

## PRODUCT INFORMATION

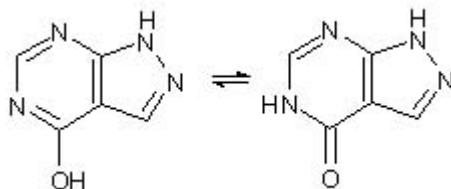
# Progout

Allopurinol



## NAME OF THE MEDICINE

Active ingredient : Allopurinol  
Chemical name : 1,5-dihydro-4H-pyrazolo[3,4-d]pyrimidin-4-one  
Structural formula :



Molecular formula :  $C_5H_4N_4O$                       Molecular weight : 136.1  
CAS Registry no. : 315-30-0

## DESCRIPTION

Allopurinol is a white or off-white, almost odourless powder. It is very slightly soluble in water and in alcohol, and is practically insoluble in chloroform and in ether. It dissolves in dilute solutions of alkali hydroxides.

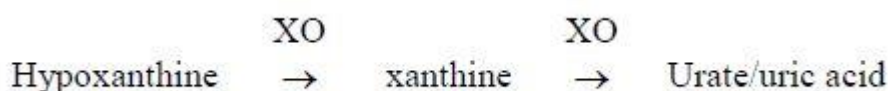
Each Progout 100 tablet contains 100 mg of allopurinol. The tablets also contain the following inactive ingredients: lactose, maize starch, povidone, macrogol 8000, sodium lauryl sulfate, purified talc and magnesium stearate. The tablets are gluten free.

Each Progout 300 tablet contains 300 mg of allopurinol. The tablets also contain the following inactive ingredients: maize starch, povidone, maltodextrin, sodium starch glycollate, microcrystalline cellulose and magnesium stearate.

## PHARMACOLOGY

### Actions

Allopurinol inhibits xanthine oxidase, the enzyme which catalyses the conversion of hypoxanthine to xanthine, and of xanthine to urate/uric acid.



Allopurinol decreases urate

formation in two ways:

1. The inhibition of xanthine oxidase reduces the amount of hypoxanthine and xanthine converted to urate/uric acid.
2. This action makes more hypoxanthine and xanthine available for re-utilisation in the purine metabolic cycle, which in turn, by a feedback mechanism, decreases overall *de novo* purine formation.

Since allopurinol decreases urate formation, it reduces urate/uric acid concentrations in both body fluids and urine. In contrast, the uricosuric agents which increase urate/uric acid excretion via the kidney will reduce the urate concentration in body fluids, but increase urate/uric acid concentration in urine. Reduction of the urate concentrations in body fluids by allopurinol permits mobilisation and dissolution of urate deposits anywhere in the body, the commonest sites being those in the skin, bones, joints and kidney interstitial tissue.

Therapeutic effects therefore include: the resolution of skin tophi and the healing of urate sinuses; eventual reduction in the frequency of attacks of acute gouty arthritis, improvement in joint mobility; reduction of the urate load to be excreted via the kidney; prevention and treatment of acute uric acid nephropathy; and, in the long-term, reduced risk of renal impairment by urate/uric acid and prevention and dissolution of uric acid renal stones.

## **Pharmacokinetics**

### **Absorption.**

Allopurinol is approximately 90% absorbed from the gastrointestinal tract.

### **Distribution.**

Allopurinol is uniformly distributed in total tissue water with the exclusion of the brain, where concentrations of the drugs are approximately 50% those of other tissues. Within muscle, small amounts of allopurinol and oxypurinol crystals have been found. Allopurinol and oxypurinol are not bound to plasma proteins. Allopurinol and oxypurinol are distributed into breast milk.

### **Metabolism.**

Allopurinol is rapidly converted in the body to the pharmacologically active principal metabolite oxypurinol and other metabolites including allopurinol riboside and oxypurinol-7-riboside. Peak plasma levels generally occur at 1.5 hours and 4.5 hours for allopurinol and oxypurinol respectively. Oxypurinol is also an inhibitor of xanthine oxidase.

### **Excretion.**

The renal clearance of hypoxanthine and xanthine is at least 10 times greater than that of uric acid. The increased xanthine and hypoxanthine in the urine have not been accompanied by problems of nephrolithiasis.

Approximately 20% of the ingested allopurinol is excreted in the faeces. Due to its rapid oxidation to oxypurinol and a renal clearance rate approximately that of glomerular filtration rate, allopurinol has a plasma half-life of about 1 to 2 hours. Allopurinol and oxypurinol are mainly excreted in the urine and little allopurinol is found in the urine 6 hours after administration. Oxypurinol, however, has a longer plasma half-life (approximately 15.0 hours) and therefore effective xanthine oxidase inhibition is maintained over a 24 hour period with single daily doses of allopurinol. Allopurinol is cleared essentially by glomerular filtration, oxypurinol is reabsorbed in the kidney tubules in a manner similar to the reabsorption of uric acid.

## **INDICATIONS**

Main clinical manifestations of urate/uric acid deposition. These are gouty arthritis, skin tophi and/or renal involvement through crystal deposition or stone formation. Such clinical manifestations may occur in idiopathic gout, uric acid lithiasis, acute uric acid nephropathy, neoplastic disease and myeloproliferative disease with high cell turnover rates, in which high urate levels occur either spontaneously or after cytotoxic therapy, certain enzyme disorders which lead to overproduction of urate and involve:

- hypoxanthine guanine phosphoribosyltransferase including Lesch-Nyhan syndrome,
- glucose-6-phosphatase including glycogen storage disease,
- phosphoribosylpyrophosphate synthetase,

- phosphoribosylpyrophosphate amidotransferase.

Progout is indicated for the management of 2,8-dihydroxyadenine (2,8-DHA) renal stones related to deficient activity of adenine phosphoribosyltransferase.

Progout is indicated for the management of recurrent mixed calcium oxalate renal stones in the presence of hyperuricosuria, when fluid, dietary and similar measures have failed.

## CONTRAINDICATIONS

Allopurinol should not be administered to individuals known to be hypersensitive to allopurinol or any other components of the formulation (see **DESCRIPTION**).

Allopurinol should not be given concomitantly with iron salts to patients with idiopathic haemochromatosis, nor should it be given to the immediate relatives of such patients.

### WARNINGS:

Allopurinol should be withdrawn immediately when a skin rash or other evidence of sensitivity occurs.

## PRECAUTIONS

Patients under treatment for hypertension or cardiac insufficiency, for example with diuretics or ACE inhibitors, may have some concomitant impairment of renal function and allopurinol should be used with care in these patients.

Asymptomatic hyperuricaemia *per se* is **not** an indication for the use of Progout. Fluid and dietary modifications with management of the underlying cause may correct the condition. If other clinical conditions suggest a need for Progout it must be introduced at low dosage (50 to 100 mg/day) to reduce the risk of adverse reactions, and increased only if the serum urate response is unsatisfactory. Extra caution should be exercised if renal function is poor (see also **DOSAGE AND ADMINISTRATION**).

Progout must be withdrawn immediately and permanently at the first signs of intolerance.

### Dermatological Effects

PROGOUT SHOULD BE DISCONTINUED AT THE FIRST APPEARANCE OF SKIN RASH OR OTHER SIGNS WHICH MAY INDICATE AN ALLERGIC REACTION. In some instances a skin rash may be followed by more severe hypersensitivity reactions such as exfoliative, urticarial and purpuric lesions as well as Stevens-Johnson syndrome (erythema multiforme exudativum), drug rash with eosinophilia and systemic symptoms (DRESS), Lyell's disease generalised vasculitis, irreversible hepatotoxicity and on rare occasions death. DRESS is also referred to as a drug-induced hypersensitivity syndrome (DIHS) and Lyell's disease is also referred to as toxic epidermal necrolysis.

### Hepatic effects

A few cases of reversible clinical hepatotoxicity have been noted in patients taking allopurinol, and in some patients asymptomatic rises in serum alkaline phosphatase or serum transaminase have been observed. If anorexia, weight loss, or pruritus develop in patients on allopurinol, evaluation of liver function should be part of their diagnostic workup. In patients with pre-existing liver disease, periodic liver function tests are recommended during the early stages of therapy.

