

## **DEPO-MEDROL<sup>®</sup> with Lidocaine**

**Methylprednisolone acetate (40 mg/mL), lidocaine hydrochloride (10 mg/mL) injection**

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### **PRESENTATION**

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Depo-Medrol with Lidocaine is a white, aqueous, sterile suspension containing methylprednisolone acetate 40 mg/mL and lidocaine hydrochloride 10 mg/mL in a 1 mL vial.

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### **USES**

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#### **Actions**

##### Methylprednisolone

Methylprednisolone is an anti-inflammatory steroid. Estimates of the relative potencies of methylprednisolone relative to prednisolone range from 1.13 to 2.1 with an average of 1.5. In general the required daily dose of methylprednisolone can be estimated to be two thirds (or 0.7) the required daily dose of prednisolone. While the effect of parenterally administered methylprednisolone acetate is prolonged, it has the same metabolic and anti-inflammatory actions as orally administered medicine.

Cortisol and its synthetic analogues, such as methylprednisolone acetate, exert their action locally by preventing or suppressing the development of local heat, redness, swelling and tenderness by which inflammation is recognized at the gross level of observation. At the microscopic level, such compounds inhibit not only the early phenomena of the inflammatory process (oedema, fibrin deposition, capillary dilation, migration of phagocytes into the inflamed areas and phagocytic activity), but also the later manifestations (capillary proliferation, fibroblast proliferation, deposition of collagen and still later cicatrisation). These compounds inhibit inflammatory response whether the inciting agent is mechanical, chemical or immunological.

##### Lidocaine

Lidocaine is a potent local anaesthetic agent widely used both for topical and injection anaesthesia. Lidocaine prevents both the generation and the conduction of the nerve impulse. Its main site of action is the cell membrane, and there is seemingly little action of physiological importance on the axoplasm. The exact mechanism whereby a local anaesthetic influences the permeability of the membrane is unknown. As general rule, small nerve fibres are more susceptible to the action of local anaesthetics than are large fibres.

## **Pharmacokinetics**

No pharmacokinetic studies have been performed with the combination product of methylprednisolone and lidocaine, however, data are provided from pharmacokinetic studies performed with the individual product components methylprednisolone and lidocaine.

### ***Absorption***

#### *Methylprednisolone*

Time-to peak concentrations ( $T_{max}$ ) are  $7.3 \pm 1$  hour after intramuscular and 4 - 8 hours after intra-articular administration.

The plasma half-lives of steroids are generally short as compared to the biological half-lives; long after measurable plasma levels of steroids are depleted pharmacological activities continue.

After a single intramuscular injection of 40 to 80 mg methylprednisolone acetate, duration of HPA axis suppression ranged from four to eight days.

#### *Lidocaine*

Pharmacokinetics of lidocaine after synovial absorption following intra-articular bolus injection in patients with knee joint arthroscopy was studied with different maximum concentration ( $C_{max}$ ) values reported. The  $C_{max}$  values are 2.18  $\mu\text{g/mL}$  at 1 hour (serum) and 0.63  $\mu\text{g/mL}$  at 0.5 hour (plasma) following administration of lidocaine doses of 7 mg/kg and 400 mg, respectively. Other reported serum  $C_{max}$  values are 0.69  $\mu\text{g/mL}$  at 5 minutes and 0.278  $\mu\text{g/mL}$  at 2 hours following administration of lidocaine doses of 25 mL of 1% and 20 mL of 1.5%, respectively.

Pharmacokinetic data of lidocaine after intra-bursa and intra-cyst administrations for local effect are not available.

### ***Distribution***

#### *Methylprednisolone*

After intra-articular administration methylprednisolone acetate diffuses from the joint into systemic circulation over approximately 7 days.

Methylprednisolone is widely distributed into the tissues, crosses the blood-brain barrier, and is secreted in breast milk. The apparent volume of distribution is approximately 1.4 L/kg.

In man, methylprednisolone forms a weak dissociable bond with albumin and transcortin. The plasma protein binding of methylprednisolone is approximately 77%.

#### *Lidocaine*

Lidocaine hydrochloride is rapidly absorbed from injection sites and rapidly spreads through surrounding tissues.

The plasma protein binding of lidocaine is concentration-dependent, and binding decreases as concentration increases. At concentrations of 1 to 5  $\mu\text{g/mL}$ , 60%-80% lidocaine is protein bound. Binding is also dependent on the plasma concentration of the  $\alpha 1$ -acid glycoprotein.

Lidocaine has a volume of distribution at steady state of 91 L.

Lidocaine penetrates into the cerebrospinal fluid.

Lidocaine readily crosses the placenta, and equilibrium of unbound drug concentration is rapidly reached. The degree of plasma protein binding in the fetus is less than in the mother, which results in lower total plasma concentrations in the fetus.

### ***Biotransformation or Metabolism***

#### *Methylprednisolone*

Methylprednisolone acetate is hydrolysed to its active form by serum cholinesterases.

Metabolism of methylprednisolone occurs via hepatic routes qualitatively similar to that of cortisol. The major metabolites are 20 beta-hydroxymethylprednisolone and 20 beta-hydroxy-6-alpha-methylprednisone, and are inactive. The metabolites are excreted in the urine as glucuronides, sulphates and unconjugated compounds. These conjugation reactions occur principally in the liver and to some extent in the kidney.

Metabolism in the liver occurs primarily via the CYP3A4. Other drugs that are CYP3A4 inhibitors, inducers or substrates can influence the metabolism of methylprednisolone (see INTERACTIONS).

Methylprednisolone, like many CYP3A4 substrates, may also be a substrate for the ATP-binding cassette (ABC) transport protein p-glycoprotein, influencing tissue distribution and interactions with other medicines modulated by P-gp.

#### *Lidocaine*

Lidocaine is rapidly de-ethylated to monoethylglycine xylidide than metabolised by amidases in the liver.

The main metabolites of lidocaine are monoethylglycine xylidide, glycinexylidide, 2,6-dimethylaniline, and 4-hydroxy-2,6-dimethylaniline. The lidocaine N-dealkylation to monoethylglycine xylidide is considered to be mediated by both CYP1A2 and CYP3A4. The metabolite 2,6-dimethylaniline is converted to 4-hydroxy-2,6-dimethylaniline by CYP2A6 and CYP2E1.

