

Research in Translational Biotechnology **Jose William***

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Commentary

The research projects are focused on the molecular mechanisms involved within the maintenance of the integrity of the mammalian genome which play a central role in carcinogenesis and in evolution. The main structures needed for the upkeep of functional and structural chromosome integrity are centromeres and telomeres. Mammalian centromeres are typically associated to highly repetitive DNA (satellite DNA); this pattern of organisation hampered an in depth molecular analysis of centromeric chromatin.

Telomeres are nucleoproteic structures located at the termini of linear chromosomes. In mammals, telomeric DNA, consisting of the tandem repetition of the hexanucleotide TTAGGG, is sure to a multiproteic complex named shelterin. Telomeres protect chromosome ends from degradation and from fusion with other telomeres. It has been demonstrated that telomeric RNA transcription deregulation is deleterious for telomere metabolism and causes genome instability. Therefore, defects within the regulation of telomeric RNA expression may contribute to carcinogenesis and tumour progression. Interstitial telomeres contains repetitions of telomeric sequences located in internal chromosome sites. Our previous work demonstrated that, in mammals, interstitial telomeres are inserted, within the course of evolution, during telomerase mediated repair of double strand breaks or by the capture of double stranded telomeric DNA molecules. Ionizing radiations cause severe damages to the DNA helix, thanks to the formation of free radicals and to oxidative stress.

In the context of this research line, we use an interdisciplinary approach to spot new symbionts and to know their role within the biology of the hosts. The use of the RNA-seq methodology allows the evaluation of changes in organic phenomenon at the entire transcriptome level. In this line of research we investigate these changes in arthropods that are vectors of diseases of great medical interest, mosquitoes and ticks, during the course of the life cycle or in response to specific stimuli, like the presence of insecticide molecules. Climate and demographic change, the rise of trade, urbanization and human travel have facilitated the spread of invasive insect species of economic and sanitary importance.

Analysis of chemoreception: The genes and therefore the encoded proteins involved in insect-host and insect-insect interactions are being characterised. Specifically we are studying the genes and their encoded proteins that are involved within the perception.

Biochemical approaches to review saliva of the tiger mosquito: The mosquito females require a feed for egg development and, once they bite a private infected with an epidemic, they will acquire the pathogen. The mosquito saliva contains pharmacologically important proteins, with vasodilatory function, anticoagulants and anti-haemostatic activities that facilitate blood acquisition.