Reduced doses should be used in patients with hepatic impairment.

## **Hypersensitivity effects**

The occurrence of hypersensitivity reactions to allopurinol may be increased in patients with decreased renal function receiving thiazides and allopurinol concurrently. For this reason, in this clinical setting, such combinations should be administered with caution and patients should be observed closely.

## **Acute gouty attacks**

Allopurinol treatment should not be started until an acute attack of gout has completely subsided, as further attacks may be precipitated. In the early stages of treatment with Pro gout, as with uricosuric agents, an acute attack of gouty arthritis may be precipitated. Therefore it is advisable to give prophylaxis with a suitable anti-inflammatory agent or colchicine (0.5 mg three times a day) for at least one month.

## **Xanthine deposition**

In conditions where the rate of urate formation is greatly increased (eg. malignant disease and its treatment, Lesch-Nyhan syndrome) the absolute concentration of xanthine in urine could, in rare cases, rise sufficiently to allow deposition in the urinary tract. This risk may be minimised by adequate hydration to achieve optimal urine dilution.

## **Impaction of uric acid renal stones**

Adequate therapy with Pro gout will lead to dissolution of large uric acid renal pelvic stones, with the remote possibility of impaction in the ureter.

## **Renal effects**

Some patients with pre-existing renal disease or poor urate clearance have shown a rise in serum urea during administration of allopurinol. Although the mechanism responsible for this has not been established, patients with impaired renal function should be carefully observed during the early stages of allopurinol administration, and dosage decreased or the drug withdrawn if increased abnormalities in renal function appear and persist. Patients under treatment for hypertension or cardiac insufficiency, for example with diuretics or ACE inhibitors, may have some concomitant impairment of renal function and allopurinol should be used with care in these patients.

Renal failure in association with administration of allopurinol has been observed among patients with hyperuricaemia secondary to neoplastic diseases. Concurrent conditions such as multiple myeloma and congestive myocardial disease were present among those patients whose renal dysfunction increased after allopurinol was begun. Renal failure is also frequently associated with gouty nephropathy and rarely with hypersensitivity reactions associated with allopurinol. Albuminuria has been observed among patients who developed clinical gout following chronic glomerulonephritis and chronic pyelonephritis.

A dose reduction will be required in patients with renal impairment (see **DOSAGE AND ADMINISTRATION**).

## **Haematological effects**

Bone marrow depression has been reported in patients receiving allopurinol, most of whom receive concomitant drugs with potential for causing this reaction. This has occurred as early as six weeks to as long as six years after the initiation of therapy of allopurinol. Rarely a patient may develop varying degrees of bone marrow depression, affecting one or more cell lines, while receiving allopurinol alone.

## **Hemochromatosis**

Allopurinol's primary action in treating gout is to inhibit the enzyme, xanthine oxidase. Xanthine oxidase may be involved in the reduction and clearance of hepatically stored iron. Some rodent studies have found increased iron storage in animals treated with allopurinol, whilst others have not. A study in 28 health volunteers found no change in hepatic iron storage with allopurinol treatment. There are no human studies which have investigated the safety of administering allopurinol to patients with haemochromatosis. Administration of allopurinol to patients with abnormal iron storage, including haemochromatosis, should be undertaken with caution.

## **Carcinogenicity**

No data is available on whether or not allopurinol has mutagenic or carcinogenic effects within humans or animals. Cytogenetic studies show that allopurinol does not induce chromosome aberrations in human blood cells *in vitro* at concentrations up to 100 micrograms/mL and *in vivo* at doses up to 600 mg/day for mean period of 40 months.

## **Effects on Fertility**

Reproduction studies in rabbits and rats using dosages up to 20 times the usual human dosage have not revealed any evidence of impaired fertility. Only rarely has infertility in human males and impotence occurred during allopurinol therapy, however a casual relationship to the drug has not been established.

## **Use in Pregnancy (Category B2)**

There is inadequate evidence of safety of allopurinol in human pregnancy, although it has been in wide use for many years without apparent ill consequence.

