TRANSITION METAL COMPOUNDS AS TOOLS TO INTERFERE INTRACELLULAR CHEMISTRY

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Organometallic and coordination bonds have accessible energy dynamics that make them attractive tools to react with cellular components. Metal-mediated chemistry of organometallics can be activated or inhibited by the right choice of the metal and its surrounding ligands. In fact, the fine balance between reactivity and inertness gives metal complexes an extraordinary feature to be exploited in the crowded and complex intracellular environment.

I will be presenting half-sandwich complexes based on ruthenium, osmium, rhodium and iridium. Structurally, the complexes all present a tether ring capable of opening and closing, which by doing so it opens or closes a vacant position in the coordination sphere of the metal. This switch-like feature allows for a certain degree of control over metal reactivity –or inertness– inside the human cell.

Some of the complexes that will be presented stand amongst the most potent metal-based compounds to date against cancer cell survival. Using osmium as an example, I will show how we try to understand the molecular basis that drive intracellular reactivity. In addition, and mandatory to fully illustrate the reactivity fate of our metal-based tools, I will show an example (using iridium complexes this time) of how we try to blueprint the whereabouts of our metal-complexes inside the human cell.

Relevant publications

AC Carrasco, V Rodríguez-Fanjul, A Habtemariam, AM Pizarro. J. Med. Chem. 2020, 63, 4005-4021.

JJ Conesa, AC Carrasco, V Rodríguez-Fanjul, Y Yang, JL Carrascosa, P Cloetens, E Pereiro, AM Pizarro. Angew. Chem. Int. Ed. 2020, 59, 1270-1278.

S Infante-Tadeo, V Rodríguez-Fanjul, A Habtemariam, AM Pizarro. Chem. Sci. 2021, 12, 9287–9297.

S Infante-Tadeo, V Rodríguez-Fanjul, CC Vequi-Suplicy, AM Pizarro. Inorg. Chem. 2022, 61, 18970−18978.

Short Bio:

https://www.nanociencia.imdea.org/home-en/people/item/ana-maria-pizarro-arranz

Ana M. Pizarro completed a PhD in Chemistry at the Universidad Autónoma de Madrid in 2004 under the supervision of Prof. C. Navarro-Ranninger, working on trans-platinum cytotoxic compounds. She was awarded a Marie Curie Individual Fellowship (FP6-EIF) to work in the laboratory of Prof. P. J. Sadler FRS at the University of Edinburgh (UK) on new organometallic ruthenium-based organometallics.

She then moved to the University of Warwick (UK) where she focused on how selected metallodrugs (based on ruthenium, osmium and iridium) exert their anticancer effects in tumour cells. After almost a decade in the UK working in the Sadler group, in 2014 she joined IMDEA Nanociencia (Madrid) as a Ramón y Cajal Fellow. In 2015 she was awarded a Marie Curie Career Integration Grant by the EC (FP7-CIG). She is one of the ten guarantors of the Severo Ochoa Centre of Excellence awards at IMDEA Nanociencia (calls 2016 and 2020). She got tenure in April 2019.

Her main research interest lies in exploiting the extraordinary features of transition metal complexes inside the human cell to modulate its machinery: (i) at the molecular level, fully understanding metal-based chemistry inside the cell, (ii) at the organelle level, identifying chemistry confinement, and (iii) in a timeline.