NAME OF THE MEDICINE:

ALLMERCAP oral suspension contains 20 mg/mL mercaptopurine.

The chemical name (CAS) of mercaptopurine is 6H-Purine-6-thione, 1,7-dihydro-, monohydrate, it has a relative molecular mass of 170.2, its molecular formula is C₅H₄N₄S⋅H₂O, CAS No.: 6112-76-1 (monohydrate) and the chemical structure is:

![Chemical structure of mercaptopurine]

DESCRIPTION:

Mercaptopurine is odourless or practically odourless, yellow crystalline powder, with a solubility of 0.26 mg/mL in water at 37°C. ALLMERCAP is a pink/brown oral liquid suspension.

ALLMERCAP oral suspension also contains the following inactive ingredients: xanthan gum, aspartame, rubus idaeus (raspberry juice), sodium methyl hydroxybenzoate, sodium ethyl hydroxybenzoate, potassium sorbate, sodium hydroxide, and water.

PHARMACOLOGY:

Mercaptopurine is an analogue of adenine, one of the bases required for nucleic acid biosynthesis, and of the purine base hypoxanthine. Hence mercaptopurine acts as an antimetabolite and interferes with the synthesis of nucleic acids in proliferating cells. Its metabolites are also pharmacologically active.

Pharmacokinetics:

Absorption of an oral tablet dose of mercaptopurine is incomplete and variable averaging about 50% of the administered dose. The half-life of mercaptopurine in the circulation is of the order of 90 minutes. It is extensively metabolised and excreted via the kidneys and the active metabolites have a longer half-life than the parent drug. Mercaptopurine has pKa's of 7.7 and 11.

In a study of healthy adult volunteers given a single dose of ALLMERCAP oral suspension, the mean Cmax was found to be 86.6 ng/mL at 45 minutes. The mean AUC0-t was found to be 121.6 ng/mL.h.

Comparison of the oral tablet and oral suspension shows the AUC to be 14% (90%CI 8, 21) and Cmax to be 39% (90%CI 22, 58) higher with the oral suspension.

INDICATIONS:

ALLMERCAP oral suspension is indicated for:

Treatment of Acute Lymphoblastic Leukaemia (ALL) in paediatric patients.
CONTRAINDICATIONS:
Hypersensitivity to any component of the preparation.

In view of the seriousness of the indications there are no other absolute contraindications.

PRECAUTIONS:

MERCAPTOPURINE IS AN ACTIVE CYTOTOXIC AGENT FOR USE ONLY UNDER THE DIRECTION OF PHYSICIANS EXPERIENCED IN THE ADMINISTRATION OF SUCH AGENTS.

Immunisation using a live organism vaccine has the potential to cause infection in immunocompromised hosts. Therefore, immunisations with live organism vaccines are not recommended.

Co-administration of ribavirin and mercaptopurine is not advised. Ribavirin may reduce efficacy and increase toxicity of mercaptopurine (see INTERACTIONS WITH OTHER MEDICINES).

The handling of ALLMERCAP oral suspension should follow standard guidelines for the handling and disposal of cytotoxic drugs.

As with all cytotoxic chemotherapy, adequate contraceptive precautions should be advised if either partner is receiving ALLMERCAP oral suspension.

Monitoring: Since mercaptopurine is strongly myelosuppressive, full blood counts must be monitored daily during remission induction. Patients must be carefully monitored during therapy.

Treatment with mercaptopurine causes bone marrow suppression leading to leucopenia and thrombocytopenia, and less frequently anaemia. Full blood counts must be taken daily during remission induction and careful monitoring of haematological parameters should be conducted during maintenance therapy. The 6-mecaptopurine oral suspension and tablet are not bioequivalent with respect to peak plasma concentration, and therefore intensified haematological monitoring of the patient is advised on switching formulations.

The leucocyte and platelet counts continue to fall after treatment is stopped, so at the first sign of abnormally large fall in the counts, treatment should be interrupted immediately.

Bone marrow suppression is reversible if mercaptopurine is withdrawn early enough.

During remission induction in acute myelogenous leukaemia the patient may frequently have to survive a period of relative bone marrow aplasia and it is important that adequate supportive facilities are available.

Mercaptopurine is hepatotoxic and liver function tests should be monitored weekly during treatment. More frequent monitoring may be advisable in those with pre-existing liver disease or receiving other potentially hepatotoxic therapy. The patient should be instructed to discontinue mercaptopurine immediately if jaundice becomes apparent.

During remission induction when rapid cell lysis is occurring, uric acid levels in blood and urine should be monitored as hyperuricaemia and/or hyperuricosuria may develop, with the risk of uric acid nephropathy.

