Targeting DNA damage and autophagy as potential therapeutic approach for cancer and neurodegenerative diseases

Our group is focused on studying DNA damage and autophagy signaling in pathological context. We recently found a new connection between DNA damage and autophagy using 3D model systems for Breast Cancer (i.e. Mammopsheres and Acini).

The development of these 3D model system in our lab provides an important tool for early drug discovery, target identification and drug screening. In these models we are able to test new compounds for their anticancer activity.

Moreover, it is well known that autophagy dysregulation may contribute to several neurodegenerative disorders, and the rescue of autophagy defect has been proposed as a good therapeutic intervention for neurodegenerative diseases like Alzheimer’s and Parkinson’s disease.

We found that ATM kinase, a central player in DNA damage response, could be crucial in autophagy regulation upon DNA damage and oxidative stress induction. Interestingly, this kinase is lost and inactivated in a rare autosomic genetic disease, called Ataxia telangiectasia. The loss of the functionality of ATM-dependent DNA damage response has a well-established role in the pathogenesis of Ataxia Telangiectasia (AT). Conversely, the significance of the ability of ATM to act as modulator of autophagy in the development of this disease, is still largely obscure. One of the goals of our lab is to investigate the role of ATM-dependent autophagy in AT pathogenesis, supporting the great challenge of designing future targeted therapies for AT patients.

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