

## New Zealand Datasheet

### Name of Medicine

#### PENMIX<sup>®</sup> 30

Biphasic isophane insulin injection 100 IU/ml

#### PENMIX<sup>®</sup> 40

Biphasic isophane insulin injection 100 IU/ml

#### PENMIX<sup>®</sup> 50

Biphasic isophane insulin injection 100 IU/ml

#### MIXTARD<sup>®</sup> 30

Biphasic isophane insulin injection 100 IU/ml

#### PROTAPHANE<sup>®</sup>

Isophane (NPH) insulin suspension injection 100 IU/ml

### Presentation

PENMIX 30 is a cloudy, white, aqueous suspension containing 30% dissolved insulin and 70% isophane human insulin in 3 ml Penfill<sup>®</sup> cartridges made of glass, with a plunger (bromobutyl) and a stopper (bromobutyl/polyisoprene) in a carton .

PENMIX 40 is a cloudy, white, aqueous suspension containing 40% dissolved insulin and 60% isophane human insulin in 3 ml Penfill<sup>®</sup> cartridges made of glass, with a plunger (bromobutyl) and a stopper (bromobutyl/polyisoprene) in a carton.

PENMIX 50 is a cloudy, white, aqueous suspension containing 50% dissolved insulin and 50% isophane human insulin in 3 ml Penfill<sup>®</sup> cartridges made of glass, with a plunger (bromobutyl) and a stopper (bromobutyl/polyisoprene) in a carton.

MIXTARD 30 is a cloudy, white, aqueous suspension containing 30% dissolved insulin and 70% isophane human insulin in 10 ml glass vials closed with a disc (bromobutyl/polyisoprene rubber) and a protective tamper-proof plastic cap in a carton.

PROTAPHANE is a cloudy, white, aqueous suspension containing isophane insulin suspension in 3 ml penfill<sup>®</sup> cartridges made of glass, with a plunger (bromobutyl) and a stopper (bromobutyl/polyisoprene) in a carton or in 10 ml glass vials closed with a disc (bromobutyl/polyisoprene rubber) and a protective tamper-proof plastic cap in a carton.

One IU (International Unit) corresponds to 0.035 mg of anhydrous human insulin.

The penfill cartridges are designed to be used with Novo Nordisk insulin delivery systems.

### Uses

#### Actions

Pharmacotherapeutic group: Drugs used in diabetes. Insulins and analogues for injection, intermediate-acting combined with fast-acting, insulin (human). ATC code A10A D01

The blood glucose lowering effect of insulin is due to the facilitated uptake of glucose following binding of insulin to receptors on muscle and fat cells and to the simultaneous inhibition of glucose output from the liver.

For PENMIX and MIXTARD the absorption profile is caused by the product being a mixture of insulins with protracted and fast absorption respectively.

An average action profile for PENMIX and MIXTARD after subcutaneous injection indicates:

Onset: within ½ hour  
Maximum: 2 - 8 hours  
Duration: up to 24 hours

For PROTAPHANE the protracted absorption is caused by the product being a suspension.

An average action profile for PROTAPHANE after subcutaneous injection indicates:

Onset: 1.5 hours  
Maximum: 4 - 12 hours  
Duration: up to 24 hours

## **Pharmacokinetics**

Insulin in the bloodstream has a half-life of only a few minutes. Consequently, the time-action profile of an insulin preparation is determined solely by its absorption characteristics.

This process is influenced by several factors, (e.g. insulin dosage injection route and site, thickness of subcutaneous fat, type of diabetes), which is why considerable intra- and inter-patient variations are seen.

### Absorption

The absorption profile is due to the product being a mixture of insulin products with fast and protracted absorption respectively. In PENMIX and MIXTARD the maximum plasma concentration of the fast-acting insulin is reached within 1.5-2.5 hours after subcutaneous administration. In PROTAPHANE the maximum plasma concentration of the insulin is reached within 2-18 hours after subcutaneous administration.

### Distribution

No profound binding to plasma proteins, except circulating insulin antibodies (if present) has been observed.

### Metabolism

Human insulin is reported to be degraded by insulin protease or insulin-degrading enzymes and possibly protein disulfide isomerase. A number of cleavage (hydrolysis) sites on the human insulin molecule have been proposed; none of the metabolites formed following the cleavage are active.

