progression in the nervous system including brain. Nevertheless, it remains ambiguous whether the gut microbiota has an impact on stroke.
Keywords: Metagenome, stroke, 16 S rRNA, DNA, gut

I. INTRODUCTION

Antibiotic-induced changes in the gut microbial flora reduce ischemic brain damage in animal model such as mice [1, 2, 3 and 4]. Severe brain lesions induced dysbacteriosis of the gut microbiota affected neuroinflammatory response after brain injury [5]. However, there are various unanswered questions in the field of gut microbiome and its effect on stroke [6]. One such query is the event that happens after stroke in which the brain maintains a shield and prevents the growth of fermentative bacteria [7]. A recent report also brought the fact in spot light that change in microbiota in C57BL/6 mice after post-stroke condition depends upon the type of breeder [8]. Moreover, stroke also promotes the movement of bacteria from the host gut microbiota to lung [9]. More recently, age-related changes in the gut microbiota and its dependent trimethylamine *N*-oxide has shown the relationship between systemic pro inflammatory cytokines/monocytes and stroke outcome [10, 11, 12, 13 and 14]. In short, stroke alters the gut microbiota which in turn modulates stroke outcome and microbiome plays a significant function in the pathogenesis of stroke [15, 16, 17, 18].

II. POTENTIAL QUESTIONS

Significant questions that arise as a result of relationship between gut microbiota and stroke include:How brain maintains a guard and prevents the growth of bacteria that promotes fermentation? Does the type of breed (in case of laboratory animal) / race (in case of human beings) affects the microbiota which in turn decides the progression of stroke? Does the stroke affect the spread of host microbiota beyond gut? How do the age-related changes in the gut microbiota affect the inflammation and stroke

III.MICROBIOTA STUDY OF THE TYPE OF BREED (IN CASE OF LABORATORY ANIMAL) / RACE (IN CASE OF HUMAN BEINGS).

Metagenomic DNA (Mt-DNA) could be isolated and purified from the gut of the type of breed (in case of laboratory animal) / race (in case of human beings) having stroke. PCR (Mi-seq) and Mt-DNA sequencing could be done. Exclusion of noise data, chimera profile generation, generation of SFF-file and Q-file, Mt-DNA sequence clustering, taxonomic recognition and data assessment could be done.

IV.METAGENOMICS OF ORGANS IN THE VICINITY OF GUT.

Metagenomic DNA (Mt-DNA) could be isolated and purified from the organs in the vicinity of gut of laboratory animal/ human beings having stroke.PCR (Mi-seq) and Mt-DNA sequencing could be done. Exclusion of noise data, chimera profile generation, generation of SFF-file and Q-file, Mt-DNA sequence clustering, taxonomic recognition and data assessment could be done.

V. ANSWERS TO THE POTENTIAL QUESTIONS

Shielding property of brain and reason behind the unfavourable condition for the growth fermentative bacteria. The type of breed (in case of laboratory animal) / race (in case of human beings) that has the significant difference in gut and brain microbiota which decides the progression of stroke. The spread of host gut microbiota to Brain, Liver, Pancreas, Esophagus, Gall bladder. The age-related changes in the microbiota of gut of same individual over a period of 3 years the affect the inflammation and stroke outcome.

VI. CHALLENGES

The following are the challenges : non availability of cadaver / live individuals and non availability of different race of human beings

