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Independent 3'untranslated region RNA: A novel non-coding regulator RNA

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Classically, the 3'untranslated region (3'UTR) is that region in eukaryotic protein-coding genes from the translation termination codon to the polyA signal. It is transcribed as an integral part of the mRNA encoded by the gene. However, there exists another kind of RNA, which consists of the 3'UTR alone, without all other elements in mRNA such as 5'UTR and coding region. The importance of independent 3'UTR RNA (referred as I3'UTR) was prompted by results of artificially introducing such RNA species into malignant mammalian cells. Since 1991, we found that the middle part of the 3'UTR of the human nuclear factor for interleukin-6 (NF-IL6) or C/EBPβ gene exerted tumor suppression effect in vivo. Our subsequent studies showed that transfection of C/EBPβ 3'UTR led to down-regulation of several genes favorable for malignancy and to up-regulation of some genes favorable for phenotypic reversion. Also, it was shown that the sequences near the termini of the C/EBPβ 3'UTR were important for its tumor suppression activity. Then, the C/EBPβ 3'UTR was found to directly inhibit the phosphorylation activity of protein kinase Cε(PKCε) in SMMC-7721, a hepatocarcinoma cell line. Recently, an AU-rich region in the C/EBPβ 3'UTR was found also to be responsible for its tumor suppression. Recently we have also found evidence that the independent C/EBPβ 3'UTR RNA is actually exists in human tissues, such as fetal liver and heart, pregnant uterus, senescent fibroblasts etc. Through 1990's to 2000's, world scientists found several 3'UTR RNAs that functioned as artificial independent RNAs in cancer cells and resulted in tumor suppression. Interestingly, majority of genes for these RNAs have promoter-like structures in their 3'UTR regions, although the existence of their transcribed products as independent 3'UTR RNAs is still to be confirmed. Our studies indicate that the independent 3'UTR RNA is a novel non-coding RNA species whose function should be the regulation not of the expression of their original mRNA, but of some essential life activities of the cell as a whole.

Biography

Ding-Gan Liu has completed his M.S. from the Shanghai Institute of Biochemistry, Chinese Academy of Sciences (CAS) and gradually upgraded to research associate, associate professor and full professor in that Institute (now the Institute of Biochemistry and Cell Biology, Shanghai institutes for Biological Sciences, CAS). During 1980's he was a visiting scientist in the Institute for Physical and Chemical Research (RIKEN), Tokyo, Japan, and in the Tsukuba Life Science Center, RIKEN, Japan. He has been the first author, corresponding author or co-author of more than 50 research papers in Chinese and international scientific journals, such as Nucleic Acids Res, PloS One, BBRC, DNA Cell Biol, and Nature etc.

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