One study in mice receiving a high intraperitoneal dose on days 10 or 13 of pregnancy resulted in fetal abnormalities but extensive studies of high oral doses in mice, rats and rabbits during days 8 to 16 produced none.

Use in pregnancy only when there is no safer alternative and when the disease itself carries risks for the mother or child.

## **Use in Lactation**

Reports indicate that allopurinol and oxypurinol are excreted in human breast milk. Concentrations of 1.5 mg/L allopurinol and 53.7 mg/L oxypurinol have been demonstrated in breast milk from a woman taking allopurinol 300 mg/day. However, there is no data concerning the effects of allopurinol, or its metabolism, on the breast-fed child.

## **Instructions to Patients**

Wherever possible a high fluid intake sufficient to yield a daily urinary output of at least two litres and the maintenance of a neutral or, preferably, slightly alkaline urine are desirable to help prevent renal precipitation of urates in hyperuricemic patients whether or not they are on allopurinol therapy. Allopurinol is better tolerated if taken after meals.

## **Effects on ability to drive and use machinery**

Since adverse reactions such as somnolence, vertigo and ataxia have been reported in patients receiving allopurinol, patients should exercise caution before driving, using machinery or participating in dangerous activities where alertness is mandatory until they are reasonably certain that allopurinol does not adversely affect performance.

## **INTERACTIONS WITH OTHER MEDICINES**

### **6-Mercaptopurine and azathioprine.**

Allopurinol inhibits the enzymatic oxidation of 6-mercaptopurine and azathioprine. Therefore, when 6-mercaptopurine or azathioprine is given concurrently with Prologon, only one-quarter of the usual dose of 6-mercaptopurine or azathioprine should be given because inhibition of xanthine oxidase will prolong their activity. Subsequent adjustment of doses of mercaptopurine or azathioprine should be made on the basis of therapeutic response and the appearance of toxic effects.

### **Adenine arabinoside.**

Evidence suggests that the plasma half-life of adenine arabinoside is increased in the presence of allopurinol. When the two products are used concomitantly, extra vigilance is necessary to recognise enhanced toxic effects.

### **Salicylates and uricosuric agents.**

Oxypurinol, the major metabolite of allopurinol and itself therapeutically active, is excreted by the kidney in a similar way to urate. Hence, drugs with uricosuric activity such as probenecid or large doses of salicylate may accelerate the excretion of oxypurinol. This may decrease the therapeutic activity of Pro gout, but the significance needs to be assessed in each case.

### **Chlorpropamide.**

If allopurinol is given concomitantly with chlorpropamide when renal function is poor, there may be an increased risk of prolonged hypoglycaemic activity.

### **Coumarin anticoagulants.**

There is no evidence that interaction between allopurinol and the coumarins seen under experimental conditions has any clinical significance. However, all patients receiving anticoagulants must be carefully monitored.

### **Phenytoin.**

Allopurinol may inhibit hepatic oxidation of phenytoin but the clinical significance has not been demonstrated.

### **Theophylline.**

Inhibition of the metabolism of theophylline has been reported in normal subjects given relatively high doses of allopurinol (300 mg twice daily) under experimental conditions. Although there have been no clinical reports of interaction, theophylline levels should be monitored in patients starting or increasing allopurinol therapy.

### **Ampicillin/amoxycillin.**

An increase in the frequency of skin rash has been reported among patients receiving ampicillin or amoxycillin concurrently with allopurinol compared to patients who are not receiving both drugs. The cause of the reported association has not been established, however it is recommended that in patients receiving allopurinol, an alternative to ampicillin or amoxycillin is used where available.

### **Cyclosporin.**

Reports suggest that the plasma concentration of cyclosporin may be increased during concomitant treatment with allopurinol. The possibility of enhanced cyclosporin toxicity should be considered if the drugs are co-administered.

## **ADVERSE EFFECTS**

Adverse reactions are usually reversed by the reduction of dosage or complete withdrawal of allopurinol. Taking allopurinol after meals may minimise gastrointestinal disturbances. When hypersensitivity reactions occur, allopurinol should be withdrawn immediately. Corticosteroids may be beneficial in overcoming such reactions.

