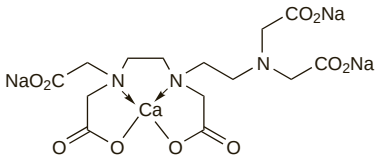
### Calcium Trisodium Pentetate *(BAN, rINN)*

Ca-DTPA; Calcii Trinatrii Pentetas; Calcium Trisodium DTPA; NSC-34249; Pentetate Calcium Trisodium *(USAN)*; Pentétate de Calcium Trisodique; Pentetato calcio y trisodio; Trisodium Calcium Diethylenetriaminepentaacetate.

Кальция Тринатрия Пентетат

$C_{14}H_{18}CaN_3Na_3O_{10}$ = 497.4.

*CAS — 12111-24-9.*



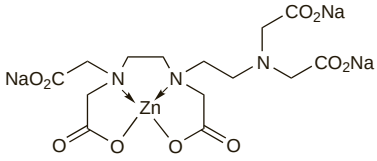
### Zinc Trisodium Pentetate *(rINNM)*

Pentétate de Zinc Trisodique; Pentetate Zinc Trisodium; Pentetato zinc y trisodio; Trisodium Zinc Diethylenetriaminepentaacetate; Zinci Trinatrii Pentetas; Zn-DTPA (zinc pentetate or zinc trisodium pentetate).

Цинка Тринатрия Пентетат

$C_{14}H_{18}N_3Na_3O_{10}Zn$ = 522.7.

*CAS — 65229-17-6 (zinc pentetate); 125833-02-5 (zinc trisodium pentetate).*



### Adverse Effects and Precautions

Adverse effects that have been reported with calcium or zinc trisodium pentetate include headache, nausea and diarrhoea, and injection-site reactions. Bronchospasm has occurred after inhalation. Pentetates chelate trace metals and supplements may be needed with long-term use. Serum-electrolytes should be monitored during use. Pentetates should be used with caution in patients with haemochromatosis since fatalities have been reported.

### Uses and Administration

Pentetic acid and its salts are chelators with the general properties of the edetates (see Edetic Acid, p.1445). Calcium trisodium pentetate is used in the treatment of poisoning by heavy metals; both calcium trisodium pentetate and zinc trisodium pentetate are used for poisoning with radioactive metals such as plutonium, americium, and curium.

In heavy-metal poisoning, calcium trisodium pentetate has been given in a dose of 1 g daily by intravenous infusion for 3 to 5 days, with further treatment, if necessary, after an interval of 3 days.

For poisoning with plutonium and similar radioactive metals, either calcium trisodium pentetate or zinc trisodium pentetate may be used. Calcium trisodium pentetate is more effective within the first 24 hours and is preferred for the initial dose; however, zinc depletion may occur and if further chelation is required treatment should be continued with zinc trisodium pentetate if possible. The usual dose is 1 g of either calcium or zinc trisodium pentetate once daily, by slow intravenous injection over 3 to 4 minutes or by intravenous infusion. Treatment is usually continued for 5 days and then modified depending on the estimated radioactive body burden. For patients with poisoning by inhalation only, the calcium trisodium pentetate or zinc trisodium pentetate may be given by nebulisation.

Pentetates, labelled with metallic radionuclides, are used in nuclear medicine (see Indium-111, p.2054, and Technetium-99m, p.2056).

**Thalassaemia.** Iron overload in patients with thalassaemia (p.1045) is usually treated with desferrioxamine, but auditory toxicity can result. Calcium pentetic acid has been used as an alternative. A study[1] in 5 patients in whom desferrioxamine had to be withdrawn because of high-tone deafness found that the pentetate was as effective as desferrioxamine and hearing improved during treatment. Oral zinc supplements were necessary to maintain adequate plasma-zinc concentrations.

1. Wonke B, *et al.* Reversal of desferrioxamine induced auditory neurotoxicity during treatment with Ca-DTPA. *Arch Dis Child* 1989; **64:** 77–82.

### Preparations

**Proprietary Preparations** (details are given in Part 3)
***Cz.:*** Ditripentat; ***Ger.:*** Ditripentat-Heyl.

### Potassium Polystyrene Sulfonate

Poliestirenosulfonato potásico; Potassium Polystyrene Sulphonate.

*CAS — 9011-99-8.*
*ATC — V03AE01.*
*ATC Vet — QV03AE01.*

### Profile

Potassium polystyrene sulfonate, the potassium salt of sulfonated styrene polymer, is a cation-exchange resin that exchanges potassium ions for calcium ions and other cations and has been used in the management of hypercalciuria and renal calculi.

### Preparations

**Proprietary Preparations** (details are given in Part 3)
**Multi-ingredient: *Ger.:*** Ujostabil†.

## Pralidoxime *(BAN, rINNM)*

Pralidoksiimi; Pralidoxim; Pralidoxima; Pralidoximum. 2-Hydroxyiminomethyl-1-methylpyridinium.

Пралидоксим

$C_7H_9N_2O$ = 137.2.

*CAS — 6735-59-7; 495-94-3.*
*ATC — V03AB04.*
*ATC Vet — QV03AB04.*

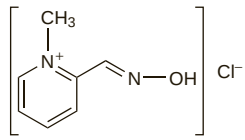
### Pralidoxime Chloride *(BANM, USAN, rINNM)*

2-Formyl-1-methylpyridinium Chloride Oxime; 2-PAM; 2-PAM Chloride; 2-PAMCl; Pralidoxima, cloruro de; Pralidoxime, Chlorure de; Pralidoxim Chloridum; 2-Pyridine Aldoxime Methochloride.

Пралидоксима Хлорид

$C_7H_9ClN_2O$ = 172.6.