### ***Elimination***

#### *Methylprednisolone*

The mean elimination half-life for total methylprednisolone is in the range of 1.8 to 5.2 hours.

Total clearance is approximately 5 to 6 mL/min/kg.

#### *Lidocaine*

The clearance of lidocaine in plasma following intravenous bolus administration is 9 to 10 mL/min/kg. The elimination half life of lidocaine following intravenous bolus injection is typically 1.5 to 2 hours.

The pharmacological actions of monoethylglycine xylidide and glycinexylidide are similar to but less potent than those of lidocaine. Monoethylglycine xylidide has a half life of approximately 2.3 hours and glycinexylidide has a half life of about 10 hours and may accumulate after long-term administration.

Only 3% of lidocaine is excreted unchanged by the kidneys. About 73% of lidocaine appears in the urine as 4-hydroxy-2,6-dimethylaniline metabolite.

### ***Special Populations***

#### ***Methylprednisolone***

No pharmacokinetic studies have been performed for methylprednisolone in special populations.

#### ***Lidocaine***

*Hepatic impairment:* Following intravenous administration, the half life of lidocaine has approximately 3-fold increase in patients with liver impairment. Pharmacokinetic data of lidocaine after intra-articular, intra-bursa and intra-cyst administrations for local effect are not available in hepatic impairment.

*Renal impairment:* Mild to moderate renal impairment (CLcr 30-60 mL/min) does not affect lidocaine pharmacokinetics but may increase the accumulation of glycinexylidide metabolite following intravenous administration. However, lidocaine clearance decreases about half and its half life is approximately doubled with increased accumulation of glycinexylidide metabolite in patients with severe renal impairment (Clcr <30 mL/min).

*Haemodialysis patients:* The pharmacokinetics of lidocaine and its main metabolite of monoethylglycine xylidide are not altered significantly in haemodialysis patients who receive an intravenous dose of lidocaine.

Pharmacokinetic data of lidocaine after intra-articular, intra-bursa and intra-cyst administrations for local effect are not available in renal impairment.

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## **INDICATIONS**

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Depo-Medrol with Lidocaine by intra-articular or soft tissue administration (including periarticular and intrabursal) is indicated as adjunctive therapy for short-term administration (to tide the patient over an acute episode or exacerbation) in:

- Synovitis of osteoarthritis
- Rheumatoid arthritis
- Acute gouty arthritis
- Epicondylitis
- Acute nonspecific tenosynovitis

- Post-traumatic osteoarthritis
- Acute and subacute bursitis
- Depo-Medrol with Lidocaine may also be useful in cystic tumours of an aponeurosis or tendon (ganglia).

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## DOSAGE AND ADMINISTRATION

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Because complications of treatment with glucocorticoids are dependent on the size of the dose and the duration of treatment, a risk/benefit decision must be made in each individual case as to dose and duration of treatment and as to whether daily or intermittent therapy should be used.

The lowest possible dose of corticosteroid should be used to control the condition under treatment and when reduction in dosage is possible, the reduction should be gradual.

Because of possible physical incompatibilities, Depo-Medrol with Lidocaine sterile aqueous suspension (methylprednisolone acetate) should not be diluted or mixed with other solutions.

When multidose vials are used, special care to prevent contamination of the contents is essential (see **WARNINGS AND PRECAUTIONS**).

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration whenever solution and container permit.

Sterile technique is necessary to prevent infections or contamination.

**Depo-Medrol with Lidocaine may be used by any of the following routes: intra-articular, periarticular, intrabursal, intralesional and into the tendon sheath. It MUST NOT be used by the intrathecal, epidural or intravenous routes (see CONTRAINDICATIONS, WARNINGS AND PRECAUTIONS and ADVERSE EFFECTS).**

### Administration for Local Effect

Therapy with Depo-Medrol with Lidocaine does not obviate the need for the conventional measures usually employed. Although this method of treatment will ameliorate symptoms, it is in no sense a cure and the steroid has no effect on the cause of the inflammation.

#### *1. Rheumatoid and Osteoarthritis*

The dose for intra-articular administration depends upon the size of the joint and varies with the severity of the condition in the individual patient. In chronic cases, injections may be repeated at intervals ranging from one to five or more weeks, depending upon the degree of relief obtained from the initial injection. The doses in the following table are given as a general guide:

Size of Joint	Examples	Range of Dosage
Large	Knees, Ankles, Shoulders	20-80 mg

Size of Joint	Examples	Range of Dosage
Medium	Elbows, Wrists	10-40 mg
Small	Metacarpophalangeal Interphalangeal Sternoclavicular Acromioclavicular	4-10 mg

### **Procedure**

It is recommended that the anatomy of the joint involved be reviewed before attempting intra-articular injection. In order to obtain the full anti-inflammatory effect, it is important that the injection be made into the synovial space. Employing the same sterile technique as for a lumbar puncture, a sterile 20 to 24 gauge needle (on a dry syringe) is quickly inserted into the synovial cavity. Procaine infiltration is elective. The aspiration of only a few drops of joint fluid proves the joint space has been entered by the needle.

The injection site for each joint is determined by the location where the synovial cavity is most superficial and most free of large vessels and nerves. With the needle in place, the aspirating syringe is removed and replaced by a second syringe containing the desired amount of Depo-Medrol with Lidocaine. The plunger is then pulled outward slightly to aspirate synovial fluid and to make sure the needle is still in the synovial space. After injection, the joint is moved gently a few times to aid mixing of the synovial fluid and the suspension. The site is covered with a small sterile dressing.

Suitable sites for intra-articular injection are the knee, ankle, wrist, elbow, shoulder, phalangeal, and hip joints. Since difficulty is occasionally encountered in entering the hip joint, precautions should be taken to avoid any large blood vessels in the area.

Joints not suitable for injection are those that are anatomically inaccessible, such as the spinal joints and those like the sacroiliac joints that are devoid of synovial space. Treatment failures are most frequently the result of failure to enter the joint space. Little or no benefit follows injection into surrounding tissue. If failures occur when injections into the synovial spaces are certain, as determined by aspiration of fluid, repeated injections are usually futile. Local therapy does not alter the underlying disease process and, whenever possible, comprehensive therapy including physiotherapy and orthopaedic correction should be employed.

