Current Research Interests:

Our team is mainly interested in the role of cell death in (i) development and tissue homeostasis, focusing on the immune system and (ii) the role of apoptosis as a barrier against malignant disease or autoimmunity.

Within these fields, we currently investigate the role of the BCL2 family in lymphocyte development and drug-resistance, e.g., to spindle-poisons, with an emphasis on the anti-apoptotic BCL2 family members A1/Bfl-1 and Mcl1 as well astheirantagonists of the BH3-only subgroup, includingBim and Noxa (Fig. 1).

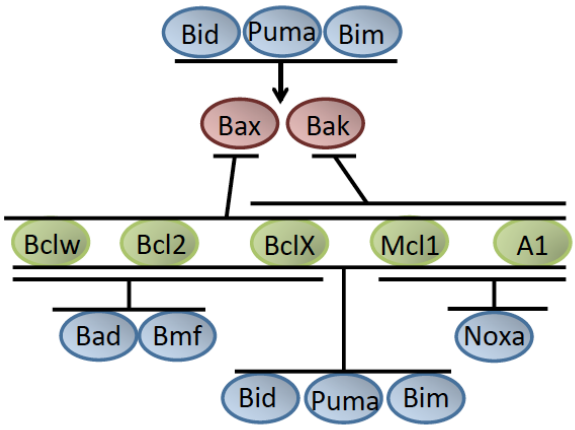

Fig. 1: The BCL2 family controls mitochondrial outer membrane integrity by an intricate interplay between pro- and anti-apoptotic proteins. Pro-survival proteins (green) prevent activation of Bax and Bak (pink), two redundant mediators of mitochondrial apoptosis, until they are neutralized by interaction with BH3-only proteins (blue). BH3-only proteins can get activated in response to a broad range of stress signals and some of them can activate Bax and Bak directly. Expression levels of these proteins are frequently altered in cancer and autoimmune diseases.See also: FEBS J. 2015 Jan 5.

Furthermore, in a different but related line of research, we currently explore the role of Caspase-2 in cell cycle control, senescence and malignant disease (Fig. 2).

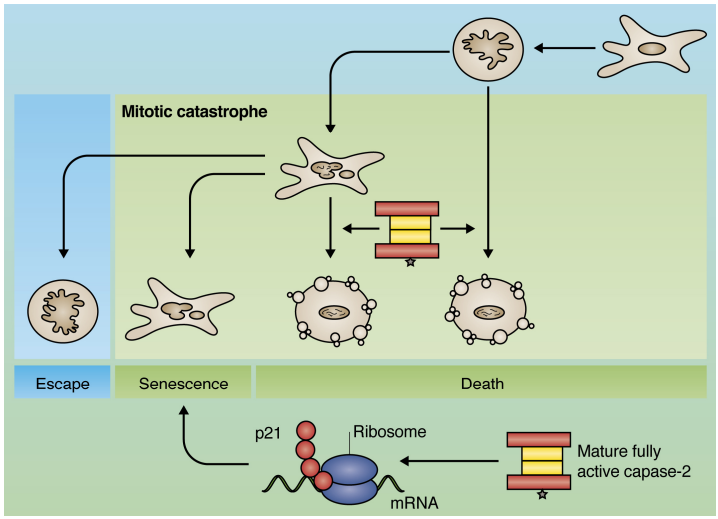

Fig. 2: Caspase-2 is a highly conserved but poorly understood endopeptidase, implicated in cell death in response to DNA damage (e.g. mitotic catastrophe), ROS production, metabolism and cell cycle control. Its mode of activation has been controversial and may under certain circumstances involve interaction with the scaffold protein RAIDD and its binding partner PIDD. Meanwhile, Caspase-2 has been established as a tumor suppressor and is as such unique within the Caspase family. In contrast to other members, specific substrates of Caspase-2 are rare. See also: J CellSci. 2012 Dec 15.

In order to address these topics experimentally, we usually employ a series of gene-modified mouse models, immunology-based assay systems and read outs, as well as cell biological approaches, including live-cell imaging, proteomics, RNAi-based assays as well as micro-array analyses or Next Generation Sequencing.