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Predicted Interactionsof Cyclooxygenase2 with Nasopharyngeal Cancer-linked Ribosomal Proteins, uS19 and eL27

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ABSTRACT

Introduction: The Cyclooxygenase 2 (COX-2) and ribosomal proteins (RP) of uS19 and eL27 were reported to be associated with nasopharyngeal cancer (NPC). However, there is no studies on their interactions.

Objective/Aim: This study aimed to extrapolated the interactions of COX-2 with uS19 and eL27 via *in silico* approach.

Methods: Bioinformatics analysis involving the web-based applications of SWISS-MODEL, ClusPro, FireDock/PatchDock and Protein Interaction Calculator (PIC), and the UniProfKB database were used for the purpose of our study.

Results: We revealed possible interactions between uS19 and eL27 with COX-2 individually. Evaluation of the interacting interface amino acid residues of the uS19-COX2 and eL27-COX2 complexes show hydrophobic and ionic bonds in the former and only hydrophobic bonds in the latter.

Conclusion: Our findings provide novel *in silico* evidence of COX-2's interactions with two NPC-associated RPs (uS19 and eL27), and propose an interplay among these proteins during the oncogenesis of NPC.

Key Words: Cyclooxygenase 2, Nasopharyngeal carcinoma, Molecular docking, Protein-protein interaction, Ribosomal proteins, uS19 (S15), eL27 (L27)

INTRODUCTION

Cyclooxygenase (COX) has two isoforms which are Cyclooxygenase-1 (COX-1) and Cyclooxygenase-2 (COX-2). While COX-1 is commonly present in normal tissues and responsible for physiological processes, COX-2 is associated with physiological stress and diseases such as inflammation and cancers respectively.[1] COX-2 represses tumour immunity and promote tumour growth[2] suggesting an association of its over-expression with carcinogenesis. In fact, COX-2 overexpression has been found in nasopharyngeal cancer (NPC)[3] with significant poor prognosis in overall survival rate among patients[4]. Hence, identifying oncogenic factors that it interacts with will be essential in unravelling the molecular events mediated by COX-2 during NPC oncogenesis.

The roles of ribosomal proteins (RPs) in tumourigenesis are widely known[5,6,7] including during the carcinogenesis of human nasopharyngeal carcinoma (NPC).[8] Two RPs that are associated with NPC are eL27 and uS19 – both reportedly upregulated in NPC.[9,10,11] However, to date, there is limited information on the molecular pathways and network (particularly, the interacting partners) of these RPs during NPC oncogenesis. More precisely, the relationships of COX-2 with eL27 and uS19 have never been studied before this.

Interactions among proteins are essential biological processes for normal cellular physiology, but when these interactions are perturbed or dysregulated, they can lead to diseases, including cancer. Post-translational modifications and protein-protein interactions (PPI) involving COX-2 have been explained.[12] Nevertheless, the association of COX-2 specifically with eL27 and/or uS19 has never been investigated. Likewise, the link between eL27 with various factors of NPC pathogenesis have been suggested[11] but never yet with COX-2. Similarly, despite uS19's suspected relationship with Epstein-Barr Virus (EBV) – encoded proteins (EBV is an established viral agent linked to causation of NPC),[13]

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