Following intra-articular corticosteroid therapy care should be taken to avoid overuse of joints in which symptomatic benefit has been obtained. Negligence in this matter may permit an increase in joint deterioration that will more than offset the beneficial effects of the steroid.

Unstable joints should not be injected. Repeated intra-articular injection may in some cases result in instability of the joint. X-ray follow-up is suggested in selected cases to detect deterioration.

If a local anaesthetic is used prior to injection of Depo-Medrol with Lidocaine, the anaesthetic package insert should be read carefully and all the precautions observed.

### ***2. Bursitis***

The area around the injection site is prepared in a sterile way and a wheal at the site made with one percent procaine hydrochloride solution. A 20 to 24 gauge needle attached to a dry syringe is

inserted into the bursa and the fluid aspirated. The needle is left in place and the aspirating syringe changed for a small syringe containing the desired dose. After injection, the needle is withdrawn and a small dressing applied.

### **3. Miscellaneous: Ganglion, Tendinitis, Epicondylitis**

In the treatment of conditions such as tendinitis or tenosynovitis, care should be taken, following application of a suitable antiseptic to the overlying skin, to inject the suspension into the tendon sheath rather than into the substance of the tendon. The tendon may be readily palpated when placed on a stretch.

When treating conditions such as epicondylitis, the area of greatest tenderness should be outlined carefully and the suspension infiltrated into the area. For ganglia of the tendon sheaths, the suspension is injected directly into the cyst. In many cases a single injection causes a marked decrease in the size of the cystic tumour and may effect disappearance.

The dose in the treatment of the various conditions of the tendinous or bursal structures listed above varies with the condition being treated and ranges from 4 to 30 mg. In recurrent or chronic conditions, repeated injections may be necessary.

The usual sterile precautions should be observed with each injection.

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## **CONTRAINDICATIONS**

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- Systemic infections unless specific anti-infective therapy is given.
- Known hypersensitivity to methylprednisolone or any component of Depo-Medrol with Lidocaine.
- Known hypersensitivity to lidocaine or other anaesthetics of the amide type
- Intravenous, intrathecal, epidural injection or any other unspecified route of administration.

Administration of live or live, attenuated vaccines is contraindicated in patients receiving immunosuppressive doses of corticosteroids (see **WARNINGS AND PRECAUTIONS, Immunosuppressive Effects/Increased Susceptibility to Infections**).

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## **WARNINGS AND PRECAUTIONS**

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This product contains benzyl alcohol which is potentially toxic when administered locally to neural tissue. Benzyl alcohol has been reported to be associated with a fatal "gaspings syndrome" in premature infants (see **WARNINGS AND PRECAUTIONS, Paediatric Use**).

The lowest possible dose of corticosteroid should be used to control the condition under treatment and when reduction in dosage is possible, the reduction should be gradual. Since complications of treatment with glucocorticoids are dependent on the size of the dose and the duration of treatment, a risk/benefit decision must be made in each individual case as to dose and duration of treatment and as to whether daily or intermittent therapy should be used.

## **Administration Precautions**

Multidose use of Depo-Medrol with Lidocaine from a single vial requires special care to avoid contamination. Although initially sterile, any multidose use of vials may lead to contamination unless strict aseptic technique is observed. Particular care, such as use of disposable sterile syringes and needles is necessary. Multidose use of Depo-Medrol with Lidocaine from vials is not recommended for intra-articular injection.

While crystals of adrenal steroids in the dermis suppress inflammatory reactions, their presence may cause disintegration of the cellular elements and physiochemical changes in the ground substance of the connective tissue. The resultant infrequently occurring dermal and/or subdermal changes may form depressions in the skin at the injection site. The degree to which this reaction occurs will vary with the amount of adrenal steroid injected. Regeneration is usually complete within a few months or after all crystals of the adrenal steroid have been absorbed.

In order to minimise the incidence of dermal and subdermal atrophy, care must be exercised not to exceed recommended doses in injections. Multiple small injections into the area of the lesion should be made whenever possible. The technique of intra-articular injection should include precautions against injection or leakage into the dermis.

**Depo-Medrol with Lidocaine should not be administered by any route other than those listed under INDICATIONS.** It is critical that, during administration of Depo-Medrol with Lidocaine, appropriate technique be used and care taken to assure proper placement of the medicine.

Severe medical events have been reported in association with the contraindicated intrathecal/epidural routes of administration (see **ADVERSE EFFECTS**). Appropriate measures must be taken to avoid intravascular injection.

When multidose vials are used, special care to prevent contamination of the contents is essential. There is some evidence that benzalkonium chloride is not an adequate antiseptic for sterilising multidose vials. A povidone-iodine solution or similar product is recommended to cleanse the vial top prior to aspiration of contents.

## **Immunosuppressive Effects/Increased Susceptibility to Infections**

Due to their suppression of the inflammatory response and immune function, corticosteroids may increase susceptibility to fungal, bacterial and viral infections and their severity. Chicken pox and measles, for example, can have a more serious or even fatal course in non-immune children or adults on corticosteroids. How the dose, route and duration of corticosteroid administration affect the risk of developing a disseminated infection is not known. The contribution of the underlying disease and/or prior corticosteroid treatment to the risk is also not known. If exposed to chicken pox, they should seek urgent medical attention. Passive immunisation is recommended if non-immune patients who come into contact with chicken pox. If a diagnosis of chicken pox is confirmed the illness warrants specialist care and urgent treatment.

The immunosuppressive effects of corticosteroids may also result in activation of latent infection or exacerbation of existing infection. Corticosteroids should be used with great care in patients with known or suspected parasitic infections such as *Strongyloides* infestation. In such patients, corticosteroid-induced immunosuppression may lead to *Strongyloides* hyperinfection and dissemination with widespread larval migration, often accompanied by severe enterocolitis and potentially fatal gram-negative septicaemia.



It is important to note that corticosteroids may increase susceptibility to infection, may mask some signs of infection, which may reach an advanced stage before the infection is recognised, and new infections may appear during their use. There may be decreased resistance and inability to localise infection when corticosteroids are used. Infections with any pathogen, including viral, bacterial, fungal, protozoan or helminthic organisms, in any location in the body, may be associated with the use of corticosteroids alone or in combination with other immunosuppressive agents that affect cellular immunity, humoral immunity, or neutrophil function. These infections may be mild, but can be severe and at times fatal. With increasing doses of corticosteroids, the rate of occurrence of infectious complications increases. Caution must therefore be exercised in patients with HIV/AIDS or diabetes.

