Pim kinases are serine/threonine kinases that play a significant role in cell cycle progression and apoptosis. There are two isoforms of Pim kinase: Pim-1 and Pim-2. Both kinases are expressed in lymphoid cells and are necessary for cytokine-dependent proliferation\(^1\).

Most current research has examined the structure and function of Pim-1, although both are potentially involved in tumorigenesis. Pim-1 activates cell cycle regulator Cdc25, stimulating cell cycle progression. As a result, it may induce unregulated cell growth. Single nucleotide polymorphisms in the gene that encodes Pim-1 have been associated with the presence of diffuse large cell lymphoma and increased risk of lung cancer. Because of its role in cell division, inhibition of Pim-1 shows activity in the treatment of various cancers\(^2\).

AZD-1208 (A9708) is a Pim-1 inhibitor that induces cell cycle arrest and apoptosis in leukemia cells and inhibits phosphorylation of downstream targets such as Bcl-2, 4EBP1, p70S6K, and S6\(^3\).

SMI-4a (S4932) is another inhibitor of Pim-1. SMI-4a limits phosphorylation of eIF4B, suppresses tumor growth, and induces cell cycle arrest and apoptosis in myeloid and lymphoid cells\(^4\).

Proteasome inhibitor MLN-2238 (M4455) modulates expression of tumor suppressor miR33b and downregulates Pim-1 activity in multiple myeloma cells\(^5\).

Mitoxantrone Dihydrochloride (M3379) is a DNA intercalator used to treat multiple sclerosis, lymphomas, and leukemias. Research shows it likely derives some activity from the direct inhibition of Pim-1\(^6\).

References: