Title : **Understanding quadruplex formation by C-rich DNA sequences: the i-motif**		
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Research Area: Biophysics		
Methods: Steady-state and time-resolved spectroscopy (UV-absorbance, CD, Fluorescence), biochemical methods		

PhD track subject

Non-canonical nucleic acids structures have emerged during the last decades as critical factors to modulate DNA and RNA transactions. Among them, i-motifs (i-DNA) represent unusual, four-stranded DNA structures present in key regions of the genome. The dynamics of i-DNA structures may be relevant for mediating key biological processes. In this context, we wish to understand the rules that govern the formation of i-DNA, their pH dependency, thermodynamics and folding kinetics by a wealth of complementary techniques ranging from biochemical studies to ultrafast time-resolved spectroscopy.

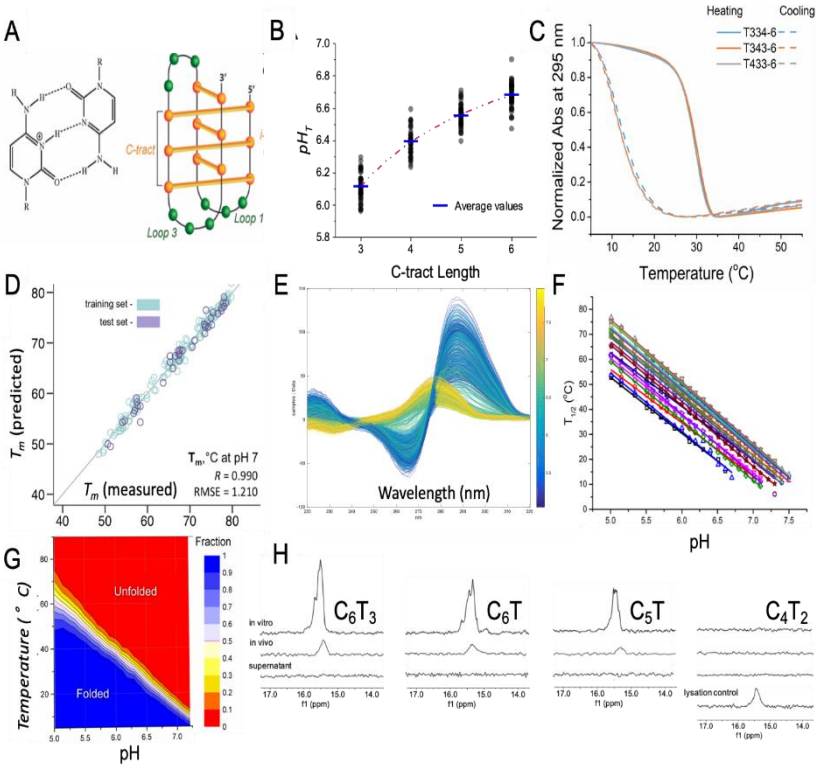

Figure 1: Analysis of i-DNA properties. (**A**) Cytosine-cytosine$^+$ (C:C$^+$) base pair (*left*) and schematic representation of an i-motif structure (*right*) (**B**) pH of mid-transition as function of C-track length. (**C**) Melting profiles at neutral pH for three different sequences: a hysteresis phenomenon is clearly visible. (**D**) Machine learning allows a reliable prediction of i-DNA stability. (**E**) Superimposition of 2500 CD spectra of various sequences at different pH. (**F**) Stability of i-DNA forming sequences as a function of pH for 20 different sequences. (**G**) Example of a phase diagram for an i-DNA forming sequence. (**H**) In cell and *in vitro* imino ^{1}H NMR spectra of four different C-rich motifs;

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