Do not use intra-articular, intrabursal or intratendinous administration for local effect in the presence of acute infection.

Depo-Medrol with Lidocaine is not recommended for use in patients with septic shock or sepsis syndrome. The role of corticosteroids in septic shock has been controversial, with early studies reporting both beneficial and detrimental effects. More recently, supplemental corticosteroids have been suggested to be beneficial in patients with established septic shock who exhibit adrenal insufficiency. However, a systematic review concluded that short-course, high-dose corticosteroids did not support their use. However, meta-analyses and a review suggest that longer courses (5-11 days) of low-dose corticosteroids might reduce mortality, especially in those with vasopressor-dependent septic shock.

Administration of live or live, attenuated vaccines is contraindicated in patients receiving immunosuppressive doses of corticosteroids. Killed or inactivated vaccines may be administered to patients receiving immunosuppressive doses of corticosteroids; however, the response to such vaccines may be diminished. Indicated immunisation procedures may be undertaken in patients receiving non-immunosuppressive doses of corticosteroids.

The use of methylprednisolone in active tuberculosis should be restricted to those cases of fulminating or disseminated tuberculosis in which the corticosteroid is used for the management of the disease in conjunction with an appropriate antituberculous regimen.

If corticosteroids are indicated in patients with latent tuberculosis or tuberculin reactivity, close observation is necessary as reactivation of the disease may occur. During prolonged corticosteroid therapy, these patients should receive chemoprophylaxis.

Kaposi's sarcoma has been reported to occur in patients receiving corticosteroid therapy. Discontinuation of corticosteroids may result in clinical remission.

### **Immune System Effects**

Allergic reactions (e.g. angioedema) may occur.

Because rare instances of skin reactions and anaphylactic/anaphylactoid reactions (e.g. bronchospasm) have occurred in patients receiving parenteral corticosteroid therapy, appropriate precautionary measures should be taken prior to administration, especially when the patient has a history of allergy to any drug. Allergic skin reactions have been reported apparently related to the excipients in the formulation. Rarely has skin testing demonstrated a reaction to methylprednisolone acetate, per se.

## **Endocrine Effects**

In patients on corticosteroid therapy (or those who have discontinued treatment but continue to experience symptoms of adrenal insufficiency) who are subjected to unusual stress such as intercurrent illness, trauma or surgery, increased dosage (or reinstatement) of rapidly acting corticosteroids may be required.

Pharmacologic doses of corticosteroids administered for prolonged periods may result in hypothalamic-pituitary-adrenal (HPA) suppression (secondary adrenocortical insufficiency). The degree and duration of adrenocortical insufficiency produced is variable among patients and depends on the dose, frequency, time of administration, and duration of glucocorticoid therapy. This effect may be minimised by use of alternate-day therapy.

In addition, acute adrenal insufficiency leading to a fatal outcome may occur if glucocorticoids are withdrawn abruptly. Therefore, withdrawal of corticosteroid should always be gradual.

Symptoms of adrenal insufficiency include: malaise, muscle weakness, mental changes, muscle and joint pain, desquamation of the skin, dyspnoea, anorexia, nausea and vomiting, fever, hypoglycaemia, hypotension and dehydration.

Drug-induced adrenocortical insufficiency may be minimised by gradual reduction of dosage. This type of relative insufficiency may persist for months after discontinuation of therapy, therefore, in any situation of stress occurring during that period, hormone therapy should be reinstated.

A steroid “withdrawal syndrome”, seemingly unrelated to adrenocortical insufficiency, may occur following abrupt discontinuance of glucocorticoids. This syndrome includes symptoms such as anorexia, nausea, vomiting, lethargy, headache, fever, joint pain, desquamation, myalgia, weight loss, and/or hypotension. These effects are thought to be due to the sudden change in glucocorticoid concentration rather than to low corticosteroid levels.

Because glucocorticoids can produce or aggravate Cushing’s syndrome, glucocorticoids should be avoided in patients with Cushing’s disease.

Corticosteroids should be used with caution in patients with hypothyroidism as there is potential for an enhanced effect of corticosteroids in these patients.

Pheochromocytoma crisis, which can be fatal, has been reported after administration of systemic corticosteroids. Corticosteroids should only be administered to patients with suspected or identified pheochromocytoma after an appropriate risk/benefit evaluation.

## **Metabolism and Nutrition**

Corticosteroids, including methylprednisolone, can increase blood glucose, worsen pre-existing diabetes and predisposes those on long term corticosteroid therapy to diabetes mellitus. Therefore, corticosteroids should be used with caution in patients with diabetes mellitus or a family history of diabetes mellitus.

## **Psychiatric Effects**

Psychic derangements may appear when corticosteroids are used, ranging from euphoria, insomnia, mood swings, personality changes, and severe depression to frank psychotic

manifestations. Also, existing emotional instability or psychotic tendencies may be aggravated by corticosteroids. Therefore, particular care is required when considering the use of corticosteroids in patients with existing or previous history of severe affective disorders.

Potentially severe psychiatric adverse reactions may occur with systemic corticosteroids (see **ADVERSE EFFECTS**). Symptoms typically emerge within a few days or weeks of starting treatment. Most reactions recover after either dose reduction or withdrawal, although specific treatment may be necessary.

Psychological effects have been reported upon withdrawal of corticosteroids; the frequency is unknown. Patients/caregivers should be encouraged to seek medical attention if psychological symptoms develop in the patient, especially if depressed mood or suicidal ideation is suspected. Patients/caregivers should be alert to possible psychiatric disturbances that may occur either during or immediately after dose tapering/withdrawal of systemic steroids.

### **Nervous System Effects**

Corticosteroids should be used with caution in patients with seizure disorders.

Corticosteroids should be used with caution in patients with myasthenia gravis (see **WARNINGS AND PRECAUTIONS, Musculoskeletal Effects**).

There have been reports of epidural lipomatosis in patients taking corticosteroids, typically with long-term use at high doses.