### Elimination

The terminal half-life is determined by the rate of absorption from the subcutaneous tissue. The terminal half-life ( $t_{1/2}$ ) is therefore a measure of the absorption rather than of the elimination *per se* of insulin from plasma (insulin in the blood stream has a  $t_{1/2}$  of a few minutes). Trials have indicated a  $t_{1/2}$  of about 5-10 hours.

## **Indications**

Treatment of diabetes mellitus.

## **Dosage and Administration**

PENMIX and MIXTARD are dual-acting insulins. They are bi-phasic formulations containing fast-acting and long-acting insulin. Premixed insulins such as PENMIX or MIXTARD are usually given once or twice daily when a rapid initial effect together with a more prolonged effect is desired.

PROTAPHANE is a long-acting insulin. The physician determines whether one or several daily injections of PROTAPHANE are necessary. PROTAPHANE may be used alone or

mixed with a fast-acting insulin. In intensive insulin therapy PROTAPHANE may be used as basal insulin (evening and/or morning injection) with fast-acting insulin given at meals.

Dosage is individual and determined in accordance with the needs of the patient.

The individual insulin requirement is usually between 0.5 and 1.0 IU/kg/day. The daily insulin requirement may be higher in patients with insulin resistance (e.g. during puberty in the young or due to obesity) and lower in patients with residual, endogenous insulin production.

An injection of PENMIX or MIXTARD should be followed by a meal or snack containing carbohydrates within 30 minutes.

In patients with diabetes mellitus optimised glycaemic control delays the onset of late diabetic complications. Close blood glucose monitoring is recommended.

Concomitant illness, especially infections and feverish conditions, usually increases the patient's insulin requirement. Concomitant diseases in the kidney, liver or affecting the adrenal, pituitary or thyroid gland can require changes in the insulin dose.

Adjustment of the dosage may also be necessary if patients change physical activity or their usual diet. Dosage adjustment may be necessary when transferring patients from one insulin preparation to another (see Warnings and Precautions).

Insulin suspensions are never to be administered intravenously.

PENMIX or MIXTARD are administered subcutaneously in the thigh or abdominal wall. If convenient the gluteal region or deltoid region may be used. A subcutaneous injection into the abdominal wall results in a faster absorption than from other injection sites.

PROTAPHANE is administered subcutaneously in the thigh. If convenient, the abdominal wall, the gluteal region or the deltoid region may also be used. Subcutaneous injection into the thigh results in a slower and less variable absorption compared to the other injection sites.

Injection into a lifted skin fold minimises the risk of intramuscular injection. Keep the needle under the skin for at least 6 seconds to make sure the entire dose is injected.

Injection sites should always be rotated within the same region in order to reduce the risk of lipodystrophy .

## **Contraindications**

Hypoglycaemia.

Hypersensitivity to human insulin or any of the excipients.

## **Warnings and Precautions**

Inadequate dosing or discontinuation of treatment, especially in type 1 diabetes, may lead to hyperglycaemia. Usually the first symptoms of hyperglycaemia usually set in gradually, over a period of hours or days. They include thirst, increased frequency of urination, nausea, vomiting, drowsiness, flushed dry skin, dry mouth, loss of appetite as well as acetone breath. In type 1 diabetes, untreated hyperglycaemic events eventually leads to diabetic ketoacidosis which is potentially lethal.

Hypoglycaemia may occur if the insulin dose is too high in relation to the insulin requirement (see Adverse Effects and Overdosage).

Omission of a meal or unplanned, strenuous physical exercise may lead to hypoglycaemia.

Patients whose blood glucose control is greatly improved e.g. by intensified insulin therapy, may experience a change in their usual warning symptoms of hypoglycaemia and should be advised accordingly. Usual warning symptoms may disappear in patients with longstanding diabetes.

Transferring a patient to another type or brand of insulin should be done under strict medical supervision. Changes in strength, brand (manufacturer), type, origin (human insulin, insulin analogue) and/or method of manufacturer may result in a change in dosage. Patients transferred to PENMIX, MIXTARD or PROTAPHANE from another type of insulin may require an increased number of daily injections or a change in dosage from that used with their usual insulin products. If an adjustment is needed when switching the patient to PENMIX, MIXTARD or PROTAPHANE, it may occur with the first dose or during the first few weeks or months.

As with any insulin therapy, injection site reactions may occur and include pain, redness, hives, inflammation, bruising, swelling and itching. Continuous rotation of the injection site within a given area may help to reduce or prevent these reactions. Reactions usually resolve in a few days to a few weeks. On rare occasions, injection site reactions may require discontinuation of PENMIX, MIXTARD or PROTAPHANE.