*CAS — 51-15-0.*
*ATC — V03AB04.*
*ATC Vet — QV03AB04.*



**Pharmacopoeias.** In *US.*
**USP 31** (Pralidoxime Chloride). A white to pale yellow, odourless, crystalline powder. Freely soluble in water.

### Pralidoxime Iodide *(BANM, USAN, rINN)*

Ioduro de pralidoxima; NSC-7760; 2-PAM Iodide; 2-PAMI; Pralidoxime, Iodure de; Pralidoxim Iodidum.

Пралидоксима Йодид

$C_7H_9IN_2O$ = 264.1.

*CAS — 94-63-3.*
*ATC — V03AB04.*
*ATC Vet — QV03AB04.*

**Pharmacopoeias.** In *Chin.*

### Pralidoxime Mesilate *(BANM, rINNM)*

Mesilato de pralidoxima; 2-PAMM; Pralidoksiimimesilaatti; Pralidoksim Mezilat; Pralidoxime, Mésilate de; Pralidoxime Mesylate *(USAN)*; Pralidoxime Methanesulphonate; Pralidoxim Mesilas; Pralidoximmesilat; P2S.

Пралидоксима Мезилат

$C_7H_9N_2O,CH_3O_3S$ = 232.3.

*CAS — 154-97-2.*
*ATC — V03AB04.*
*ATC Vet — QV03AB04.*

### Pralidoxime Metilsulfate *(BANM, rINNM)*

Pralidoxima, metilsulfato de; Pralidoxime Methylsulphate; Pralidoxime, Métilsulfate de; Pralidoxim Metilsulfas.

Пралидоксима Метилсульфат

$C_7H_9N_2O,CH_3SO_4$ = 248.3.

*CAS — 1200-55-1.*
*ATC — V03AB04.*
*ATC Vet — QV03AB04.*

**Pharmacopoeias.** In *It.*

### Adverse Effects

Use of pralidoxime may be associated with drowsiness, dizziness, disturbances of vision, nausea, tachycardia, headache, hyperventilation, and muscular weakness. Tachycardia, laryngospasm, and muscle rigidity have been attributed to giving pralidoxime intravenously at too rapid a rate. Large doses of pralidoxime may cause transient neuromuscular blockade.

### Precautions

Pralidoxime should be used cautiously in patients with renal impairment; a reduction in dosage may be necessary. Caution is also required in giving pralidoxime to patients with myasthenia gravis as it may precipitate a myasthenic crisis. Pralidoxime should not be used to treat poisoning by carbamate pesticides.

When atropine and pralidoxime are given together, the signs of atropinisation may occur earlier than might be expected when atropine is used alone.

### Pharmacokinetics

Pralidoxime is not bound to plasma proteins, does not readily pass into the CNS, and is rapidly excreted in the urine, partly unchanged and partly as a metabolite. The elimination half-life is about 1 to 3 hours.

◊ References.

1. Sidell FR, Groff WA. Intramuscular and intravenous administration of small doses of 2-pyridinium aldoxime methochloride to man. *J Pharm Sci* 1971; **60:** 1224–8.
2. Siddell FR, *et al.* Pralidoxime methanesulfonate: plasma levels and pharmacokinetics after oral administration to man. *J Pharm Sci* 1972; **61:** 1136–40.
3. Swartz RD, *et al.* Effects of heat and exercise on the elimination of pralidoxime in man. *Clin Pharmacol Ther* 1973; **14:** 83–9.
4. Schexnayder S, *et al.* The pharmacokinetics of continuous infusion pralidoxime in children with organophosphate poisoning. *J Toxicol Clin Toxicol* 1998; **36:** 549–55.

### Uses and Administration

Pralidoxime is a cholinesterase reactivator. It is used as an adjunct to, but *not* as a substitute for, atropine in the treatment of poisoning by certain cholinesterase inhibitors. Its main indication is in poisoning due to organophosphorus insecticides or related compounds (see p.2047). These compounds phosphorylate and consequently inactivate cholinesterase, causing acetylcholine accumulation and muscle paralysis. Pralidoxime acts principally to reactivate cholinesterase, restoring the enzymatic destruction of acetylcholine at the neuromuscular junction and relieving muscle paralysis. However, concomitant use of atropine is required to counteract directly the adverse effects of acetylcholine accumulation, particularly at the respiratory centre. Pralidoxime is not equally antagonistic to all organophosphorus anticholinesterases as reactivation is dependent on the nature of the phosphoryl group and the rate at which inhibition becomes irreversible. It is not effective in the treatment of poisoning due to phosphorus, inorganic phosphates, or organophosphates without anticholinesterase activity. It has usually been contra-indicated in the treatment of poisoning by carbamate insecticides (including carbaryl poisoning) as it may increase toxicity (see p.2037). The use of pralidoxime has been suggested for the treatment of overdosage by anticholinesterase drugs, including those used to treat myasthenia gravis such as neostigmine; however, it is only slightly effective and its use is not generally recommended.

Pralidoxime is usually given as the chloride or mesilate but the iodide and metilsulfate salts have also been used. Doses are usually expressed in terms of the salts.

Pralidoxime may be given by slow intravenous injection over 5 to 10 minutes, by intravenous infusion over 15 to 30 minutes, or by subcutaneous or intramuscular injection; it has also been given orally.

In the treatment of **organophosphorus poisoning** pralidoxime should be given as soon as possible. After about 24 hours it becomes less effective since cholinesterase inactivation usually becomes irreversible after this time; however, patients with severe poisoning may occasionally respond up to 36 hours or longer after exposure, depending on the organophosphate involved. Injections of *atropine* should be given intravenously or intramuscularly and repeated as necessary until the patient shows signs of atropine toxicity; atropinisation should then be maintained for 48 hours or more. Large amounts of atropine may be required.