### **Ocular Effects**

Corticosteroids should be used cautiously in patients with ocular herpes simplex because of possible risk of corneal scarring, loss of vision and corneal perforation.

Prolonged use of corticosteroids may produce posterior subcapsular cataracts and nuclear cataracts (particularly in children), exophthalmos, or increased intraocular pressure, which may result in glaucoma with possible damage to the optic nerves. Establishment of secondary fungal and viral infections of the eye may also be enhanced in patients receiving glucocorticoids.

Corticosteroid therapy has been associated with central serous chorioretinopathy, which may lead to retinal detachment.

### **Cardiac Effects**

Adverse effects of glucocorticoids on the cardiovascular system, such as dyslipidemia and hypertension, may predispose treated patients with existing cardiovascular risk factors to additional cardiovascular effects if high doses and/or prolonged courses are used. When using corticosteroids in these patients, attention should be paid to risk modification and additional cardiac monitoring should be considered.

Systemic corticosteroids should be used with caution, and only if strictly necessary, in cases of congestive heart failure.

## **Vascular Effects**

Thrombosis including venous thromboembolism has been reported to occur with corticosteroids. As a result corticosteroids should be used with caution in patients who have or may be predisposed to thromboembolic disorders.

Corticosteroids should be used with caution in patients with hypertension.

## **Gastrointestinal Effects**

There is no universal agreement on whether corticosteroids per se are responsible for peptic ulcers encountered during therapy; however, glucocorticoid therapy may mask the symptoms of peptic ulcer so that perforation or haemorrhage may occur without significant pain. In combination with NSAIDs, the risk of developing gastrointestinal ulcers is increased.

Corticosteroids should be used with caution in non-specific ulcerative colitis if there is a probability of impending perforation, abscess or other pyogenic infection, diverticulitis, fresh intestinal anastomoses, or active or latent peptic ulcer, oesophagitis and gastritis.

## **Hepatobiliary Effects**

Corticosteroids should be used with caution in patients with hepatic failure.

High doses of corticosteroids may produce acute pancreatitis.

There is an enhanced effect of corticosteroids in patients with cirrhosis.

## **Musculoskeletal Effects**

Corticosteroids should be used with caution in patients with myasthenia gravis who are receiving anticholinesterase therapy as corticosteroid use may decrease plasma anticholinesterase activity.

An acute myopathy has been reported with the use of high doses of corticosteroids, most often occurring in patients with disorders of neuromuscular transmission (e.g. myasthenia gravis) or in patients receiving concomitant therapy with anticholinergics, such as neuromuscular blocking drugs (e.g. pancuronium). This acute myopathy is generalised, may involve ocular and respiratory muscles, and may result in quadriplegia. Elevations of creatine kinase may occur. Clinical improvement or recovery after stopping corticosteroids may require weeks to years.

Corticosteroids should be used with caution in patients with osteoporosis. Osteoporosis is a common but infrequently recognised adverse effect associated with a long-term use of large doses of glucocorticoid.

Corticosteroid should be used with caution in patients with Duchenne's muscular dystrophy since transient rhabdomyolysis and myoglobinuria have been reported following strenuous activities.

Corticosteroids should be used with caution in patients with previous steroid myopathy.

## **Renal and Urinary Disorders**

Corticosteroids should be used with caution in patients with renal insufficiency.

## **Investigations**

Average and large doses of hydrocortisone or cortisone can cause elevation of blood pressure, salt and water retention, and increased excretion of potassium. These effects are less likely to occur with the synthetic derivatives except when used in large doses. Dietary salt restriction and potassium supplementation may be necessary. All corticosteroids increase calcium excretion.

## **Discontinuation (see WARNINGS AND PRECAUTIONS, Endocrine Effects)**

## **Injury, Poisoning and Procedural Complications**

Systemic corticosteroids are not indicated for, and should therefore not be used to treat traumatic brain injury. A multicentre study revealed an increased mortality at 2 weeks and 6 months after injury in patients administered methylprednisolone compared to placebo. A causal association with methylprednisolone treatment has not been established.

## **Other**

Aspirin and nonsteroidal anti-inflammatory agents should be used cautiously in conjunction with corticosteroids (see **INTERACTIONS, Other Interactions, NSAIDs**).

## **Additional Precautions Specific For Parenteral Corticosteroids**

Intra-articular injection of a corticosteroid may produce systemic as well as local effects. No additional benefit derives from the intramuscular administration of Depo-Medrol with Lidocaine. Where parenteral corticosteroid therapy for sustained systemic effect is desired, plain Depo-Medrol should be used.

Appropriate examination of any joint fluid present is necessary to exclude a septic process.

A marked increase in pain accompanied by local swelling, further restriction of joint motion, fever, and malaise are suggestive of septic arthritis. If this complication occurs and the diagnosis of sepsis is confirmed, appropriate antimicrobial therapy should be instituted.

Local injection of a steroid into a previously infected joint is to be avoided.

Corticosteroids should not be injected into unstable joints (see **DOSAGE AND ADMINISTRATION**).

Sterile technique is necessary to prevent infections or contamination.

## **Effects on Fertility**

Reproductive toxicity studies have not been conducted with the combination of methylprednisolone and lidocaine.

Corticosteroids have been shown to impair fertility in animal studies.

No effects could be detected in reproductive toxicity studies of lidocaine in rats.

## **Use in Pregnancy**

### ***Methylprednisolone***

Corticosteroids have been shown to be teratogenic in many species when given in doses equivalent to the human dose. Some animal studies have shown that corticosteroids (such as methylprednisolone), when administered to the mother, may cause fetal malformations of various kinds (cleft palate, skeletal malformations) and intra-uterine growth retardation. Adequate human reproductive studies have not been done with corticosteroids. Therefore the use of this drug in pregnancy, nursing mothers, or women of childbearing potential requires that the benefits of the drug be carefully weighed against the potential risk to the mother and embryo or fetus. Since there is inadequate evidence of safety in human pregnancy, this drug should be used in pregnancy only if clearly needed.

Corticosteroids readily cross the placenta. An increased incidence of low-birth weights in infants born of mothers receiving corticosteroids has been reported.

