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## Circulating 5' tRNA halves and Y RNA fragments are potential signaling molecules and biomarkers of diseases

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Small non-coding RNAs (sncRNAs) with known functions can undergo processing into smaller RNAs. Deep sequencing has made it possible to obtain highly detailed information on the types and abundance of sncRNAs in biological specimens, leading to the discovery that sncRNAs circulate in the blood. Circulating sncRNAs may serve as signaling molecules because of their ability to carry out a variety of cellular functions. Processed derivatives of tRNAs and Y RNAs circulating as components of larger complexes in the blood are described; these complexes are not in exosomes or microvesicles, but circulate as particles of 100-300 kDa. Y RNA fragments are dramatically more abundant in human than in mouse serum, possibly reflecting the much greater copy number of Y RNA genes and pseudogenes in humans. While the cells that produce circulating YRNA fragments are not yet known, circulating 5' tRNA halves may originate from blood cells and hematopoietic tissues, where they are detected at significant levels. The functions of circulating tRNA and Y RNA derivatives are not yet known; however, we found that serum levels of specific subtypes of 5' tRNA halves change markedly with age, and that these changes can be prevented by calorie restriction. We also found that specific subtypes of tRNA and YRNA fragments exhibit changes in abundance associated with clinicopathological characteristics of breast cancer. Although these findings do not establish causality, they suggest that circulating 5' tRNA halves and Y RNA fragments with known cellular functions may participate in breast cancer syndromes and have potential as circulating biomarkers. The findings make a case for a deeper investigation of the subject; larger studies with multiple types of cancer are needed to adequately evaluate their potential use for the development of noninvasive cancer screening.

### Biography

Dhahbi J M earned an M.D. at the University of Tunis in 1984, and a PhD in Genetics at the University of California, Riverside in 1998. He worked as a public health physician in Tunisia. In the USA, he worked as a senior scientist at several pharmaceutical companies and he was a CIRM Clinical Fellow, at Oakland Children's Hospital. Currently, as a Research Biochemist, at University of California Riverside, he is using deep sequencing to study the anti-aging and anti-cancer effects of calorie restriction. He focuses on circulating 5' tRNA halves and YRNA fragments; he is exploring the possibility that they can be markers of aging and its associated diseases, particularly cancer.

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