A few patients who have experienced hypoglycaemic reactions after transfer from animal source insulin have reported that early warning symptoms of hypoglycaemia were less pronounced or different from those experienced with their previous insulin.

Before travelling between different time zones, the patient should be advised to consult the doctor, since this may mean that the patient has to take insulin and meals at different times.

Insulin suspensions are not to be used in insulin infusion pumps.

#### Combination of thiazolidinediones and insulin products

Cases of congestive heart failure have been reported when thiazolidinediones were used in combination with insulin, especially in patients with risk factors for development of congestive heart failure. This should be kept in mind if treatment with the combination of thiazolidinediones and insulin medicinal products is considered. If the combination is used, patients should be observed for signs and symptoms of congestive heart failure, weight gain and oedema. Thiazolidinediones should be discontinued if any deterioration in cardiac symptoms occurs.

PENMIX, MIXTARD and PROTAPHANE contain metacresol, which may cause allergic reactions.

### **Pregnancy and Lactation**

There are no restrictions on the treatment of diabetes with insulin during pregnancy as insulin does not pass the placental barrier.

Both hypoglycaemia and hyperglycaemia, which can occur in inadequately controlled diabetes therapy, increase the risk of malformations and death *in utero*. Intensified blood glucose control and monitoring of pregnant women with diabetes are recommended throughout pregnancy and when contemplating pregnancy.

Insulin requirements usually fall in the first trimester and increase subsequently during the second and third trimester. After delivery, insulin requirements normally return rapidly to pre-pregnancy values

There is no restriction on treatment with PENMIX, MIXTARD or PROTAPHANE during breast-feeding. Insulin treatment of the nursing mother involves no risk to the baby. However, the insulin dosage, diet or both may need to be adjusted.

### Effects on Ability to Drive and Use Machines

The patient's ability to concentrate and react may be impaired as a result of hypoglycaemia. This may constitute a risk in situations where these abilities are of special importance (e.g. driving a car or operating machinery).

Patients should be advised to take precautions to avoid hypoglycaemia whilst driving, this is particularly important in those who have reduced or absent awareness of the warning signs of hypoglycaemia or have frequent episodes of hypoglycaemia. The advisability of driving should be considered in these circumstances.

### Adverse Effects

#### a. Summary of the safety profile

The most frequently reported adverse reaction during treatment is hypoglycaemia. In clinical trials and during marketed use, the frequencies of hypoglycaemia vary with patient population, dose regimens and level of glycaemic control, please see section c below.

At the beginning of the insulin treatment, refraction anomalies, oedema and injection site reactions (pain, redness, hives, inflammation, bruising, swelling and itching at the injection site) may occur. These reactions are usually of transitory nature. Fast improvement in blood glucose control may be associated with acute painful neuropathy, which is usually reversible. Intensification of insulin therapy with abrupt improvement in glycaemic control may be associated with temporary worsening of diabetic retinopathy, while long-term improved glycaemic control decreases the risk of progression of diabetic retinopathy.

#### b. Tabulated list of adverse reactions

Adverse reactions listed below are based on clinical trial data and classified according to MedDRA frequency and System Organ Class. Frequency categories are defined according to the following convention: Very common ( $\geq 1/10$ ); common ( $\geq 1/100$  to  $< 1/10$ ); uncommon ( $\geq 1/1,000$  to  $< 1/100$ ); rare ( $\geq 1/10,000$  to  $< 1/1,000$ ); very rare ( $< 1/10,000$ ); not known (cannot be estimated from the available data).

Immune system disorders	Uncommon – Urticaria, rash
	Very rare – Anaphylactic reactions*
Metabolism and nutrition disorders	Very common – Hypoglycaemia*
Nervous system disorders	Uncommon – Peripheral neuropathy (Painful neuropathy), PENMIX, MIXTARD
	Very rare – Peripheral neuropathy (Painful neuropathy), PROTAPHANE
Eye disorders	Very rare – Refraction disorders
	Uncommon – Diabetic retinopathy
Skin and subcutaneous tissue disorders	Uncommon – Lipodystrophy*

General disorders and administration site conditions	Uncommon – Injection site reactions
	Uncommon – Oedema

\* see section c

### c. Description of selected adverse reactions

#### *Anaphylactic reactions*

The occurrence of generalised hypersensitivity reactions (including generalised skin rash, itching, sweating, gastrointestinal upset, angioneurotic oedema, difficulties in breathing, palpitation, reduction in blood pressure and fainting/loss of consciousness) is very rare but can potentially be life threatening.

