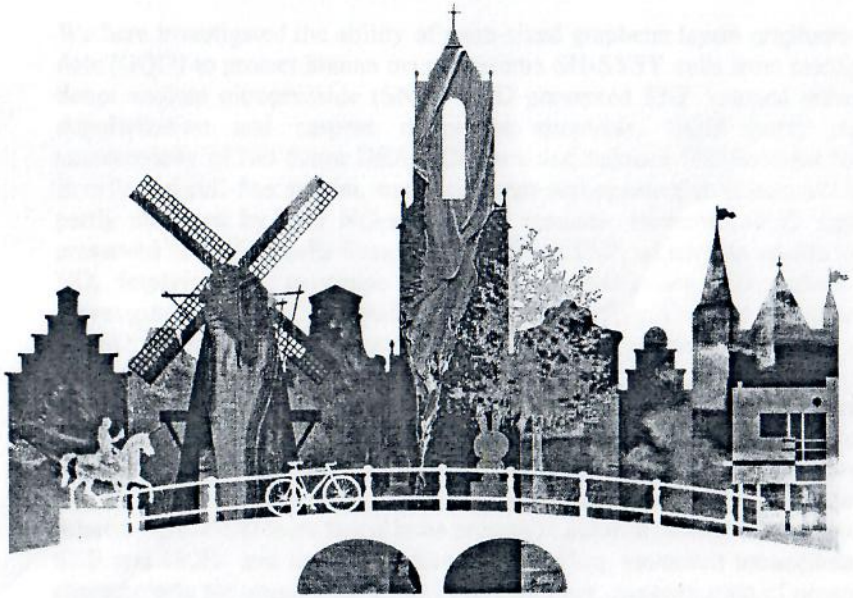
3rd Nordic Autophagy Society (NAS) Conference

Utrecht, May 22nd-24th 2019



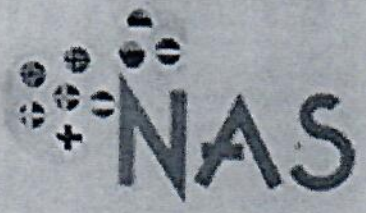
Venue: St. Bartholomeus Gasthuis, Lange Smeestraat 40, 3511 PZ Utrecht
(https://www.bartholomeusgasthuis.nl/)

Local organizers

Paul Coffer (University Medical Center Utrecht)
Muriel Mari (University Medical Center Groningen)
Fulvio Reggiori (University Medical Center Groningen)

Nordic Autophagy Society (NAS)

https://nordicautophagy.org/



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B1: Neuroprotective activity of GQD against SNP-induced toxicity are mediated by ROS/RNS scavenging and protective autophagy induction

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We here investigated the ability of nano-sized graphene layers graphene quantum dots (GQD) to protect human neuroblastoma SH-SY5Y cells from toxicity of NO donor sodium nitroprusside (SNP). GQD prevented SNP induced mitochondrial depolarization and caspase dependent apoptosis. GQD partly suppressed neurotoxicity of NO donor DEA-NONOate and reduced SNP induced NO release in cells and cell-free system, suggesting that neuroprotective effects of GQD were partly mediated by their NO-scavenging capacity. However, GQD significantly preserved SH-SY5Y cells from light exhausted SNP, which was unable to produce NO, implying the existence of protective mechanism independent of NO-scavenging. Unspecific antioxidants, as well as hydroxyl radical (•OH) scavengers DMSO, vitamin E and glutathione mimicked neuroprotective activity of GQD, while GQD diminished concentration of reactive oxygen species (ROS), especially •OH, in cells and cell culture medium, suggesting important role of •OH scavenging in neuroprotective activity of GQD. However, the ability of GQD to protect SH-SY5Y cells from SNP was not exclusively mediated by their ability to scavenge NO and ROS from medium, since it persisted after washing of GQD preincubated cells. Interestingly, GQD were found to be present in autophagosome-like vacuoles. Both SNP and GQD, and especially their combination, increased intracellular acidity characteristic for presence of autophagolysosomes, concentration of proautophagic protein beclin-1, while decreased level of specific substrate of autophagic proteolysis p62. Moreover, SNP and GQD, and above all their combination, increased concentration of autophagosome-associated protein LC3 II in the presence of inhibitor of autophagic proteolysis bafilomycin A1. Finally, autophagy inhibitors 3-methyladenine, wortmannin and NH4Cl prevented neuroprotective ability of GQD, implying that GQD stimulated prosurvival autophagy in SNP treated neurons. Therefore, by demonstrating ability of GQD to protect SH-SY5Y neurons from SNP induced apoptosis by scavening NO/ROS and stimulation of cytoprotective autophagy, our results suggest that GQD could be valuable candidate for treatment of neurodegenerative disorders.