

# [Editorial: sirtuinome rewiring to hijack cancer cell behavior and hamper resistan...](https://assignbuster.com/editorial-sirtuinome-rewiring-to-hijack-cancer-cell-behavior-and-hamper-resistance-to-anticancer-intervention/)

[](https://assignbuster.com/)[Health & Medicine](https://assignbuster.com/essay-subjects/health-n-medicine/)

Editorial on the Research Topic   
Sirtuinome Rewiring to Hijack Cancer Cell Behavior and Hamper Resistance to Anticancer Intervention

Extensive reprogramming of energy metabolism and detoxification processes are increasingly seen as critical factors involved in metastatic progression and in development of chemo- and radio-resistance ( [1](#B1) – [3](#B3) ). Mammal sirtuins (SIRT1-7) are a family of conserved NAD + -dependent protein deac(et)ylases and/or mono-[ADP-ribosyl]transferases with varied cellular distribution. Their role as epigenetic players and crucial regulators of energy metabolism and adaptation to cellular stress is currently under extensive investigation worldwide, not only in physiological processes (e. g., in aging) but also in the pathogenesis of cardiovascular and neurodegenerative diseases, diabetes and cancer ( [1](#B1) , [2](#B2) , [4](#B4) – [6](#B6) ). In particular, sirtuin-dependent signaling is suspected to play a dual role in cell biology, on one hand protecting DNA from genomic instability and limiting the replicative potential, on the other hand inhibiting senescence and promoting survival and growth advantage ( [7](#B7) ). Interestingly, SIRT3-5 localize to mitochondria and regulate targets involved in diverse biomolecular pathways, including energy metabolism and apoptotic death ( [8](#B8) – [11](#B11) ). Such characteristics confer a great importance to sirtuins, in terms of preventive medicine and therapeutic potential in anticancer strategies.

Unfortunately, despite the broad interest in this field, results currently available are still insufficient to draw definitive conclusions about the role of the sirtuinome in the regulation of key aspects of tumor cell biology, as well as of the interactions between cancer cells and the surrounding environment. More importantly, the key question as to whether sirtuins can be considered as tumor suppressors or oncogenic proteins remains unanswered.

In this Research Topic we collected original studies (mini)review and perspective articles that were focused on the SIRT-dependent mechanisms that underlie various tumor- and cancer-related processes, both at cellular and tissue level.

Solid tumors are often accompanied by neo-vascularization that is needed to create a highly integrated micro-ecosystem aimed at limiting both hypoxic stress and build-up of toxic tumor metabolites. As reviewed by Edatt et al. , sirtuins seem to play an important role in the regulation of the functional cross-talk between pro-angiogenic and anti-angiogenic signaling surrounding neoplasms. This is achieved by controlling proliferation and migration of endothelial cells, as well as through the direct or indirect modulation of the activity of eNOS, p53, HIF-1α, FOXO, Notch, VEGF, and other factors that are essential to vascular function and organization. The authors also provided evidence of the involvement of several key miRNAs in such a regulation. Edatt et al. gave also interesting details of the crucial cross-talk between pro-inflammatory signaling and pro-angiogenic pathways controlled by sirtuins in the tumor milieu, linking SIRT-dependent changes in NFκB signal transduction to interleukin release. The authors concluded that despite some apparent contradicting angiogenic roles seemingly played by sirtuins in tumors, the SIRT-dependent epigenetic regulation of vascular remodeling is increasingly considered as a promising therapeutic target to limit or prevent tumor angiogenesis.

2. Carafa V, Altucci L, Nebbioso A. Dual tumor suppressor and tumor promoter action of sirtuins in determining malignant phenotype. *Front Pharmacol.* (2019) 10: 38. doi: 10. 3389/fphar. 2019. 00038

3. Falone S, Santini S, Cordone V, Cesare P, Bonfigli A, Grannonico M, et al. Power frequency magnetic field promotes a more malignant phenotype in neuroblastoma cells via redox-related mechanisms. *Sci Rep.* (2017) 7: 11470. doi: 10. 1038/s41598-017-11869-8

4. Lautrup S, Sinclair DA, Mattson MP, Fang EF. NAD + in brain aging and neurodegenerative disorders. *Cell Metab.* (2019) 30: 630–55. doi: 10. 1016/j. cmet. 2019. 09. 001

5. Kitada M, Ogura Y, Monno I, Koya D. Sirtuins and Type 2 diabetes: role in inflammation, oxidative stress, and mitochondrial function. *Front Endocrinol.* (2019) 10: 187. doi: 10. 3389/fendo. 2019. 00187

6. Ma S, Fan L, Cao F. Combating cellular senescence by sirtuins: implications for atherosclerosis. *Biochim Biophys Acta Mol Basis Dis.* (2019) 1865: 1822–30. doi: 10. 1016/j. bbadis. 2018. 06. 011

7. Bosch-Presegué L, Vaquero A. The dual role of sirtuins in cancer. *Genes Cancer.* (2011) 2: 648–62. doi: 10. 1177/1947601911417862

8. Parihar P, Solanki I, Mansuri ML, Parihar MS. Mitochondrial sirtuins: emerging roles in metabolic regulations, energy homeostasis and diseases. *Exp Gerontol.* (2015) 61: 130–41. doi: 10. 1016/j. exger. 2014. 12. 004

9. Liu Y, Liu Y-L, Cheng W, Yin X-M, Jiang B. The expression of SIRT3 in primary hepatocellular carcinoma and the mechanism of its tumor suppressing effects. *Eur Rev Med Pharmacol Sci.* (2017) 21: 978–98.

10. Chen Z, Lin J, Feng S, Chen X, Huang H, Wang C, Yu Y, He Y, Han S, Zheng L, et al. SIRT4 inhibits the proliferation, migration, and invasion abilities of thyroid cancer cells by inhibiting glutamine metabolism. *OncoTargets Ther.* (2019) 12: 2397–408. doi: 10. 2147/OTT. S189536

11. Zhang R, Wang C, Tian Y, Yao Y, Mao J, Wang H, et al. SIRT5 promotes hepatocellular carcinoma progression by regulating mitochondrial apoptosis. *J Cancer.* (2019) 10: 3871–82. doi: 10. 7150/jca. 31266