Azathioprine (Imuran)

Azathioprine, which is abbreviated AZA, is an immunosuppressant medication used in organ transplantation and to treat autoimmune disorders. This drug works as a prodrug, or precursor, to 6-mercaptopurine, which interferes with nucleic acid and DNA synthesis. It strongly affects proliferating cells, such as the T cells and B cells, leading to myelosuppresion in patients. Furthermore, this drug is metbolized by xanthine oxidase. Thus, patients taking allopurinol (which inhibits xanthine oxidase) should reduce their AZA dosage. Patients with IBD taking this medication also run the risk of developing acute pancreatitis.



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Mechanism

Antimetabolite

Anti-metal-ball

AZA, azathioprine, is an antimetabolite, meaning it's a substance that competes with, replaces, or inhibits a specific metabolite of a cell and thereby interferes with the cell’s normal metabolic functioning. Antimetabolites can be used in cancer treatment, as they interfere with cell division and the growth of tumors. Because cancer cells spend more time dividing than other cells, inhibiting cell division harms tumor cells more than other cells.

Prodrug of 6-mercaptopurine (6-MP)

6-shooter American-captain

Azathioprine (AZA) is a prodrug that is quickly converted to 6-mercaptopurine (6-MP). This conversion occurs via a nonenzymatic nucleophilic attack by compounds found in red blood cells and other tissues. 6-MP is the active form of this medication and is a thiopurine that works to interfere with DNA synthesis.

Inhibits Synthesis of Nucleic Acids

Inhibiting-chains on Nuclear Acidic-lemon Factory

AZA is converted to 6-MP, which inhibits purine nucleotide synthesis and metabolism. By inhibiting purine synthesis, the structure and functions of RNA and DNA are altered.

Indications

Autoimmune Disorders

Auto-in-moon

Azathioprine (AZA) is used for various autoimmune disorders, including rheumatoid arthritis, Crohn's disease, and SLE. Other autoimmune disorder indications include glomerulonephritis, ulcerative colitis, myasthenia gravis, and multiple sclerosis.

Kidney Transplantation

Kidney Train-plant

AZA, which has the trade name Imuran, is FDA-approved for preventing rejection after kidney transplantation. Off-label use of this drug includes preventing rejection after a liver transplant.

Side Effects

Myelosuppression

Suppressed Red and White-blood-cells

Severe bone marrow suppression can occur as a side effect of this drug. Severe leukopenia, thrombocytopenia, anemias including macrocytic anemia, and pancytopenia may be seen in patients taking AZA.

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Increased Toxicity with Allopurinol Use

Up-arrow Toxins with Aloe-piranha

Azathioprine displays increased toxicity when combined with the gout medication allopurinol. This increase is because azathioprine is metabolized by the enzyme xanthine oxidase. This enzyme, however, is inhibited by allopurinol (a gout medication). Thus, taking both medications should be avoided when possible, and if this can't be circumvented, AZA doses should be reduced by 25%, and patients require regular blood labs.

Pancreatitis

Pancreas-on-fire

A small percentage of patients taking AZA are at risk for developing pancreatitis, and this side effect is associated with patients with Crohn's disease.

Malignancy

Malignant-man

Patients receiving this immunosuppressant are at increased risk of developing lymphoma and other malignancies, particularly of the skin. There have been reported cases of post-transplant lymphoma and hepatosplenic T-cell lymphoma (HSTCL) in patients. Thus, physicians should inform patients of the risk of malignancy while taking azathioprine or Imuran.

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