PONSTAN®
(Mefenamic Acid)

1. NAME OF THE MEDICINAL PRODUCT

PONSTAN®, PONSTAN® FORTE, PONSTAN® FLASH, PONSTAN® SUSPENSION

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

Active Ingredient: Mefenamic acid

Mefenamic acid is available as:

PONSTAN® Suspension: containing 50 mg/5 mL mefenamic acid
PONSTAN® Tablets: containing 250 mg mefenamic acid
PONSTAN® Forte Tablets: containing 500 mg mefenamic acid
PONSTAN® Flash Tablet: containing 250 mg mefenamic acid

3. PHARMACEUTICAL FORM

Suspension, Tablet

4. CLINICAL PARTICULARS

4.1. THERAPEUTIC INDICATIONS

PONSTAN® is indicated for:

1) The symptomatic relief of rheumatoid arthritis (including Still's Disease), osteoarthritis,[6,7,8,9,10,11] and pain including muscular, traumatic and dental pain, headaches of most aetiology, post-operative and postpartum pain[12,13,14]

2) The symptomatic relief of primary dysmenorrhoea[15]

3) Menorrhagia due to dysfunctional causes or the presence of an intrauterine device (IUD) when organic pelvic pathology has been excluded[16,17,18]

4) Premenstrual syndrome[19,20,21]

5) The relief of pyrexia in paediatric patients over 6 months of age[22,23,24]

4.2. POSOLOGY AND METHOD OF ADMINISTRATION[30]

Undesirable effects may be minimized by using the minimum effective dose for the shortest duration necessary to control symptoms.[36]

The oral dosage form of mefenamic acid may be taken with food if gastrointestinal upset occurs.

Mild to moderate pain/rheumatoid arthritis/osteoarthritis in adults and adolescents over 14 years of age: 500 mg three times daily.

According to CDS Version 14 Dated 01 November 2019; Supersedes CDS Version 13 Dated: 15 August 2018

Dysmenorrhoea: 500 mg three times daily, to be administered at the onset of menstrual pain and continued while symptoms persist according to the judgement of the physician.

Menorrhagia: 500 mg three times daily, starting with the onset of bleeding and associated symptoms and continued according to the judgement of the physician.

Premenstrual syndrome: 500 mg three times daily, starting with the onset of symptoms and continued until the anticipated cessation of symptoms according to the judgement of the physician.

For Still's Disease or antipyretic action in infants and children over 6 months to 14 years: 19.5 mg/kg to 25 mg/kg of body weight daily in divided doses three times daily.

Paediatric Use

Mefenamic acid is reported to be effective for pyrexia in paediatric patients over 6 months of age and for pain in adolescents over 14 years of age.

Use in the Elderly

Impairment of renal function, sometimes leading to acute renal failure, has been reported. Elderly or debilitated patients seem unable to tolerate ulceration or bleeding as well as some other individuals; most spontaneous reports of fatal gastrointestinal events are in this patient population (see section **4.4. Special Warnings and Precautions for Use –** Gastrointestinal (GI) Effects).

4.3. CONTRAINDICATIONS

Mefenamic acid should not be used in patients with known hypersensitivity to mefenamic acid or any of the components of this product.

Because the potential exists for cross-sensitivity to aspirin or other nonsteroidal anti-inflammatory drugs (NSAIDs), mefenamic acid should not be given to patients in whom these drugs induce symptoms of bronchospasm, allergic rhinitis, or urticaria.

Mefenamic acid is contraindicated in patients with active ulceration or chronic inflammation of either the upper or lower gastrointestinal tract and should be avoided in patients with pre-existing renal disease.