There are individuals with an inherited deficiency of the enzyme thiopurine methyltransferase (TPMT) who may be unusually sensitive to the myelosuppressive effect of mercaptopurine and prone to developing rapid bone marrow depression following the initiation of treatment with mercaptopurine. This problem could be exacerbated by coadministration with drugs that inhibit TPMT, such as olsalazine, mesalazine or sulphasalazine. Also a possible association between decreased TPMT activity and secondary leukaemias and myelodysplasia has been reported in individuals receiving mercaptopurine in combination with other cytotoxics (see ADVERSE EFFECTS). Some laboratories offer testing for TPMT deficiency, although these tests have not been shown to identify all patients at risk of severe toxicity. Therefore close monitoring of blood counts is still necessary.

Cross resistance usually exists between mercaptopurine and 6-thioguanine (Lanvis).

The dosage of mercaptopurine may need to be reduced when this agent is combined with other drugs whose primary or secondary toxicity is myelosuppression (see INTERACTIONS WITH OTHER MEDICINES: Myelosuppressive agents).
Renal and/or hepatic impairment
Caution is advised during the administration of mercaptopurine in patients with renal impairment and/or hepatic impairment. Consideration should be given to reducing the dosage in these patients and haematological response should be carefully monitored (see DOSAGE AND ADMINISTRATION).

Carcinogenesis, mutagenesis, impairment of fertility
Mercaptopurine in common with other anti-metabolites is potentially mutagenic and chromosome damage has been reported in rats and humans.

Mercaptopurine causes embryolethality and severe teratogenic effects in mice, rats, hamsters and rabbits at doses that are non-toxic to the mother. In all species, the degree of embryotoxicity and type of malformations is dependent on the dose and the stage of gestation at the time of administration.

Patients receiving immunosuppressive therapy, including mercaptopurine, are at an increased risk of developing lymphoproliferative disorders and other malignancies, notably skin cancers (melanoma and non-melanoma), sarcomas (Kaposi’s and non-Kaposi’s) and uterine cervical cancer in situ. The increased risk appears to be related to the degree and duration of immunosuppression. It has been reported that discontinuation of immunosuppression may provide partial regression of the lymphoproliferative disorder.

A treatment regimen containing multiple immunosuppressants (including thiopurines) should therefore be used with caution as this could lead to lymphoproliferative disorders, some with reported fatalities. A combination of multiple immunosuppressants, given concomitantly increases the risk of Epstein-Barr virus (EBV)-associated lymphoproliferative disorders.

Increases in chromosomal aberrations were observed in the peripheral lymphocytes of leukaemic patients and in a hypernephroma patient who received an unstated dose of mercaptopurine and in patients with chronic renal disease treated at doses of 0.4-1.0 mg/kg/day.

In view of its action on cellular deoxyribonucleic acid (DNA), mercaptopurine is potentially carcinogenic and consideration should be given to the theoretical risk of carcinogenesis with this treatment. Three cases have been documented of the occurrence of acute nonlymphatic leukaemia in patients who received mercaptopurine for non-neoplastic disorders.

A patient with Hodgkin’s disease treated with mercaptopurine and multiple additional cytotoxic agents developed acute myelogenous leukaemia.

Twelve and a half years after mercaptopurine treatment for myasthenia gravis, a female patient developed chronic myeloid leukaemia.

Reports of hepatosplenic T-cell lymphoma in the inflammatory bowel disease population (this is an unregistered indication) have been received when azathioprine (the prodrug to mercaptopurine) or mercaptopurine is used either with or without concomitant treatment with anti-TNF alpha antibody. This rare type of T cell lymphoma has an aggressive disease course and is usually fatal (see ADVERSE EFFECTS).

Use in Pregnancy: (Category D)
Substantial transplacental and transamniotic transmission of mercaptopurine and its metabolites from the mother to the foetus have been shown to occur.

As with all cytotoxic chemotherapy, adequate contraceptive precautions should be advised if either partner is receiving ALLMERCAP oral suspension.

Mercaptopurine has been shown to be embryotoxic in rats at doses that are not toxic to the mother. It has also been proven to be embryolethal when administered at higher doses in the first half of the gestation period. The potential risk for humans is largely unknown.

Maternal exposure: Normal offspring have been born after mercaptopurine therapy administered as a single chemotherapy agent during human pregnancy, particularly when given prior to conception or after the first trimester.

Abortions and prematurity have been reported after maternal exposure. Multiple congenital abnormalities have been reported following maternal mercaptopurine treatment in combination with other chemotherapy agents.
**Paternal exposure:** Congenital abnormalities and spontaneous abortions have been reported after paternal exposure to mercaptopurine.

A leukaemia patient treated with mercaptopurine 100 mg/day (plus splenic irradiation) throughout pregnancy gave birth to a normal, premature baby. A second baby, born to the same mother who was treated as before, together with busulfan 4 mg/day, had multiple severe abnormalities, including corneal opacities, microphthalmia, cleft palate and hypoplasia of the thyroid and ovaries. The use of mercaptopurine should be avoided whenever possible during pregnancy, particularly during the first trimester. In any individual case the potential hazard to the foetus must be balanced against the expected benefit to the mother.

Transient profound oligospermia was observed in a young man who received mercaptopurine 150 mg/day plus prednisone 80 mg/day for acute leukaemia. Two years after cessation of the chemotherapy he had a normal sperm count and fathered a normal child.

**Use in Lactation:** Mercaptopurine has been detected in the breast milk of renal transplant patients receiving immunosuppressive therapy with azathioprine, a pro-drug of mercaptopurine and thus mothers receiving mercaptopurine should not breast feed.

**Macrophage activation syndrome**

ALLMERCAP is only indicated for treatment of ALL in paediatric patients.

Macrophage activation syndrome (MAS) is a known, life-threatening disorder that may develop in patients with autoimmune conditions, in particular with inflammatory bowel disease (IBD) (unlicensed indication), and there could potentially be an increased susceptibility for developing the condition with the use of mercaptopurine. If MAS occurs, or is suspected, evaluation and treatment should be started as early as possible, and treatment with mercaptopurine should be discontinued. Physicians should be attentive to symptoms of infection such as EBV and cytomegalovirus (CMV), as these are known triggers for MAS.

**INTERACTIONS WITH OTHER MEDICINES:**

Vaccinations with live organism vaccines are not recommended in immunocompromised individuals (see PRECAUTIONS).

**Effect of concomitant drugs on mercaptopurine**

**Ribavirin**

Ribavirin inhibits the enzyme, inosine monophosphate dehydrogenase (IMPDH), leading to a lower production of the active 6-thioguanine nucleotides. Severe myelosuppression has been reported following concomitant administration of a pro-drug of mercaptopurine and ribavirin; therefore concomitant administration of ribavirin and mercaptopurine is not advised (see PRECAUTIONS).

**Myelosuppressive agents**

When mercaptopurine is combined with other myelosuppressive agents, caution should be used; dose reductions may be needed based on haematological monitoring (see PRECAUTIONS).

**Allopurinol/oxipurinol/thiopurinol**

Xanthine oxidase activity is inhibited by allopurinol, oxipurinol and thiopurinol, which results in reduced conversion of biologically active 6-thioinosinic acid to biologically inactive 6-thiouric acid.

When allopurinol, oxipurinol and/or thiopurinol and mercaptopurine are administered concomitantly it is essential that only a 25% of the usual dose of mercaptopurine is given (see DOSAGE AND ADMINISTRATION) since allopurinol decreases the rate of catabolism of mercaptopurine.

**Aminosalicylates**

There is *in vitro* and *in vivo* evidence that aminosalicylate derivatives (e.g. olsalazine, mesalazine or sulphasalazine) inhibit the TPMT enzyme. Therefore, lower doses of mercaptopurine may need to be considered when administered concomitantly with aminosalicylate derivatives (see PRECAUTIONS).

Following unregulated consumption of salicylates, sulphonamides or undefined tranquillisers by patients receiving mercaptopurine therapy, a slower onset of pancytopenia has been documented.
Effect of mercaptopurine on other drugs

Anticoagulants
Inhibition of the anticoagulant effect of warfarin and acenocoumarol has been reported when co-administered with mercaptopurine; therefore higher doses of the anticoagulant may be needed. It is recommended that coagulation tests are closely monitored when anticoagulants are concurrently administered with mercaptopurine.

Other forms of interaction
The administration of mercaptopurine with food may decrease systemic exposure slightly but this is unlikely to be of clinical significance. Therefore, ALLMERCAP may be taken with food or on an empty stomach, but patients should standardise the method of administration. The dose should not be taken with milk or dairy products since they contain xanthine oxidase, an enzyme which metabolises mercaptopurine and might therefore lead to reduced plasma concentrations of mercaptopurine.

ADVERSE EFFECTS:
The following convention has been utilised for the classification of undesirable effects: very common (≥1/10), common (≥1/100 and <1/10), uncommon (≥1/1000 and <1/100), rare (≥1/10,000 and <1/1000), very rare (<1/10,000).

