Platelets play a crucial role in the maintenance of hemostasis as well as in thrombosis and vessel occlusion that underlie stroke and acute coronary syndromes. Released into the blood stream from bone marrow megakaryocytes and having a circulating life of 8-10 days, platelets need to preserve and/or restore their content in order to maintain their functions. Unable to turn to gene transcription, anucleate platelets nevertheless contain a diversified messenger RNA (mRNA) transcriptome as well as rough endoplasmic reticulum and ribosomes that can mediate de novo protein biosynthesis, thereby raising the issue as to how platelet mRNAs are regulated.

One of the most important regulators of mRNAs are microRNAs. Encoded in our genome, this family of small, 19- to 24-nucleotide (nt) RNA species is generated by the ribonuclease III Dicer. MicroRNAs are known to guide Argonaute 2 effector ribonucleoprotein (RNP) complexes for the regulation of specific mRNAs through the recognition of binding sites usually located in their 3' untranslated region. MicroRNAs are predicted to regulate ~60% of the genes in humans, suggesting that every cellular processes may be under microRNA control in our body! MicroRNAs are thus expected to play a significant role in human health and disease.

We reported that human platelets harbor a diverse and particularly abundant array of microRNAs, as well as a functional microRNA pathway (Landry et al., 2009). Offering a new perspective to the control of gene expression in these anucleate elements of the cardiovascular system, our recent advances on platelet microRNAs will be discussed.