Adverse reactions in association with allopurinol are rare in the overall treated population and mostly of a minor nature. The incidence is higher in the presence of renal and/or hepatic disorder.

### **Dermatological**

These are the most common reactions and may occur at any time during treatment. They may be pruritic, maculopapular, sometimes scaly, sometimes purpuric and rarely exfoliative. Pro gout should be withdrawn immediately should such reactions occur. After recovery from mild reactions, Pro gout may, if desired, be reintroduced at a small dose (e.g. 50 mg/day) and gradually increased. If the rash recurs, Pro gout should be permanently withdrawn as more severe hypersensitivity reactions may occur.

## **Generalised hypersensitivity**

Skin reactions associated with exfoliation, fever, lymphadenopathy, arthralgia and/or eosinophilia resembling Stevens-Johnson and/or Lyell disease (toxic epidermal necrolysis) occur rarely. Drug rash with eosinophilia and systemic symptoms (DRESS) (drug-induced hypersensitivity syndrome (DIHS)) also occurs rarely. Associated vasculitis and tissue response may be manifested in various ways including hepatitis, interstitial nephritis and, very rarely, epilepsy. If such reactions do occur, it may be at any time during treatment. Progout should be withdrawn **immediately** and **permanently**.

Corticosteroids may be beneficial in overcoming them. When generalised hypersensitivity reactions have occurred, renal and/or hepatic disorder has usually been present, particularly when the outcome has been fatal.

Very rarely acute anaphylactic shock has been reported.

## **Angioimmunoblastic lymphadenopathy**

Angioimmunoblastic lymphadenopathy has been described rarely following biopsy of a generalised lymphadenopathy. It appears to be reversible on withdrawal of Progout.

## **Hepatic function**

Rare reports of hepatic dysfunction ranging from asymptomatic rises in liver function tests to hepatitis (including hepatic necrosis and granulomatous hepatitis) have been reported without overt evidence of more generalised hypersensitivity. Granulomatous hepatitis appears to be reversible on withdrawal of Progout.

## **Gastrointestinal**

In early clinical studies, nausea and vomiting were reported. Further reports suggest that this reaction is not a significant problem and can be avoided by taking Progout after meals. Recurrent haematemesis has been reported as an extremely rare event as has steatorrhea.

## **Haematological**

Bone marrow depression has been reported in patients receiving additional medications during allopurinol therapy. However rarely has a patient receiving allopurinol alone, acquired one or more of their cell lines to be affected by bone marrow depression. There have been occasional reports of transient reduction in the numbers of circulating formed elements of the blood, usually in association with renal and/or hepatic disorder. Adverse effects such as leukocytosis, leukopenia, eosinophilia, thrombocytopenia and granulocytopenia have occurred very rarely. The clinical significance has yet to be demonstrated.

## **Other**

The following complaints have been reported occasionally: fever, general malaise, asthenia, headache, vertigo, ataxia, somnolence, coma, depression, paralysis, paraesthesia, neuropathy, visual disorder, cataract, macular changes, taste perversion, stomatitis, changed bowel habit, infertility, impotence, nocturnal emission, diabetes mellitus, hyperlipidaemia, furunculosis, alopecia, discoloured hair, angina, hypertension, bradycardia, oedema, uraemia, haematuria, angioedema and gynaecomastia.

## **DOSAGE AND ADMINISTRATION**

The dosage should be adjusted by monitoring serum urate concentrations and urinary urate/uric acid levels at appropriate intervals.

### **Dose frequency**

Progout may be taken orally after a meal and may be taken once a day. It is well tolerated, especially after food. Should the daily dosage exceed 300 mg and gastrointestinal intolerance be manifested, a divided dose regimen may be appropriate.

Wherever possible, a high fluid intake sufficient to yield a daily urinary output of 2L and the maintenance of a neutral or alkaline urine are desirable in hyperuricaemic patients whether or not they are on Pro gout therapy.

