MTOR a inhibitory mTOR

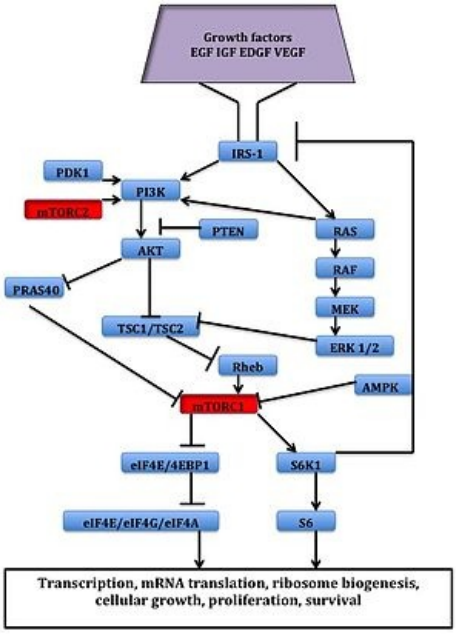
mTOR (mammalian target of rapamycin) is one of the important proteins of the signaling cascade. It is a serine/threonine kinase that is composed of 2549 amino acids, which corresponds to 289 kDa. In mammals, this protein occurs as **mTORC1** (mTOR complex 1) and as **mTORC2** (mTOR complex 2).

Function

mTOR, for example, is used in **cell growth and cell survival**, influences **metabolic pathways** (e.g. for insulin) and, last but not least, molecules used in signal propagation in the cell (growth factors, hormones). Functionally, it is part of the **phosphatidylinositol 3-kinase** (PI3K) family of enzymes due to its homologous C-terminus as that of PI3K. It is thus closely connected with the **PI3K-AKT** and the **Ras-ERK** pathways. It regulates translation initiation factor 4G (or eIF4G) as well as ribosomal 40S S6 kinase (S6K1/S6K2). Disorders of this protein are thought to be associated with diabetes mellitus and various types of cancer.

mTOR inhibitors

The best-known representative is **rapamycin** (**sirolism**), which was originally administered as an immunosuppressant used after transplants, but is now indicated especially for **kidney cancers** or metastatic breast tumors. Chemically, it is a low-molecular macrolide antibiotic produced by bacteria of the genus Streptomyces. Other representatives include **everolimus** and **temsirolimus**. The most common indication for the use of mTOR inhibitors is various types of cancer (that is, they serve as ***cytostatics***), but the effect of these molecules on certain neurodegenerative diseases is also being intensively investigated.



mTOR signal pathway

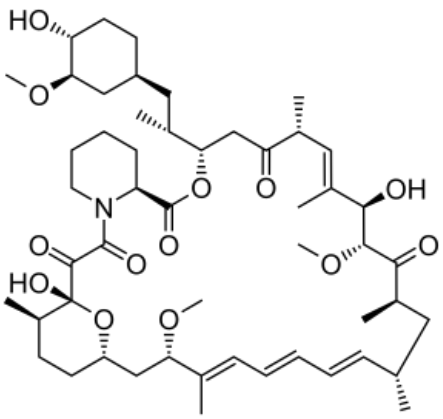
Mechanism of action of mTOR inhibitors

By inhibiting mTOR, the synthesis of **cyclin D** is limited (the cell is stopped in the G1 phase cell cycle) and **HIF-1a** (as a result, VEGF is not expressed, which would induce neoangiogenesis).

Links

Related Articles

- Cytostatics
- Antitumor therapy
- Cell Signaling



Sirolimus

Zdroje

JIŘINA, Martínková a Kolektiv. *Farmakologie - pro studenty zdravotnických oborů, 2., zcela přepracované a doplněné vydání.* - edition. Grada Publishing a.s., 2018. 520 pp. ISBN 9788027109296.

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