Treatment of pre-operative pain in the setting of coronary artery bypass graft (CABG) surgery.[36]

Patients with severe renal and hepatic failure.[36]

Patients with severe heart failure.[36]

4.4. SPECIAL WARNINGS AND PRECAUTIONS FOR USE

The use of mefenamic acid with concomitant systemic non-aspirin NSAIDs including cyclooxygenase-2 (COX-2) inhibitors should be avoided.[36,61] Concomitant use of a systemic NSAID and another systemic NSAID may increase frequency of gastrointestinal ulcers and bleeding.[61]

Cardiovascular Effects

NSAIDs may cause an increased risk of serious cardiovascular (CV) thrombotic events, myocardial infarction, and stroke, which can be fatal. This risk may increase with duration of use. The relative increase of this risk appears to be similar in those with or without known CV disease or CV risk factors. However, patients with known CV disease or CV risk factors may be at greater risk in terms of absolute incidence, due to their increased rate at baseline.[62] To minimize the potential risk for an adverse CV event in patients treated with mefenamic acid, the lowest effective dose should be used for the shortest duration possible. Physicians and patients should remain alert for the development of such events, even in the absence of previous CV symptoms. Patients should be informed about the signs and/or symptoms of serious CV toxicity and the steps to take if they occur (see section **4.3. Contraindications**).[36]

Hypertension

As with all NSAIDs, mefenamic acid can lead to the onset of new hypertension or worsening of pre-existing hypertension, either of which may contribute to the increased incidence of CV events. NSAIDs, including mefenamic acid, should be used with caution in patients with hypertension. Blood pressure should be monitored closely during the initiation of therapy with mefenamic acid and throughout the course of therapy.[36,37]

Fluid Retention and Oedema

As with other drugs known to inhibit prostaglandin synthesis, fluid retention and oedema have been observed in some patients taking NSAIDs, including mefenamic acid. Therefore, mefenamic acid should be used with caution in patients with compromised cardiac function and other conditions predisposing to, or worsened by, fluid retention. Patients with pre-existing congestive heart failure or hypertension should be closely monitored.[36]

Gastrointestinal (GI) Effects

If diarrhoea occurs, the dosage should be reduced or temporarily suspended. Symptoms may recur in certain patients following subsequent exposure.

NSAIDs, including mefenamic acid, can cause serious gastrointestinal (GI) adverse events including inflammation, bleeding, ulceration, and perforation of the stomach, small intestine, or large intestine, which can be fatal. When GI bleeding or ulceration occurs in patients receiving mefenamic acid, the treatment should be withdrawn. Patients most at risk of developing these types of GI complications with NSAIDs are the elderly, patients with CV disease, patients using concomitant corticosteroids, antiplatelet drugs (such as aspirin)[66], selective serotonin reuptake inhibitors, patients ingesting alcohol[63] or patients with a prior history of, or active, gastrointestinal disease, such as ulceration, GI bleeding or inflammatory conditions.[61] Therefore, mefenamic acid should be used with caution in these patients (see section **4.3. Contraindications**).[36]

Skin Reactions

Serious skin reactions, some of them fatal, including drug reaction with eosinophilia and systemic symptoms (DRESS syndrome)[67] exfoliative dermatitis, Stevens-Johnson syndrome, and toxic epidermal necrolysis, have been reported very rarely in association with the use of NSAIDs, including mefenamic acid. Patients appear to be at highest risk for these events early in the course of therapy, the onset of the event occurring in the majority of cases within the first month of treatment.

Mefenamic acid should be discontinued at the first appearance of skin rash, mucosal lesions, or any other sign of hypersensitivity.[36]

Laboratory Tests

A false-positive reaction for urinary bile, using the diazo tablet test, may result following mefenamic acid administration. If biliuria is suspected, other diagnostic procedures, such as the Harrison spot test, should be performed.

Renal Effects

In rare cases, NSAIDs, including mefenamic acid, may cause interstitial nephritis, glomerulitis, papillary necrosis and the nephrotic syndrome. NSAIDs inhibit the synthesis of renal prostaglandin which plays a supportive role in the maintenance of renal perfusion in patients whose renal blood flow and blood volume are decreased. In these patients, administration of an NSAID may precipitate overt renal decompensation, which is typically followed by recovery to pre-treatment state upon discontinuation of NSAID therapy. Patients at greatest risk of such a reaction are those with congestive heart failure, liver cirrhosis, nephrotic syndrome, overt renal disease and the elderly. Such patients should be carefully monitored while receiving NSAID therapy.[36]

Discontinuation of NSAID therapy is typically followed by recovery to the pre-treatment state. Since mefenamic acid metabolites are eliminated primarily by the kidneys, the drug should not be administered to patients with significantly impaired renal function.

