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Advances and challenges in the diagnostic accuracy for surgical management of inflammatory bowel disease: Potential role of molecular biometrics

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In the 20th century, it has become possible to plant a new organ instead of diseased or lost organ. The ways to replace organs has been implemented in three different approaches: i) use of artificial organ (extra-corporeal or intra-corporeal), ii) transplantation of organs from other humans and iii) construction of new organ by use of sources from the same patient's own body. One of the most extensive procedures following the third option, is the "restorative proctocolectomy (RPC) and ileal pouch-anal anastomosis (IPAA)" for surgical treatment of ulcerative colitis (UC) and familial adenomatous polyposis (FAP). RPC replaces the colon and rectum by a pouch formed from the ileum and sutured to the anal canal preserving the anal sphincters. The reconstruction restore gastrointestinal continuity, defecation, deferral and discrimination. Successes of RPC and IPAA depend on the correct diagnosis, which is currently not offered accurately in up to 30% of inflammatory bowel disease (IBD) patients. In trying to find a solution to diagnosis inaccuracy dilemma in IBD, proteomic evaluation of surgical pathology specimens of colonic mucosal and submucosal layers, individually; of IBD, encompassing Crohn's colitis (CC) (a colonic Crohn's disease (CD)) and UC has been the focus to the advancement of diagnostic medicine to improve diagnostic accuracy in IBD. Mass spectrometry (MS) is unique among analytical technologies in its advantage and ability to directly measure individual molecular species in complex clinical specimens, allowing it to make significant contribution to our understanding of biological molecules in health and in disease. It has become an essential tool for qualitative and quantitative analysis of cellular systems. The biochemical complexity and functional diversity of the biometric system are well suited to proteomic studies. The direct analysis of cells and tissues by matrix assisted laser desorption/ionization imaging mass spectrometry (MALDI IMS) has developed significant momentum for applications that have diagnostic potential. MALDI IMS methodology permits histology-directed target highly specific areas in colonic tissue for analysis without the need for extensive sample preparation. MALDI IMS provides molecular information from specific cell types within tissue sections. This laser-based approach significantly reduces the analysis time for each location sampled. This presentation discusses a perspective on the application of sophisticated MALDI IMS and bioinformatics technologies, to detect unique molecular biometrics to trying to improving diagnostic accuracy in IBD, elucidation of advances involving the identification of differentiating proteomic patterns, while offering a perspective on the challenges faced in the transfer.

Biography

Amosy E M'Koma is Assistant Professor of Surgery, Biochemistry and Cancer Biology in the Department of Biochemistry and Cancer Biology at Meharry Medical College and Vanderbilt University Medical Center, Division of General Surgery, Colon and Rectal Surgery. Dr. M'Koma received medical training initiated and completed his MD degree at Kharkov Medical Institute in Kharkov, Ukraine in 1984. He did his postgraduate and surgical residency program at the Karolinska University Hospital, Huddinge in Stockholm, Sweden. He was Board Certified in General Surgery (The Swedish Board of Health and Welfare in 1990). Dr. M'Koma pursued a Licentiate of Medical Science degree (1999) and a PhD (2001) in Surgery from the Karolinska Nobel Institute, Sweden. Dr. M'Koma came to the United States to further pursue academic endeavors. He was able to work at the Mayo Clinic in Rochester, Minnesota as a Research Trainee where he interacted with some of the leaders in the field of Colon and Rectal Surgery. The interactions with investigators at the Mayo clinic provided additional insight into the development of his research career in inflammatory bowel disease (IBD). He interacted with some of the leading physicians in the areas of IBD and received guidance and advice on the research activities that had the potential to significantly impact the understanding and surgical treatment of the disease. His research efforts during this time related to an in depth study of the scientific and clinical background of inflammatory colitis and it maladies. Dr. M'Koma research interest is focused on the pathophysiology of IBD more focused on diagnostic methodologies and surgical management of ulcerative colitis (UC) and familial adenomatous polyposis (FAP). The research is gravitated to gastrointestinal disease, specifically relating to the restorative physiology of intestinal continuity after operations for IBD, specifically, restorative proctocolectomy (RPC). The research efforts are directed towards developing strategic methodologies based on MALDI-mass spectrometry, proteomics and recombinant single-chain antibody to identify molecular biometrics that can provide discriminatory diagnostic tool for the colitides.

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