Neoplasms benign, malignant and unspecified (including cysts and polyps)
Rare: neoplasms including lymphoproliferative disorders, skin cancers (melanomas and non-melanomas), sarcomas (Kaposi’s and non-Kaposi’s) and uterine cervical cancer in situ.
Very rare: secondary leukaemia and myelodysplasia
Frequency Unknown: hepatosplenic T-cell lymphoma in patients with inflammatory bowel disease (an unlicensed indication) when used in combination with or without concomitant anti-TNF alpha antibody has been reported (see PRECAUTIONS).

Blood and lymphatic system disorders
Very common: bone marrow suppression; leucopenia and thrombocytopenia. The main side effect of treatment with mercaptopurine is bone marrow suppression leading to leucopenia and thrombocytopenia.
Common: anaemia

Immune system disorders
Hypersensitivity reactions with the following manifestations have been reported.
Uncommon: arthralgia; skin rash; drug fever
Rare: facial oedema

Metabolism and nutrition disorders
Common: anorexia
Frequency Unknown: hypoglycaemia

Gastrointestinal disorders
Common: nausea; vomiting; pancreatitis in the IBD population (an unlicensed indication); stomatitis and diarrhoea
Uncommon: pancreatitis (in the licensed indication); oral ulceration
Rare: intestinal ulceration

Hepatobiliary disorders
Common: biliary stasis; hepatotoxicity
Uncommon: hepatic necrosis

Mercaptopurine is hepatotoxic in animals and humans. The histological findings in humans have shown hepatic necrosis and biliary stasis.

The incidence of hepatotoxicity varies considerably and can occur with any dose, but more frequently when the recommended dose of 2.5 mg/kg bodyweight daily is exceeded.

Monitoring of liver function tests may allow early detection of liver toxicity. This is usually reversible if mercaptopurine therapy is stopped soon enough. However, irreversible liver damage leading to a fatal outcome has occurred.
Skin and subcutaneous tissue disorders
Rare: alopecia
Frequency Unknown: photosensitivity reaction

Reproductive system and breast disorders
Rare: transient oligospermia.

DOSAGE AND ADMINISTRATION:
ALLMERCAP is only indicated for use in children. For children the usual dose is 2.5 mg/kg bodyweight/day, but the dose and duration of administration depend on the nature and dosage of other cytotoxic agents given in conjunction with mercaptopurine. The dosage should be carefully adjusted to suit the individual patient.

Mercaptopurine has been used in various combination therapy schedules for acute leukaemia and the literature should be consulted for details.

When allopurinol and mercaptopurine are administered concomitantly it is essential that only a quarter of the usual dose of mercaptopurine is given since allopurinol decreases the rate of catabolism of mercaptopurine.

ALLMERCAP may be taken with food or on an empty stomach, but patients should standardise the method of administration. The dose should not be taken at the same time as milk or dairy products (see INTERACTIONS WITH OTHER MEDICINES). ALLMERCAP should be taken at least 1 hour before or 2 hours after milk or dairy products.

Renal or hepatic impairment
Consideration should be given to reducing the dosage in patients with impaired hepatic or renal function.

OVERDOSAGE:
Contact the Poisons Information Centre on telephone 0800 764 766 for advice on management of overdose.

Symptoms: Gastro-intestinal effects, including nausea, vomiting, diarrhoea and anorexia may be early symptoms of overdosage having occurred. The principal toxic effect is on the bone marrow and haematological toxicity is likely to be more profound with chronic overdosage than with a single ingestion of mercaptopurine.

The risk of overdosage is also increased when allopurinol is being given concomitantly with mercaptopurine. Liver dysfunction and gastroenteritis may also occur.

Treatment: As there is no known antidote, blood counts should be closely monitored and general supportive measures, together with appropriate blood transfusion, instituted if necessary. Active measures (such as the use of activated charcoal) may not be effective in the event of mercaptopurine overdose unless the procedure can be undertaken within 60 minutes of ingestion.

PRESENTATION AND STORAGE CONDITIONS:
Presentation:
ALLMERCAP is a pink/brown oral liquid suspension in a 100 mL amber glass bottle with a tamper evident child resistant closure. The product is supplied with a bottle adaptor and 2 oral syringes (graduated to 1 mL and 5 mL).

Storage: Store below 25°C. Protect from light.

NAME AND ADDRESS OF THE SPONSOR:
Link Pharmaceuticals Ltd.
Level 31, Vero Centre
48 Shortland Street
Auckland 1140

Telephone: 09 358 7146
CLASSIFICATION OF THE MEDICINE:
S4 – Prescription Only Medicine

DATE OF FIRST CONSENT:
18 November 2016

DATE OF MOST RECENT AMENDMENT:
12 January 2017