#### *Hypoglycaemia*

The most frequently reported adverse reaction is hypoglycaemia. It may occur if the insulin dose is too high in relation to the insulin requirement. Severe hypoglycaemia may lead to unconsciousness and/or convulsions and may result in temporary or permanent impairment of brain function or even death. The symptoms of hypoglycaemia usually occur suddenly. They may include cold sweats, cool pale skin, fatigue, nervousness or tremor, anxiousness, unusual tiredness or weakness, confusion, difficulty in concentration, drowsiness, excessive hunger, vision changes, headache, nausea and palpitation.

#### *Lipodystrophy*

Lipodystrophy is reported as uncommon. Lipodystrophy may occur at the injection site.

## **Interactions**

A number of drugs are known to interact with the glucose metabolism.

#### **The following substances may reduce the insulin requirements:**

Oral anti-diabetic products, monoamine oxidase inhibitors (MAOI), non-selective beta-blocking agents, angiotensin converting enzyme (ACE) inhibitors, salicylates, anabolic steroids and sulphonamides.

#### **The following substances may increase the insulin requirements:**

Oral contraceptives, thiazides, glucocorticoids, thyroid hormones, sympathomimetics, growth hormone and danazol.

Beta-blocking agents may mask the symptoms of hypoglycaemia and delay recovery from hypoglycaemia.

Octreotide / lanreotide may either increase or decrease the insulin requirement.

Alcohol may intensify and prolong the hypoglycaemic effect of insulin.

## **Overdosage**

A specific overdose of insulin cannot be defined, however, hypoglycaemia may develop over sequential stages if too high doses relative to the patient's requirement are administered:

- Mild hypoglycaemic episodes can be treated by oral administration of glucose or sugary products. It is therefore recommended that the diabetic patient always carries sugar containing products.

Severe hypoglycaemic episodes, where the patient has become unconscious, can be treated with glucagon (0.5 to 1 mg) given intramuscularly or subcutaneously by a trained person or with

glucose given intravenously by a healthcare professional. Glucose must also be given intravenously if the patient does not respond to glucagon within 10 to 15 minutes. Upon regaining consciousness administration of oral carbohydrate is recommended for the patient in order to prevent a relapse.

## **Pharmaceutical Precautions**

Insulin preparations should be stored between 2°C and 8°C, (in a refrigerator), not in or near a freezing compartment. Insulin preparations which have been frozen must not be used. Insulin preparations should be protected from excessive heat or sunlight.

After first use MIXTARD and PROTAPHANE vials may be kept at room temperature (up to 25°C) for 6 weeks. PENMIX and PROTAPHANE Penfill may be used or carried as a spare (below 25°C) for 6 weeks.

Insulin suspensions should not be used if they do not appear uniformly white and cloudy after suspension.

## **Medicine Classification**

Prescription Medicine

## **Package Quantities**

PENMIX 30, 40 and 50 are available as a Penfill® of 3 ml in cartons of five.

MIXTARD 30 is available in glass vials of 10 ml.

PROTAPHANE is available as a Penfill® of 3 ml in cartons of five, or in glass vials of 10 ml.

## **Further Information**

### **Incompatibilities**

In general terms, insulin should only be added to compounds with which it has known compatibility. Insulin suspensions should not be added to infusion fluids.

### **Instructions for Use/Handling**

The carton contains a package leaflet with instructions for use and handling. The necessity of re-suspending the insulin suspension immediately before use is to be stressed to the patient. The re-suspended liquid shall appear uniformly white and cloudy.

PENMIX and PROTAPHANE Penfill is accompanied by a package leaflet with detailed instructions for use to be followed.

MIXTARD and PROTAPHANE vials are for use with insulin syringes with the corresponding unit scale. When two types of insulin are mixed, draw the amount of fast-acting insulin first, followed by the amount of long-acting insulin.

PENMIX and PROTAPHANE Penfill are for single person use only. The container must not be refilled.

PENMIX and PROTAPHANE Penfill are designed to be used with Novo Nordisk insulin delivery systems and NovoFine® or NovoTwist® needles.

### **Excipients**

Glycerol

Disodium phosphate dihydrate

Metacresol

Phenol

Zinc chloride  
Protamine sulphate  
Sodium hydroxide (for pH adjustment)  
Hydrochloric acid (for pH adjustment)  
Water for injections

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