Hematologic Effects

Mefenamic acid can inhibit platelet aggregation and may prolong prothrombin time in patients on warfarin therapy (see section **4.5. Interactions with Other Medicinal Products and Other Forms of Interaction**).

Hepatic Effects

Borderline elevations of one or more liver function tests may occur in some patients receiving mefenamic acid therapy. These elevations may progress, may remain essentially unchanged, or may be transient with continued therapy. A patient with symptoms and/or signs suggesting liver dysfunction, or in whom an abnormal liver test has occurred, should be evaluated for evidence of the development of a more severe hepatic reaction while on therapy with mefenamic acid. If abnormal liver tests persist or worsen, if clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur, mefenamic acid should be discontinued.

Use with oral anticoagulants

The concomitant use of NSAIDs, including mefenamic acid, with oral anticoagulants increases the risk of GI and non-GI bleeding and should be given with caution. Oral anticoagulants include warfarin/coumarin-type and novel oral anticoagulants (e.g., apixaban, dabigatran, rivaroxaban). Anticoagulation/INR should be monitored in patients taking a warfarin/coumarin-type anticoagulant (see section **4.5. Interactions with Other Medicinal Products and Other Forms of Interactions**).[61]

4.5. INTERACTION WITH OTHER MEDICINAL PRODUCTS AND OTHER FORMS OF INTERACTION

Acetylsalicylic Acid: Mefenamic acid interferes with the anti-platelet effect of low-dose aspirin, and thus may interfere with aspirin's prophylactic treatment of CV disease.[61]

Anticoagulants: Mefenamic acid has been shown to displace warfarin from protein binding sites, and may enhance the response to oral anticoagulants.[25] Therefore, concurrent administration of mefenamic acid with oral anticoagulant drugs requires frequent prothrombin time monitoring.

Anti-hypertensives including diuretics, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II antagonists (AIIA) and beta-blockers: NSAIDs can reduce the efficacy of diuretics and other antihypertensive drugs, including ACE inhibitors, AIIA and beta-blockers.[38,39,40,41,61]

In patients with impaired renal function (e.g., dehydrated patients or elderly patients with compromised renal function), the co-administration of an ACE inhibitor or an AIIA and/or diuretics with a cyclo-oxygenase inhibitor can increase the deterioration of the renal function, including the possibility of acute renal failure, which is usually reversible.[42,61] The occurrence of these interactions should be considered in patients taking mefenamic acid with an ACE inhibitor or an AIIA and/or diuretics.[61]

Therefore, the concomitant administration of these drugs should be done with caution, especially in elderly patients. Patients should be adequately hydrated and the need to monitor the renal function should be assessed in the beginning of the concomitant treatment and periodically thereafter.

Corticosteroids: Increased risk of gastrointestinal ulceration or bleeding.[43,44,45]

Cyclosporine: Because of their effect on renal prostaglandins, NSAIDs such as mefenamic acid may increase the risk of nephrotoxicity with cyclosporine.[46,47,48,61]

Hypoglycaemic agents: There have been reports of changes in the effects of oral hypoglycaemic agents in the presence of NSAIDs. Therefore, mefenamic acid should be administered with caution in patients receiving insulin or oral hypoglycaemic agents.

