

NLRP3 inflammasome regulatory mechanisms, role in health and disease, and therapeutic potential

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The NLRP3 inflammasome is a multi-protein complex composed of NLRP3, ASC and caspase-1, controlling protease caspase-1 activity and the maturation and release of cytokine IL-1 β and IL-18. Aberrant activation of the NLRP3 inflammasome promotes the pathogenesis of inflammatory diseases, including COVID-19, chronic kidney disease, type II diabetes, atherosclerosis, neurodegenerative diseases, inflammatory bowel disease, gout, rheumatoid arthritis, cancers and infectious disease. The importance of the NLRP3 inflammasome has attracted the interest of researchers and biotech companies. Increasing evidences show that the NLRP3 inflammasome is a promising therapeutic target in many diseases. Inhibition of NLRP3 inflammasome did not dampen broader immune responses needed to fight infection, because the host defense ability can be covered by other inflammasomes, offering a more practical, more effective and safer therapy. Development of NLRP3 inhibitors becomes an important topic of pharmaceutical industry, and “Inflammasome Science” has been selected as one of the top five biopharma events of 2020. Although no NLRP3-targeting drugs have hit the market yet, various companies are taking a wide range of strategies to tackle NLRP3 inflammasome. In this talk I will introduce the pathogenic roles of the NLRP3 inflammasome, and share the experiences in discovery the NLRP3 inflammasome inhibitors using disease-specific drug screening platform targeting the NLRP3 inflammasome.

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