VII. ALTERNATIVE STRATEGIES

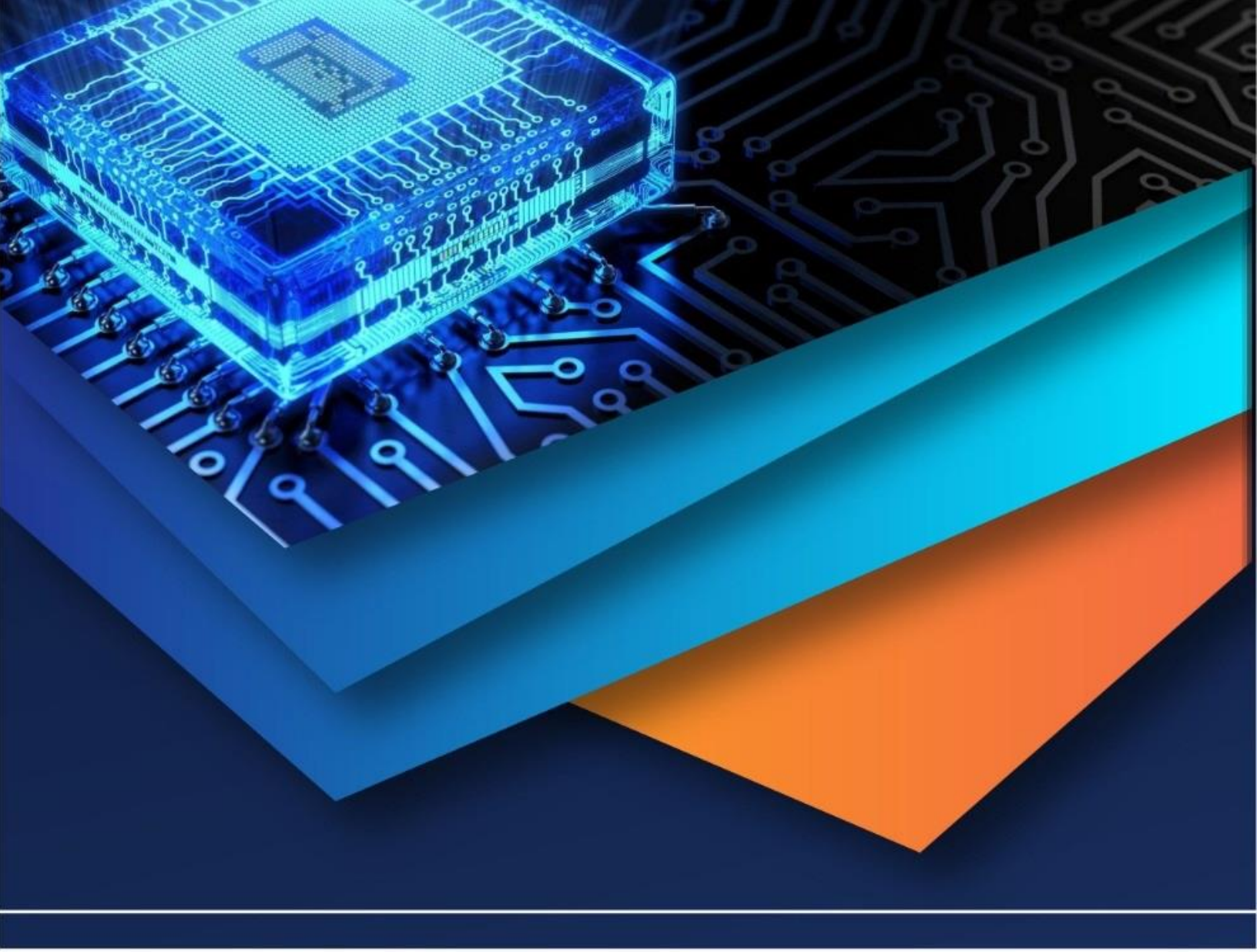
Metaproteomics and metatranscriptomics are considered as alternative strategies.

VIII. ACKNOWLEDGMENT

The author thanks the management of KARE.