Infants born to mothers who have received substantial doses of corticosteroids during pregnancy must be carefully observed and evaluated for signs of adrenal insufficiency, although neonatal adrenal insufficiency is rarely reported in infants exposed *in utero* to corticosteroids.

Cataracts have been observed in infants born to mothers treated with long-term corticosteroids during pregnancy.

Benzyl alcohol can cross the placenta (see **WARNINGS AND PRECAUTIONS, Paediatric Use**).

### ***Lidocaine***

Adequate human reproductive studies have not been done with lidocaine.

Lidocaine readily crosses the placenta.

### ***Labour and Delivery***

There are no known effects of corticosteroids on labour and delivery. The use of local anaesthetics such as lidocaine during labour and delivery may be associated with adverse effects on mother and fetus.

## **Use in Lactation**

### ***Methylprednisolone***

Corticosteroids are excreted in breast milk.

Corticosteroids distributed into breast milk may suppress growth and interfere with endogenous glucocorticoid production in nursing infants. Since adequate reproductive studies have not been performed in humans with glucocorticoids, these drugs should be administered to nursing mothers only if the benefits of therapy are judged to outweigh the potential risks to the infant.

### ***Lidocaine***

It is not known whether lidocaine is excreted in human breast milk.

## Paediatric Use

This product contains benzyl alcohol. Benzyl alcohol is associated with severe adverse effects, including fatal "gaspings syndrome", in paediatric patients.

The minimum amount of benzyl alcohol at which toxicity may occur is unknown. The risk of benzyl alcohol toxicity depends on the quantity administered and the hepatic capacity to detoxify the chemical. Premature and low-birth-weight infants may be more likely to develop toxicity.

Growth and development of infants and children on prolonged corticosteroid therapy should be carefully observed. Corticosteroids may cause growth retardation in infancy, childhood and adolescence. The effects may be irreversible, therefore, long-term daily divided doses of corticosteroids should be avoided in these patients.

In infants, children and adolescents, corticosteroid treatment should be restricted to the most serious indications. Use in children should be limited to the shortest possible time.

Increased intracranial pressure with papilloedema (pseudotumour cerebri) in children has been reported, usually after treatment withdrawal of methylprednisolone. Infants and children on prolonged corticosteroid therapy are at special risk from raised intracranial pressure.

High doses of corticosteroids may produce pancreatitis in children.

## Use in the Elderly

The use of corticosteroids, particularly long-term use, in the elderly should be planned bearing in mind the more serious consequences of the common side effects, especially osteoporosis, hypertension, hypokalaemia, diabetes, susceptibility to infection and thinning of the skin. Close clinical supervision is required to avoid life-threatening reactions.

## Genotoxicity

Genotoxicity studies have not been conducted with the combination of methylprednisolone and lidocaine.

There was no evidence of a potential for genetic and chromosome mutations when methylprednisolone was tested in limited studies performed in bacterial and mammalian cells.

Genotoxicity tests with lidocaine showed no evidence of mutagenic potential. A metabolite of lidocaine, 2,6-xylidine, showed weak genotoxic potential *in vitro* and *in vivo*.

## Carcinogenicity

Long-term studies in animals have not been performed to evaluate carcinogenic potential in methylprednisolone, lidocaine or the combination of methylprednisolone and lidocaine.

A metabolite of lidocaine, 2,6-xylidine, has been shown to be carcinogenic in rats with unknown clinical relevance in relation to short-term/intermittent use of lidocaine as a local anaesthetic.

## Effects on Ability to Drive and Use Machines

The effect of corticosteroids on the ability to drive or use machinery has not been systematically evaluated. Undesirable effects, such as dizziness, vertigo, visual disturbances, and fatigue are possible after treatment with corticosteroids. If affected, patients should not drive or operate machinery.

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## ADVERSE EFFECTS

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**Administration by other than indicated routes has been associated with reports of serious medical events including: arachnoiditis, meningitis, paraparesis/paraplegia, sensory disturbances, headache, functional gastrointestinal disorder/bladder dysfunction, seizures, visual impairment including blindness, ocular and periocular inflammation, and residue or slough at injection site.**

The adverse effects for methylprednisolone acetate are listed below by system organ class and frequency.

### *Infections and Infestations*

Not known: Opportunistic infection, infection<sup>a</sup>, peritonitis, oesophageal candidiasis, injection site infection<sup>b</sup>.

### *Blood and Lymphatic System Disorders*

Not known: Leucocytosis

### *Immune System Disorders*

Not known: Drug hypersensitivity (including anaphylactic reaction and anaphylactoid reaction), suppression of reactions to skin tests.

### *Endocrine Disorders*

Not known: Cushingoid, hypopituitarism, steroid withdrawal syndrome.

### *Metabolism and Nutrition Disorders*

Not known: Lipomatosis, sodium retention, fluid retention, alkalosis hypokalaemic, metabolic acidosis, dyslipidaemia, glucose tolerance impaired<sup>c</sup>, increased insulin requirement (or oral hypoglycaemic agents in diabetics), increased appetite (which may result in weight increased).

### *Psychiatric Disorders*

Not known: Affective disorder (including depressed mood, euphoric mood affect lability, drug dependence, suicidal ideation), psychotic disorder (including mania, delusion, hallucination and schizophrenia), psychotic behaviour, mental disorder, personality change, mood swings, confusional state, abnormal behaviour, anxiety, irritability, insomnia.



### ***Nervous System Disorders***

Not known: Epidural lipomatosis, intracranial pressure increased (with papilloedema [benign intracranial hypertension]), convulsion, amnesia, cognitive disorder, dizziness, headache.

### ***Eye Disorders***

Not known: Central serous chorioretinopathy, blindness<sup>d</sup>, cataract, glaucoma, exophthalmos, corneal thinning, scleral thinning, exacerbation of ophthalmic viral or fungal disease.

### ***Ear and Labyrinth Disorders***

Not known: Vertigo.

### ***Cardiac Disorders***

Not known: Cardiac failure congestive (in susceptible patients).

### ***Vascular Disorders***

Not known: Thrombosis, hypertension, hypotension.

### ***Respiratory, Thoracic and Mediastinal Disorders***

Not known: Pulmonary embolism, hiccups.

### ***Gastrointestinal Disorders***

Not known: Peptic ulcer (with possible peptic ulcer perforation and peptic ulcer haemorrhage), intestinal perforation, gastric haemorrhage, pancreatitis, oesophagitis ulcerative, oesophagitis, abdominal distension, abdominal pain, diarrhoea, dyspepsia, nausea.

### ***Skin and Subcutaneous Tissue Disorders***

Not known: Angioedema, hirsutism, petechiae, ecchymosis, subcutaneous atrophy, skin atrophy, erythema, hyperhidrosis, skin striae, rash, pruritus, urticaria, telangiectasia, skin hyperpigmentation, skin hypopigmentation, acne.

### ***Musculoskeletal and Connective Tissue Disorders***

Not known: Muscular weakness, myalgia, myopathy, muscle atrophy, osteoporosis, osteonecrosis, pathological fracture, neuropathic arthropathy, arthralgia, growth retardation.

### ***Reproductive System and Breast Disorders***

Not known: Menstruation irregular, amenorrhoea.

### ***General Disorders and Administration Site Conditions***

Not known: Abscess sterile, oedema peripheral, impaired healing, fatigue, malaise, injection site reaction, post-injection flare<sup>e</sup>.

### ***Investigations***

Not known: Intraocular pressure increased, carbohydrate tolerance decreased, blood potassium decreased, nitrogen balance negative (due to protein catabolism), calcium balance negative, urine calcium increased, alanine aminotransferase increased, aspartate aminotransferase increased, blood alkaline phosphatase increased, blood urea increased.

### ***Injury, Poisoning and Procedural Complications***

Not known: Spinal compression fracture, tendon rupture<sup>f</sup>.

<sup>a</sup> Including increased susceptibility to and severity of infections, masking of infections and latent infections (e.g. tuberculosis) becoming active.

<sup>b</sup> Following non-sterile administration.

<sup>c</sup> Manifestations of latent diabetes mellitus.

<sup>d</sup> Rare instances of blindness associated with intralesional therapy around the face and head.

<sup>e</sup> Following intra-articular use.

<sup>f</sup> Particularly of the Achilles tendon.

## **LIDOCAINE**

### ***Immune System Disorders***

Anaphylactic reaction.

### ***Psychiatric Disorders***

Anxiety, confusional state, nervousness, euphoric mood.

### ***Nervous System Disorders***

Loss of consciousness, convulsion, dizziness, tremor, hypoaesthesia, somnolence.

### ***Eye Disorders***

Diplopia, vision blurred.

### ***Ear and Labyrinth Disorders***

Tinnitus.

### ***Cardiac Disorders***

Cardiac arrest, bradycardia.

### ***Vascular Disorders***

Circulatory collapse, hypotension.

### ***Respiratory, Thoracic and Mediastinal Disorders***

Respiratory arrest, respiratory depression.

### ***Gastrointestinal Disorders***

Vomiting.

### ***Skin and Subcutaneous Tissue Disorders***

Skin lesion, urticaria.

### ***Musculoskeletal and Connective Tissue Disorders***

Muscle twitching.

### ***General Disorders and Administration Site Conditions***

Oedema, feeling hot, feeling cold.

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## **INTERACTIONS**

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The pharmacokinetic interactions listed below are potentially clinically important.

Methylprednisolone is a cytochrome P450 enzyme (CYP) substrate and is metabolised mainly by the CYP3A4 enzyme. CYP3A4 is the dominant enzyme of the most abundant CYP subfamily in the liver of adult humans. It catalyses 6 $\beta$ -hydroxylation of steroids, the essential Phase I metabolic step for both endogenous and synthetic corticosteroids. Many other compounds are also substrates of CYP3A4, some of which (as well as other medicines) have been shown to alter glucocorticoid metabolism by induction (upregulation) or inhibition of the CYP3A4 enzyme.

### **CYP3A4 Inhibitors**

Drugs that inhibit CYP3A4 activity generally decrease hepatic clearance, resulting in increased plasma concentration of methylprednisolone. Coadministration of CYP3A4 inhibitors may require titration of methylprednisolone dosage to reduce the risk of adverse effects and avoid steroid toxicity.

CYP3A4 inhibitors include:

- Antifungals such as ketoconazole and itraconazole.
- Antiemetics such as aprepitant and fosaprepitant.
- Immunosuppressants such as ciclosporin. Mutual inhibition of metabolism occurs with concurrent use of ciclosporin and methylprednisolone, which may increase the plasma concentrations of either or both drugs. Therefore, it is possible that adverse events associated with the use of either drug alone may be more likely to occur upon coadministration. Convulsions have been reported with concurrent use of methylprednisolone and ciclosporin.

- Macrolide antibacterials such as clarithromycin, erythromycin and troleandomycin.
- HIV-Protease inhibitors such as indinavir and ritonavir, may increase plasma concentrations of corticosteroids. Corticosteroids may induce the metabolism of HIV-protease inhibitors, resulting in reduced plasma concentrations.
- Calcium channel blockers such as diltiazem.
- Isoniazid may increase the plasma concentration of methylprednisolone. In addition, there is a potential effect of methylprednisolone to increase the acetylation rate and clearance of isoniazid.
- Oral contraceptives such as ethinylestradiol and norethisterone, retard the metabolism of corticosteroids due to increased binding to globulin, resulting in increased plasma levels of corticosteroids and potentiating their biological effect. The dose of corticosteroids may need to be adjusted when commencing or stopping oral contraceptive therapy.
- Grapefruit juice.

### **CYP3A4 Inducers**

Drugs that induce CYP3A4 activity generally increase hepatic clearance, resulting in decreased plasma concentrations of methylprednisolone. Coadministration of these substances may require an increase in methylprednisolone dosage to achieve the desired result.

CYP3A4 inducers include:

- Anticonvulsants such as phenobarbital, phenytoin, carbamazepine and primidone.
- Bactericidal antibiotics such as rifampicin and rifabutin.

### **CYP3A4 Substrates**

In the presence of another CYP3A4 substrate, the hepatic clearance of methylprednisolone may be affected, with corresponding dosage adjustments required. It is possible that adverse events associated with the use of either drug alone may be more likely to occur with coadministration. Most CYP3A4 inhibitors are also CYP3A4 substrates.

- Immunosuppressants such as cyclophosphamide and tacrolimus.

### **Other Interactions**

Other interactions and effects that occur with methylprednisolone are described below.

