Sirolimus

Sirolimus, also known as rapamycin, is an immunosuppressant that primarily works as an mTOR inhibitor. It inhibits T-cell activation and B-cell differentiation. Sirolimus is typically used in drug eluting stents to reduce stenosis and for kidney transplant rejection prophylaxis. Notable side effects include pancytopenia, insulin resistance, and hyperlipidemia.



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Mechanism

mTOR Inhibitor

M-Tornado with Inhibiting-chains

Sirolimus is an mTOR inhibitor. It binds to FK506 binding protein (FKBP) which leads to the inhibition of mTOR kinase. mTOR is mechanistic / mammalian target of rapamycin.

Inhibits T-cell Activation

Tennis-ball Activated with Inhibiting-chains

Sirolimus functions as a proliferation signal inhibitor by targeting the mTOR signaling pathway, an important stimulator of cell growth and proliferation. Sirolimus binds to FKBP, forming a complex that inhibits mTOR. This leads to interruption of IL-2 signal transduction, which decreases T-cell activation.

Inhibits B-cell Differentiation

Different Basketballs with Inhibiting-chains

By inhibiting the mTOR signaling pathway, Sirolimus leads to interruption of IL-2 signal transduction, preventing G1 to S phase progression and B cell differentiation. Inhibition of B-cell differentiation leads to decreased production of IgM, IgG, and IgA antibodies.

Indications

Drug Eluting Stents

Stent-tube with Med-bottles

Sirolimus is used in drug-eluting stents which decreases restenosis but increases thrombosis risk.

Kidney Transplant Rejection Prophylaxis

Kidney on Train-plant with Purple-axes

Sirolimus is used in kidney transplant patients to prevent rejection. As rejection is an autoimmune process that is often mediated by T cells, their inhibition by sirolimus decreases the incidence of rejection.

Side Effects

Pancytopenia

Pan-side-toe-peanut

Sirolimus can cause pancytopenia, which is a decrease in the number of all blood cell types (white blood cells, red blood cells, and platelets).

Insulin Resistance

Insect-syringe swatted by Resistance

Chronic use of sirolimus can cause insulin resistance.

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Hyperlipidemia

Hiker-lips

Sirolimus can lead to hyperlipidemia and an increased risk of cardiovascular disease.

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