REFERENCES

[1] Benakis, Corinne, David Brea, Silvia Caballero, Giuseppe Faraco, Jamie Moore, Michelle Murphy, Giulia Sita et al. "Commensal microbiota affects ischemic stroke outcome by regulating intestinal [gamma][delta] T cells." Nature medicine 22, no. 5 (2016): 516-523.
[2] Malkki, Hemi. "Gut microbiota influence stroke recovery in mice." Nature Reviews Neurology 12, no. 5 (2016): 252-253.
[3] Ridler, Charlotte. "Gut microbiota: gut bacteria affect post-ischaemic inflammation in stroke by modulating intestinal T cells." Nature Reviews Gastroenterology & Hepatology 13, no. 5 (2016): 250.
[4] Winek, Katarzyna. "Impact of the Gut Microbiota on the Outcome After Experimental Stroke." PhD diss., Charité-Universitätsmedizin Berlin, 2017.
[5] Singh, Vikramjeet, Stefan Roth, Gemma Llovera, Rebecca Sadler, Debora Garzetti, Bärbel Stecher, Martin Dichgans, and Arthur Liesz. "Microbiota dysbiosis controls the neuroinflammatory response after stroke." Journal of Neuroscience 36, no. 28 (2016): 7428- 7440.
[6] Winek, Katarzyna, Andreas Meisel, and Ulrich Dirnagl. "Gut microbiota impact on stroke outcome: Fad or fact?." Journal of Cerebral Blood Flow & Metabolism 36, no. 5 (2016): 891- 898.
[7] Swidsinski, Alexander, Vera Loening-Baucke, Monika Krüger, and Steffen Kirsch. "Central nervous system and the colonic bioreactor: analysis of colonic microbiota in patients with stroke unravels unknown mechanisms of the host defense after brain injury." Intestinal Research 10, no. 4 (2012): 332-342.
[8] Sadler, Rebecca, Vikramjeet Singh, Corinne Benakis, Debora Garzetti, David Brea, Bärbel Stecher, Josef Anrather, and Arthur Liesz. "Microbiota differences between commercial breeders impacts the post-stroke immune response." Brain, behavior, and immunity 66 (2017): 23-30.
[9] Wen, Shu Wen, and Connie HY Wong. "An unexplored brain-gut microbiota axis in stroke."Gut microbes 8, no. 6 (2017): 601-606.
[10] Spychala, Monica S., Venugopal Reddy Venna, Michal Jandzinski, Sarah J. Doran, David J. Durgan, Bhanu Priya Ganesh, Nadim J. Ajami et al. "Age-related changes in the gut microbiota influence systemic inflammation and stroke outcome." Annals of neurology 84, no. 1 (2018): 23- 36.
[11] Haghikia, Arash, Xinmin S. Li, Thomas G. Liman, Nils Bledau, David Schmidt, Friederike Zimmermann, Nicolle Kränkel et al. "Gut Microbiota–Dependent Trimethylamine N-Oxide Predicts Risk of Cardiovascular Events in Patients With Stroke and Is Related to Proinflammatory Monocytes." Arteriosclerosis, thrombosis, and vascular biology 38, no. 9 (2018): 2225-2235.
[12] Haghikia, A., X. S. Li, T. Liman, C. Widera, K. Sonnenschein, K. Weissenborn, J. Bauersachs et al. "Gut microbiota-dependent TMAO, aortic atherosclerosis and risk of cardiovascular events in patients with stroke." Atherosclerosis 275 (2018).
[13] Haghikia, A., T. Liman, X. S. Li, D. Schmidt, F. Zimmermann, N. Kraenkel, D. Fraccarollo et al. "P2467 Gut microbiota-dependent TMAO and risk of cardiovascular events in patients with stroke: relation to pro-inflammatory monocytes." European Heart Journal 39, no. suppl_1 (2018): ehy565-P2467.
[14] Haghikia, A., X. S. Li, T. Liman, N. Bledau, C. Widera, K. Sonnenschein, K. Weissenborn et al. "5761Relation of gut microbiota-dependent TMAO with aortic atherosclerosis: prognostic implication for patients with stroke." European Heart Journal 38, no. suppl_1 (2017).
[15] Winek, Katarzyna, Ulrich Dirnagl, and Andreas Meisel. "Role of the Gut Microbiota in Ischemic Stroke." Neurology International Open 1, no. 04 (2017): E287-E293.
[16] Dong, Wei, Yi Zhang, Yanbing Zhu, and Yongbo Zhang. "Gut microbiota and stroke."International Journal of Cerebrovascular Diseases 25, no. 6 (2017): 531-535.
[17] Stanley, Dragana, Robert J. Moore, and Connie HY Wong. "An insight into intestinal mucosal microbiota disruption after stroke." Scientific reports 8, no. 1 (2018): 568.
[18] Winek, Katarzyna, Ulrich Dirnagl, and Andreas Meisel. "Role of the Gut Microbiota in Ischemic Stroke." AKTUELLE NEUROLOGIE 45, no. 2 (2018): 127-134.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY