

### Millipred™ Oral Tablet

(prednisolone tablets USP, 5 mg, 50 mg)

### MILLIPRED™ DP - 6-Day Tablet

#### Dose Pack

(prednisolone tablets USP, 5 mg, 50 mg)

### MILLIPRED™ DP - 12-Day

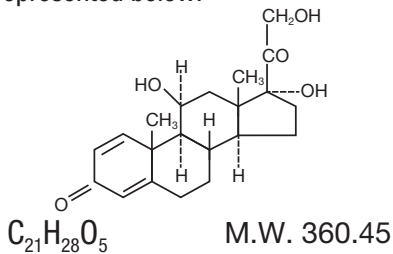
#### Tablet Dose Pack

(prednisolone tablets USP, 5 mg, 50 mg)

Rx only

## DESCRIPTION

Glucocorticoids are adrenocortical steroids, both naturally occurring and synthetic, which are readily absorbed from the gastrointestinal tract. Prednisolone is a white crystalline powder, very slightly soluble in water. It is designated chemically as pregna-1,4-diene-3,20-ione, 11,17,21-trihydroxy-, (11)-. The structural formula is represented below:



Millipred and Millipred DP Tablets contain the following inactive ingredients: anhydrous lactose, colloidal silicon dioxide, crospovidone, D&C Yellow No. 10, docusate sodium, FD&C Yellow No. 6, magnesium stearate and sodium benzoate.

## CLINICAL PHARMACOLOGY

Naturally occurring glucocorticoids (hydrocortisone and cortisone), which also have salt-retaining properties, are used as replacement therapy in adrenocortical deficiency states. Prednisolone is primarily used for its potent anti-inflammatory effects in disorders of many organ systems. Glucocorticoids cause profound and varied metabolic effects. In addition, they modify the body's immune responses to diverse stimuli.

## INDICATIONS AND USAGE

**1. Endocrine disorders.** Primary or secondary adrenocortical insufficiency (hydrocortisone or cortisone is the first choice; synthetic analogs may be used in conjunction with mineralocorticoids where applicable; in infancy mineralocorticoid supplementation is of particular importance). Congenital adrenal hyperplasia. Nonsuppurative thyroiditis. Hypercalcemia associated with cancer

**2. Rheumatic disorders.** As adjunctive therapy for short term administration (to tide the patient over an acute episode or exacerbation) in:

- Psoriatic arthritis
- Rheumatoid arthritis; including juvenile rheumatoid arthritis (selected cases may require low-dose maintenance therapy)
- Ankylosing spondylitis
- Acute and subacute bursitis
- Acute nonspecific tenosynovitis
- Acute gouty arthritis
- Post-traumatic osteoarthritis
- Synovitis of osteoarthritis
- Epicondylitis

**3. Collagen diseases.** During an exacerbation or as maintenance therapy in selected cases of:

- Systemic lupus erythematosus
- Acute rheumatic carditis
- Systemic dermatomyositis (poly-myositis).

## 4. Dermatologic diseases

- Pemphigus
- Bullous dermatitis herpetiformis
- Severe erythema multiforme (Stevens-Johnson syndrome);
- Exfoliative dermatitis
- Mycosis fungoides
- Severe psoriasis
- Severe seborrheic dermatitis.

**5. Allergic states.** Control of severe or incapacitating allergic conditions intractable to adequate trials of conventional treatment:

- Seasonal or perennial allergic rhinitis
- Serum sickness
- Bronchial asthma
- Contact dermatitis
- Atopic dermatitis
- Drug hypersensitivity reactions

**6. Ophthalmic diseases.** Severe acute and chronic allergic and inflammatory processes involving the eye and its adnexa such as:

- Allergic conjunctivitis
- Keratitis
- Allergic corneal marginal ulcers
- Herpes zoster ophthalmicus
- Iritis and iridocyclitis
- Chorioretinitis
- Anterior segment inflammation
- Diffuse posterior uveitis and choroiditis
- Optic neuritis
- Sympathetic ophthalmia

## 7. Respiratory diseases

- Symptomatic sarcoidosis
- Loeffler's syndrome not manageable by other means
- Berylliosis
- Fulminating or disseminated pulmonary tuberculosis when used

concurrently with appropriate antituberculous

- chemotherapy
- Aspiration pneumonitis

## 8. Hematologic disorders

- Idiopathic thrombocytopenic purpura in adults
- Secondary thrombocytopenia in adults
- Acquired (autoimmune) hemolytic anemia
- Erythroblastopenia (RBC anemia)
- Congenital (erythroid) hypoplastic anemia

**9. Neoplastic diseases.** For palliative management of:

- Leukemias and lymphomas in adults
- Acute leukemia of childhood

**10. Edematous states.** To induce a diuresis or remission of proteinuria in the nephrotic syndrome, without uremia, of the idiopathic type or that due to lupus erythematosus.

**11. Gastrointestinal diseases.** To tide the patient over a critical period of the disease in:

- Ulcerative colitis
- Regional enteritis

**12. Nervous system.** Acute exacerbations of multiple sclerosis.

## 13. Miscellaneous

- Tuberculous meningitis with subarachnoid block or impending block when used concurrently with appropriate antituberculous chemotherapy
- Trichinosis with neurologic or myocardial involvement

## CONTRAINDICATIONS

Systemic fungal infections

## WARNINGS

Persons who are on drugs which suppress the immune system are more susceptible to infections than healthy individuals. Chickenpox and measles, for example, can have a more serious or even fatal course in non-immune children or adults on corticosteroids. In such children or adults who have not had these diseases, particular care should be taken to avoid exposure. How the dose, route and duration of corticosteroid administration affects 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 chickenpox, prophylaxis with varicella zoster immune globulin (VZIG) may be indicated. If exposed to measles, prophylaxis with pooled intramuscular immunoglobulin (IG) may be indicated. (See the respective package inserts for complete VZIG and IG prescribing information.) If chickenpox develops, treatment with antiviral agents may be considered.

In patients on corticosteroid therapy subjected to unusual stress increased dosage of rapidly acting corticosteroids before, during, and after the stressful situation is indicated. Corticosteroids may mask some signs of infection, and new infections may appear

## DOSAGE AND ADMINISTRATION

The initial dosage of Millipred and Millipred DP Tablets may vary from 5 mg to 60 mg per day depending on the specific disease entity being treated. In situations of less severity, lower doses will generally suffice, while in selected patients higher initial doses may be required. The initial dosage should be maintained or adjusted until a satisfactory response is noted. If after a reasonable period of time there is a lack of satisfactory clinical response, prednisolone should be discontinued and the patient transferred to other appropriate therapy.

### **IT SHOULD BE EMPHASIZED THAT DOSAGE REQUIREMENTS ARE VARIABLE AND MUST BE INDIVIDUALIZED ON THE BASIS OF THE DISEASE UNDER TREATMENT AND THE RESPONSE OF THE PATIENT.**

After a favorable response is noted, the proper maintenance dosage should be determined by decreasing the initial drug dosage in small increments at appropriate time intervals until the lowest dosage which will maintain an adequate clinical response is reached. It should be kept in mind that constant monitoring is needed in regard to drug dosage. Included in the situations which may make dosage adjustments necessary are changes in clinical status secondary to remissions or exacerbations in the disease process, the patient's individual drug responsiveness, and the effect of patient exposure to stressful situations not directly related to the disease entity under treatment; in this latter situation it may be necessary to increase the dosage of prednisolone for a period of time consistent with the patient's condition. If after long-term therapy the drug is to be stopped, it is recommended that it be withdrawn gradually rather than abruptly.

### **Alternate-Day Therapy**

Alternate-Day Therapy is a corticosteroid dosing regimen in which twice the usual daily dose of corticoid is administered every other morning. The purpose of this mode of therapy is to provide the patient requiring long-term pharmacologic dose treatment with the beneficial effects of corticoids while minimizing certain undesirable effects, including pituitary-adrenal suppression, the Cushingoid state, corticoid withdrawal symptoms, and growth suppression in children. The rationale for this treatment schedule is based on two major premises: (a) the anti-inflammatory or therapeutic effect of corticoids persists longer than their physical presence and metabolic

effects and (b) administration of the corticosteroid every other morning allows for re-establishment of more nearly normal hypothalamic-pituitary-adrenal (HPA) activity on the off-steroid day. A brief review of the HPA physiology may be helpful in understanding this rationale. Acting primarily through the hypothalamus a fall in free cortisol stimulates the pituitary gland to produce increasing amounts of corticotropin (ACTH) while a rise in free cortisol inhibits ACTH secretion. Normally the HPA system is characterized by diurnal (circadian) rhythm. Serum levels of ACTH rise from a low point about 10 p.m. to a peak level about 6 a.m. Increasing levels of ACTH stimulate adreno-cortical activity resulting in a rise in plasma cortisol with maximal levels occurring between 2 a.m. and 8 a.m. This rise in cortisol dampens ACTH production and in turn adrenocortical activity. There is a gradual fall in plasma corticoids during the day, the lowest levels occurring about midnight. The diurnal rhythm of the HPA axis is lost in Cushing's disease, a syndrome of adrenocortical hyperfunction characterized by obesity with centripetal fat distribution, thinning of the skin with easy bruisability, muscle wasting with weakness, hypertension, latent diabetes, osteoporosis, electrolyte imbalance, etc. The same clinical findings of hyperadrenocorticism may be noted during the long-term pharmacologic dose corticoid therapy administered in conventional daily divided doses. It would appear, then, that a disturbance in the diurnal cycle with maintenance of elevated corticoid values during the night may play a significant role in the development of undesirable corticoid effects.

Escape from these constantly elevated plasma levels for even short periods of time may be instrumental in protecting against undesirable pharmacologic effects. During conventional pharmacologic dose corticosteroid therapy, ACTH production is inhibited with subsequent suppression of cortisol production by the adrenal cortex. Recovery time for normal HPA activity is variable depending upon the dose and duration of treatment. During this time the patient is vulnerable to any stressful situation.

Although it has been shown that there is considerably less adrenal suppression following a single morning dose of prednisolone (10 mg) as opposed to a quarter of that dose administered every 6 hours, there is evidence that some

suppressive effect on adrenal activity may be carried over into the following day when pharmacologic doses are used. Further, it has been shown that a single dose of certain corticosteroids will produce adrenocortical suppression for two or more days. Other corticoids, including methylprednisolone, hydrocortisone, prednisone, and prednisolone, are considered to be short acting (producing adrenocortical suppression for 1 1/4 days to 1 1/2 days following a single dose) and thus are recommended for alternate-day therapy.

The following should be kept in mind when considering alternate-day therapy:

1. Basic principles and indications for cortico-steroid therapy should apply. The benefits of alternate-day therapy should not encourage the indiscriminate use of steroids.
2. Alternate-day therapy is a therapeutic technique primarily designed for patients in whom long-term pharmacologic corticoid therapy is anticipated.
3. In less severe disease processes in which corticoid therapy is indicated, it may be possible to initiate treatment with alternate-day therapy. More severe disease states usually will require daily divided high dose therapy for initial control of the disease process. The initial suppressive dose level should be continued until satisfactory clinical response is obtained, usually four to ten days in the case of many allergic and collagen diseases. It is important to keep the period of initial suppressive dose as brief as possible particularly when subsequent use of alternate-day therapy is intended. Once control has been established, two courses are available: (a) change to alternate-day therapy and then gradually reduce the amount of corticoid given every other day, or (b) following control of the disease process, reduce the daily dose of corticoid to the lowest effective level as rapidly as possible and then change over to an alternate-day schedule. Theoretically, course (a) may be preferable.
4. Because of the advantages of alternate-day therapy, it may be desirable to try patients on this form of therapy who have been on daily corticoids for long periods of time (e.g., patients with rheumatoid arthritis). Since these patients may already have a suppressed HPA axis, establishing them on alternate-day therapy may be difficult and not always successful. However, it is recommended that regular attempts be made to change them over. It may be helpful to triple or even quadruple the daily maintenance dose and administer this every other day rather than just doubling the daily dose if difficulty is encountered. Once the patient is again controlled, an attempt should be made to reduce this dose to a minimum.
5. As indicated above, certain corticosteroids, because of their prolonged suppressive effect on adrenal activity, are not recommended for alternate-day therapy (e.g., dexamethasone and betamethasone).

during their use. There may be decreased resistance and inability to localize infection when corticosteroids are used. Prolonged use of corticosteroids may produce posterior subcapsular cataracts, glaucoma with possible damage to the optic nerves, and may enhance the establishment of secondary ocular infections due to fungi or viruses.

### Usage in Pregnancy

Since adequate human reproduction studies have not been done with corticosteroids, the use of these drugs in pregnancy, nursing mothers or women of childbearing potential requires that the possible benefits of the drug be weighed against the potential hazards to the mother and embryo or fetus. Infants born of mothers who have received substantial doses of corticosteroids during pregnancy, should be carefully observed for signs of hypoadrenalism. 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 synthetic derivatives except when used in large doses. Dietary salt restriction and potassium supplementation may be necessary. All corticosteroids increase calcium excretion. While on corticosteroid therapy patients should not be vaccinated against smallpox. Other immunization procedures should not be undertaken in patients who are on corticosteroids, especially on high dose, because of possible hazards of neurological complications and a lack of antibody response.

The use of prednisolone 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.

### PRECAUTIONS

#### Information for Patients

Persons who are on immunosuppressant doses of corticosteroids should be warned to avoid exposure to chickenpox or measles. Patients should also be advised that if they are exposed, medical advice should be sought without delay. Drug-induced secondary adrenocortical insufficiency may be

minimized 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. Since mineralocorticoid secretion may be impaired, salt and/or a mineralocorticoid should be administered concurrently. There is an enhanced effect of corticosteroids on patients with hypothyroidism and in those with cirrhosis.

Corticosteroids should be used cautiously in patients with ocular herpes simplex because of possible corneal perforation.

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. 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. Aspirin should be used cautiously in conjunction with corticosteroids in hypoprothrombinemia.

Steroids should be used with caution in nonspecific ulcerative colitis, if there is a probability of impending perforation, abscess or other pyogenic infection; diverticulitis; fresh intestinal anastomoses; active or latent peptic ulcer; renal insufficiency; hypertension; osteoporosis and myasthenia gravis. Growth and development of infants and children on prolonged corticosteroid therapy should be carefully observed. Although controlled clinical trials have shown corticosteroids to be effective in speeding the resolution of acute exacerbations of multiple sclerosis they do not show that they affect the ultimate outcome or natural history of the disease.

The studies do show that relatively high doses of corticosteroids are necessary to demonstrate a significant effect.

(See **DOSAGE AND ADMINISTRATION** section.)

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.

### ADVERSE REACTIONS

#### Fluid and Electrolyte Disturbances

- Sodium retention
- Fluid retention
- Congestive heart failure in susceptible patients
- Potassium loss
- Hypokalemic alkalosis
- Hypertension

#### Musculoskeletal

- Muscle weakness
- Steroid myopathy
- Loss of muscle mass
- Osteoporosis
- Vertebral compression fractures
- Aseptic necrosis of femoral and humeral heads
- Pathologic fracture of long bones.

#### Gastrointestinal

- Peptic ulcer with possible perforation and hemorrhage
- Pancreatitis
- Abdominal distention
- Ulcerative esophagitis.

#### Dermatologic

- Impaired wound healing
- Thin fragile skin
- Petechiae and ecchymoses
- Facial erythema
- Increased sweating
- May suppress reactions to skin tests.

#### Neurological

- Convulsions
- Increased intracranial pressure with papilledema (pseudotumor cerebri) usually after treatment
- Vertigo
- Headache

#### Endocrine

- Menstrual irregularities
- Development of Cushingoid state
- Suppression of growth in children
- Secondary adrenocortical and pituitary unresponsiveness, particularly in times of stress, as in trauma, surgery, or illness
- Decreased carbohydrate tolerance
- Manifestations of latent diabetes mellitus
- Increased requirements for insulin or oral hypoglycemic agents in diabetics

#### Ophthalmic

- Posterior subcapsular cataracts
- Increased intraocular pressure
- Glaucoma
- Exophthalmos.

#### Metabolic

- Negative nitrogen balance due to protein catabolism

6. The maximal activity of the adrenal cortex is between 2 a.m. and 8 a.m., and it is minimal between 4 p.m. and midnight. Exogenous corticosteroids suppress adrenocortical activity the least, when given at the time of maximal activity (a.m.).

7. In using alternate-day therapy it is important, as in all therapeutic situations, to individualize and tailor the therapy to each patient. Complete control of symptoms will not be possible in all patients. An explanation of the benefits of alternate-day therapy will help the patient to understand and tolerate the possible flare-up in symptoms which may occur in the latter part of the off-steroid day. Other symptomatic therapy may be added or increased at this time if needed.

8. In the event of an acute flare-up of the disease process, it may be necessary to return to a full suppressive daily divided corticoid dose for control. Once control is again established, alternate-day therapy may be reinstated.

9. Although many of the undesirable features of corticosteroid therapy can be minimized by alternate-day therapy, as in any therapeutic situation, the physician must carefully weigh the benefit-risk ratio for each patient with whom corticoid therapy is being considered.

## **HOW SUPPLIED**

Millipred and Millipred DP Tablets (prednisolone tablets USP, 5 mg) are scored, round, peach tablet imprinted DAN DAN 5059 supplied in bottles of 100 (NDC 23594-505-01), bottles of 50 (NDC 23594-505-50) a unit of use Blister Pack of 21 tablets (NDC 23594-505-21) and a unit of use Blister Pack of 48 tablets (NDC 23594-505-48) respectively. Dispense in a well-closed container with child-resistant closure. Store at 20°-25°C (68°-77°F). [See USP controlled room temperature.]

Manufactured By:

Watson Pharma Private Limited

Verna, Salcette Goa 403 722 INDIA

Distributed By: Zylera Pharmaceuticals

Research Triangle Park, NC 27713

Revised: 11/2015

MILL021115