Kostas Tokatlidis received his BSc (Hons) in Chemical Engineering, from Thessaloniki and his PhD in from Delaware in 1993. He worked with Prof Dhurjati in collaboration with the Pasteur Institute on the formation of inclusion bodies in bacteria. He worked as a postdoc on protein folding and chaperones with Michel Goldberg at the Pasteur Institute, followed by a postdoc (1994-1998) in the Biozentrum, Basle Switzerland with Jeff Schatz on mitochondria biogenesis. He joined the University of Manchester UK (1999) as a Lister fellow and then moved to the IMBB in Crete (2003). He has attracted funds from the EU, charities and research councils, and has been honoured with prestigious fellowships and Awards (Fulbright, EMBO, HFSP, EU, Lister, MRC). In 2013 he was awarded the Royal Society Wolfson research merit award and was elected to EMBO membership for his contributions. Among his seminal discoveries are the process of oxidative folding in mitochondria, novel protein import components and mitochondrial targeting pathways. Kostas Tokatlidis holds the Cathcart Chair of Biochemistry at the University of Glasgow.

Protein Targeting and Oxidative Folding in Mitochondria

All cells need energy for their metabolism, survival, and development. Animal cells, including human cells, produce most of their energy by oxidative phosphorylation in mitochondria. These are semi-autonomous intracellular organelles with a double-membrane and have their own DNA. Protein import into mitochondria is fundamental for their biogenesis, since the mitochondrial DNA encodes only 13 of the more than one thousand mitochondrial proteins. Protein import is therefore critical for cell survival. The process of protein import relies on the operation of very elaborate multi-protein, nanoscale, mitochondrial assemblies that determine the efficient sorting of all proteins imported into mitochondria. Targeting to the intermembrane space relies on the Mia40 pathway that orchestrates oxidative folding of proteins in this mitochondrial compartment. We discovered this pathway and its key components. This is the only pathway that chemically modifies a transported protein. We will present the machinery of this pathway, its mechanism of action and how it cross-talks to redox signalling in cells. We will also discuss the ramifications of the links between mitochondria biogenesis and the cellular defence against oxidative stress, which is a hallmark of several age-related neurodegenerative diseases, cardiovascular dysfunction and cancer.