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Genetic Polymorphisms of Ischemic Stroke in Asians

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ABSTRACT

The increasing incidence of ischemic stroke emphasizes the necessity for early detection and preventive strategies. Diagnostic biomarkers currently available for ischemic stroke only become detectable shortly before the manifestation of stroke symptoms. Genetic variants associated with ischemic stroke offer a potential solution to address this diagnostic limitation. However, it is crucial to acknowledge that genetic variants cannot be modified in the same way as epigenetic changes. Nevertheless, individuals carrying risk or protective variants can modify their lifestyle to potentially influence the associated epigenetic factors. This study aims to summarize specific variants relevant to Asian populations that may aid in the early detection of ischemic stroke and explore their impact on the disease's pathophysiology. These variants give us important information about the genes that play a role in ischemic stroke by affecting things like atherosclerosis pathway, blood coagulation pathway, homocysteine metabolism, transporter function, transcription, and the activity of neurons regulation. It is important to recognize the variations in genetic variants among different ethnicities and avoid generalizing the pathogenesis of ischemic stroke.

1. Introduction

Between the projected years 2020 and 2030, there has been an increase in the incidence of ischemic stroke while mortality rates have decreased [1]. This suggests that current therapies for ischemic stroke have been successful in treating the disease but have not been effective in preventing its occurrence. Therefore, there is an urgent need to identify markers that can predict the development of ischemic stroke before it occurs. In disease diagnosis, various diagnostic tools have shown promise in predicting disease occurrence or progression. Imaging techniques, considered classical markers, provide valuable insights into the pathological changes within the body. Plasma levels of BNP, D-dimer, and CK-MB serve as current markers, offering reliable indications for ischemic stroke [2]. Epigenetic markers, including DNA methylation [3] and microRNA [4], have gained considerable attention in recent years for ischemic stroke diagnostic tools. However, these markers may only provide early diagnostic value when they are detectable shortly before the manifestation of stroke symptoms [2–4].

Genetic variants associated with ischemic stroke offer a potential solution to bridge this diagnostic gap. These variants can be analyzed

Abbreviations: 3-MA, 3-methyladenine; AA, arachidonic acid; ACE, angiotensin-converting enzyme; AF, atrial fibrillation; BNP, brain natriuretic peptide; Ca^{2+}, calcium; CAD, coronary artery disease; CK-MB, creatine-kinase-MB; CPA, carboxypeptidase A; CTMCs, connective tissue mast cells; CX37, connexin 37; ER, endoplasmic reticulum; GWAS, genome-wide association studies; HATs, histone acetyltransferases; HDAC, histone deacetylases; HDL, high-density lipoproteins; HMWK, high molecular weight kininogen; HS, heparan sulphate; HUVECs, human umbilical vein endothelial cells; IFN-γ, interferon γ; LDL, low-density lipoprotein; LMWK, low molecular weight kininogen; LPL, lipoprotein lipase; LPS, lipopolysaccharide; LTB4, leukotriene B4; LXA4, lipoxin A4; MACE, major adverse cardiovascular events; MCPs, mast cell proteases; Na^{2+}, natrium; NFκβ, nuclear factor-κβ; NLRP3, Nod-like receptor protein 3; OxLDL, oxidized LDL; RAS, renin-angiotensin system; ROS, reactive 263 oxygen species; SAA, serum amyloid A; T2DM, type 2 diabetes mellitus; TF, tissue factor; TG, triglyceride; TGF-β, transforming growth factor-beta; TLR, toll-like receptor; tPA, tissue plasminogen activator; TSP, thrombospondin; UA, uric acid; VLDL, very low-density lipoproteins; VSMCs, vascular smooth muscle cells.

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