#### ***Antacids***

Concurrent use may decrease absorption of corticosteroids. Efficacy may be reduced sufficiently to require dosage adjustments in patients receiving small doses of corticosteroids.

### ***Antidiabetic Agents***

Corticosteroids may increase blood glucose levels. Dose adjustments of antidiabetic therapy may be required with concurrent therapy.

### ***Anticholinergics***

Corticosteroids may influence the effect of anticholinergics.

Acute myopathy has been reported with the concomitant use of high doses of corticosteroids and anticholinergics, such as neuromuscular blocking drugs (see **WARNINGS AND PRECAUTIONS, Musculoskeletal Effects**).

Antagonism of the neuromuscular blocking effects of pancuronium and vecuronium has been reported in patients taking corticosteroids. This interaction may be expected with all competitive neuromuscular blockers.

### ***Anticholinesterases***

Steroids may reduce the effects of anticholinesterases in myasthenia gravis

### ***Anticoagulants (Oral)***

The effect of methylprednisolone on oral anticoagulants is variable. There are reports of enhanced as well as diminished effects of anticoagulants when given concurrently with corticosteroids. Therefore, coagulation indices (such as INR or prothrombin time) should be monitored to maintain the desired anticoagulant effects.

### ***Aromatase Inhibitors***

Aminogluethimide-induced adrenal suppression may exacerbate endocrine changes caused by prolonged glucocorticoid treatment.

### ***Cardiac Glycosides***

There is a risk of toxicity if hypokalaemia occurs due to corticosteroid treatment.

### ***Diuretics and Other Potassium Depleting Agents***

Excessive potassium loss maybe experienced with concurrent use of corticosteroids and potassium depleting diuretics (such as frusemide and thiazides) or carbonic anhydrase inhibitors (such as acetazolamide). Patients should be observed closely for development of hypokalaemia. There is also an increased risk of hypokalaemia with concurrent use of corticosteroids with amphotericin B, xanthenes, or beta2 agonists.

### ***Mifepristone***

The effect of corticosteroids may be reduced for 3-4 days after taking mifepristone.

### ***NSAIDs***

Concomitant administration may increase the risk of gastrointestinal bleeding and ulceration.

Methylprednisolone may increase the renal clearance of high-dose aspirin, which can lead to decreased salicylate serum levels. Discontinuation of methylprednisolone treatment can lead to raised salicylate serum levels, which could lead to an increased risk of salicylate toxicity.

Aspirin should be used cautiously in conjunction with corticosteroids in patients suffering from hypoprothrombinemia.

### ***Somatropin***

Concomitant administration may inhibit the growth promoting effect of somatropin.

### ***Sympathomimetics***

There is an increased risk of hypokalaemia with concurrent high doses of corticosteroids and sympathomimetics such as salbutamol, salmeterol, terbutaline or formoterol.

### ***Vaccines***

Live vaccines should not be given to individuals with impaired immune responsiveness. The antibody response to other vaccines may be diminished.

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## **OVERDOSAGE**

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There is no clinical syndrome of acute overdosage with Depo-Medrol with Lidocaine (methylprednisolone acetate).

### **Methylprednisolone**

Repeated frequent doses (daily or several times per week) over a protracted period may result in a Cushingoid state, and other complications of chronic steroid therapy.

Reports of acute toxicity and/or death following overdosage of corticosteroids are rare. In the event of overdosage, no specific antidote is available; treatment is supportive and symptomatic.

Methylprednisolone is dialysable.

### **Lidocaine**

Overdose with lidocaine can manifest itself in a transient stimulation of the central nervous system with early symptoms: yawning, restlessness, dizziness, nausea, vomiting, dysarthria, ataxia, hearing and visual disturbances. With moderate intoxication also twitching and convulsions can occur. This can be followed by unconsciousness, respiratory depression and coma. In very severe intoxication due to decreased myocardial contractility and delayed impulse conduction, hypotension and cardiovascular collapse can be expected to be followed by a complete heart block and cardiac arrest. Treatment is symptomatic and where appropriate, convulsions may be treated with diazepam, ventilation may be used for respiratory depression, hypotension may be treated by the administration of fluids and dopamine. Similarly, with asystole, adrenaline administration may be used and, if necessary, pacemaker insertion may be considered.

Contact the National Poisons Centre on 0800 764 766 for advice on the management of an overdose.

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## PHARMACEUTICAL PRECAUTIONS

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### Storage Conditions

Store below 25°C. Protect from freezing.

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## MEDICINE CLASSIFICATION

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Prescription Medicine.

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## PACKAGE QUANTITIES

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Depo-Medrol with Lidocaine is available in vials of 1 mL.

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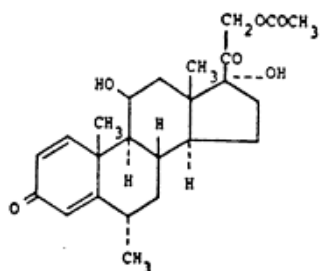
## FURTHER INFORMATION

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The chemical name for methylprednisolone acetate is pregna-1,4-diene-3,20-dione, 21-(acetyloxy)-11,17-dihydroxy-6-methyl-, (6 $\alpha$ ,11 $\beta$ ). The chemical name for lidocaine hydrochloride is 2-(Diethylamino)-N-(2,6-dimethylphenyl)-acetamide hydrochloride.

The structural formulae are shown below:

Methylprednisone acetate

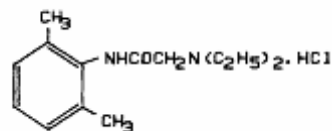


Molecular formula: C<sub>24</sub>H<sub>32</sub>O<sub>6</sub>

Molecular weight: 416.51

CAS Registry Number: 53-36-1

Lidocaine hydrochloride



C<sub>14</sub>H<sub>22</sub>N<sub>2</sub>O<sub>2</sub>.HCl

234.34

137-58-6

### *Excipients*

Depo-Medrol with Lidocaine contains myristyl-gamma-picolinium chloride 0.19 mg/mL and benzyl alcohol 8.7 mg/mL as preservatives.

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## **NAME AND ADDRESS**

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Toll Free Number: 0800 736 363

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## **DATE OF PREPARATION**

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10 November 2014.

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