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EXPRESSION PATTERNS OF THE HUMAN RIBOSOMAL PROTEIN GENES *eL14* AND *uS19* IN COLON CANCER IS DEPENDENT ON THE TYPE AND STAGE OF THE CANCER CELL

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ABSTRACT

Although the association of some ribosomal protein genes with colorectal cancer is widely known, the detailed mechanisms and complete list of associated genes is lacking. More importantly, the behaviours of these genes in different types and stages of the cancer are poorly understood. Herein we report the study of two ribosomal protein genes in cell lines derived from different sites and stages of colon cancer. Specifically, we analysed the expression pattern of *eL14* and *uS19* in HCT116 and SW480 cell lines. These two genes, although associated with a wide variety of cancer types, are poorly or have not been studied in colorectal cancer. Semi-quantitative reverse transcription – polymerase chain reaction (RT-PCR) approach was used, together with Students' *t*-test validation. We found a significantly ($p < 0.05$) differential *eL14* and *uS19* expression patterns between HCT116 and SW480 cell lines. Our findings suggest that *eL14* and *uS19* have higher activity in a poorly differentiated cell line derived from advanced (metastatic) stage (Duke's Stage D) colorectal carcinoma tissues compared to the moderately differentiated cell line derived from a mid-stage (Duke's Stage B) colorectal adenocarcinoma tumour. This will have important implications for both ribosomal protein genes as type and stage specific biomarkers for colon cancer.

Key words: Ribosomal protein genes, colon cancer, transcript level, *eL14*, *uS19*

INTRODUCTION

Differential expression of ribosomal protein (RP) genes is widely reported in a variety of cancer types. Over the years, there is increasing evidence of their association with colorectal cancer (Pogue-Geile *et al*., 1991; Kondoh *et al*., 1992; Wang *et al*., 2000; Shenoy *et al*., 2012; Yu *et al.*, 2019). Patterns of their expression also varies with different stages of malignancy (Lai & Xu, 2007), thus substantiating their involvement in the carcinogenesis of colon cancer. While some RP genes have elevated expression in colorectal cancer (CRC), several others are down-regulated, particularly in metastatic CRC (Lai & Xu, 2007). These RP genes are suspected to have specific roles in tumour progression and cancer metastasis, and cellular differentiation in CRC (Gou *et al*., 2010). However, not enough is known about the whole list of RP genes that is associated with CRC. Current literature lists at least 80 members of the RP gene family in existence (Ban *et al*., 2014). Exactly how many and which of these are linked to colorectal cancer is yet to be clarified. At what stages of the cancer are they most active also remains to be fully elucidated.

We sought to study the ribosomal protein gene L14 (*eL14*) in the context of colorectal carcinoma because its link to the different stages of malignancy of the cancer has never been properly studied. *eL14* is located at a chromosomal position 3p21.3 (Huang *et al*., 2006) – a region where the loss of heterozygosity (LOH) is associated with several types of cancer, and possibly have tumour suppressor genes (Liu *et al*., 2003). *eL14* has been found to be differentially expressed in lung, oral, (Shriver *et al*., 1998), oesophageal (Huang *et al*., 2006), and nasopharyngeal (Sim *et al*., 2018) cancers. More importantly, it is strongly correlated to microsatellite instability in CRC cases (Yu *et al.*, 2019). In the case of RP gene S15 (*uS19*), despite

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