## **Adults**

2 to 10 mg/kg bodyweight/day or 100 to 200 mg daily in mild conditions; 300 to 600 mg daily in moderately severe conditions; 700 to 900 mg daily in severe conditions.

## **Children under 15 years**

10 to 20 mg/kg bodyweight/day or 100 to 400 mg daily. Use in children is rarely indicated, except in malignant conditions (especially leukaemia) and certain enzyme disorders such as Lesch-Nyhan syndrome.

## **Use in the Elderly**

In the absence of specific data, the lowest dosage which produces satisfactory urate reduction should be used. Particular attention should be paid to dosage advice in renal disorder and Precautions.

## **Renal impairment**

Since allopurinol and its metabolites are excreted by the kidney, impaired renal function may lead to retention of the drug and/or its metabolites with consequent prolongation of plasma half-lives. In the presence of impaired renal function, serious consideration should be given to initiating treatment with a maximum dose of 100 mg/day and increasing it only if the serum and/or urinary urate response is unsatisfactory. In severe renal insufficiency, it may be advisable to use less than 100 mg/day or to use single doses of 100 mg at longer intervals than one day.

Alternative schedules based on creatinine clearances are unsatisfactory because of the impression of low clearance values.

If facilities are available to monitor plasma oxypurinol concentrations, the dose should be adjusted to maintain plasma oxypurinol levels below 100 micromol/L (15.2 microgram/mL).

## **Renal dialysis**

Allopurinol and its metabolites are removed by renal dialysis. If dialysis is required two to three times a week, consideration should be given to an alternative dosage schedule of Pro gout 300 to 400 mg immediately after each dialysis with none in the interim.

## **Dosage in Hepatic impairment**

Reduced doses should be used in patients with hepatic impairment. Periodic liver function tests are recommended during the early stages of therapy.

## **Treatment of high urate turnover conditions (e.g. neoplasia, Lesch-Nyhan syndrome)**

It is advisable to correct existing hyperuricaemia and/or hyperuricosuria with Pro gout before starting cytotoxic therapy. It is important to ensure adequate hydration to maintain optimum diuresis and to attempt alkalisation of urine to increase solubility of urinary urate/uric acid. Dosage of Pro gout should be in the lower range.

If urate nephropathy or other pathology has compromised renal function, the advice given in **Renal Impairment** (above) should be followed.

These steps may reduce the risk of xanthine and/or oxypurinol deposition complicating the clinical situation (see also **INTERACTIONS WITH OTHER MEDICINES** and **ADVERSE EFFECTS**).

## **OVERDOSAGE**

Accidental or deliberate ingestion of up to 5 g of allopurinol or very rarely 20 g, has been reported.



## **Symptoms**

These include nausea, vomiting, diarrhoea and dizziness.

## **Treatment**

Recovery followed general supportive measures.

Massive absorption of allopurinol may lead to considerable inhibition of xanthine oxidase activity, which should have no untoward effects unless 6-mercaptopurine and/or azathioprine are being taken concomitantly. Adequate hydration to maintain optimum diuresis facilitates excretion of allopurinol and its metabolites. If considered necessary, haemodialysis may be used.

Contact the Poisons Information Centre on 131126 (Australia) for advice on the management of overdose.

## **PRESENTATION AND STORAGE CONDITIONS**

Progout 100 : 100 mg tablet: white, scored, marked AL/100 on one side, G on reverse  
Available in HDPE bottles in pack sizes of 10,100, 200 and 1000 tablets  
Store below 25°C

Progout 300 : 300 mg tablet: white, scored, marked AL/300 on one side, G on reverse  
Available in HDPE bottles in pack sizes of 30 and 60 tablets  
Store below 25°C

Some strengths, pack sizes and/or pack types may not be marketed.

## **NAME AND ADDRESS OF THE SPONSOR**

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## **POISON SCHEDULE OF THE MEDICINE**

Prescription Only Medicine - S4

## **DATE OF FIRST INCLUSION ON THE AUSTRALIAN REGISTER OF THERAPEUTIC GOODS (THE ARTG)**

21/10/1991

## **DATE OF MOST RECENT AMENDMENT**

5 May 2017

**Progout\_pi\May17/00**