Lithium: Mefenamic acid has produced an elevation of plasma lithium levels and a reduction in renal lithium clearance. Thus, when mefenamic acid and lithium are administered concurrently, patients should be observed carefully for signs of lithium toxicity.[26,27]

Methotrexate: Caution is advised when methotrexate is administered concurrently with NSAIDs, including mefenamic acid, because NSAID administration may result in increased plasma levels of methotrexate, especially in patients receiving high doses of methotrexate.[49,50,51,52,61]

Tacrolimus: Possible increased risk of nephrotoxicity when NSAIDs are given with tacrolimus.[53]

4.6. FERTILITY, PREGNANCY AND LACTATION

Fertility

Based on the mechanism of action, the use of NSAIDs may delay or prevent rupture of ovarian follicles, which has been associated with reversible infertility in some women. In women who have difficulties conceiving or who are undergoing investigation of infertility, withdrawal of NSAIDs, including mefenamic acid should be considered.[58]

Pregnancy (see section **5.3. PRECLINICAL SAFETY DATA**)

Since there are no adequate and well-controlled studies in pregnant women, this drug should be used only if the potential benefits to the mother justify the possible risks to the fetus. It is not known if mefenamic acid or its metabolites cross the placenta.[31] However, because of the effects of drugs in this class (i.e., inhibitors of prostaglandin synthesis) on the fetal CV system (e.g., premature closure of the ductus arteriosus)[33,34] the use of mefenamic acid in pregnant women is not recommended and should be avoided during the third trimester of pregnancy.[64] Mefenamic acid inhibits prostaglandin synthesis which may result in prolongation of pregnancy and interference with labour when administered late in the pregnancy.[33,34] Women on mefenamic acid therapy should consult their physician if they decide to become pregnant.

Inhibition of prostaglandin synthesis might adversely affect pregnancy. Data from epidemiological studies suggest an increased risk of spontaneous abortion after use of prostaglandin synthesis inhibitors in early pregnancy. In animals, administration of prostaglandin synthesis inhibitors has been shown to result in increased pre- and post-implantation loss.[59]

If used during second or third trimester of pregnancy, NSAIDs may cause fetal renal dysfunction which may result in reduction of amniotic fluid volume or oligohydramnios in severe cases. Such effects may occur shortly after treatment initiation and are usually reversible. Pregnant women on mefenamic acid should be closely monitored for amniotic fluid volume.[65]

Lactation

Trace amounts of mefenamic acid may be present in breast milk and transmitted to the nursing infant.[28] Therefore, mefenamic acid should not be taken by nursing mothers.

4.7. EFFECTS ON ABILITY TO DRIVE AND USE MACHINES

The effect of mefenamic acid on the ability to drive or use machinery has not been systematically evaluated.

4.8. UNDESIRABLE EFFECTS

Blood and lymphatic system disorders: agranulocytosis, aplastic anaemia, autoimmune haemolytic anaemia*, bone marrow hypoplasia, decreased hematocrit, eosinophilia, leukopoenia, pancytopenia and thrombocytopenic purpura, platelet aggregation inhibition[60]

Immune system disorders: anaphylaxis

Metabolism and nutrition disorders: glucose intolerance in diabetic patients, hyponatremia, fluid retention[60]

Psychiatric disorders: nervousness

Nervous system disorders: aseptic meningitis,[54] blurred vision, convulsions, dizziness, drowsiness, headache and insomnia

Eye disorders: eye irritation, reversible loss of color vision

Ear and labyrinth disorders: ear pain

Cardiac disorders: palpitation

Vascular disorders: hypotension, hypertension[60]

Respiratory, thoracic and mediastinal disorders: asthma, dyspnoea

Gastrointestinal disorders: gastrointestinal inflammation[60], gastrointestinal hemorrhage[60], gastrointestinal ulcer[60], gastrointestinal perforation[60]

The most frequently reported side effects associated with mefenamic acid involve the gastrointestinal tract. Diarrhoea appears to be the most common side effect and is usually dose-related. It generally subsides on dosage reduction, and rapidly disappears on termination of therapy. Some patients may not be able to continue therapy.

The following are the most common gastrointestinal side effects: abdominal pain, diarrhoea and nausea with or without vomiting.

Less frequently reported gastrointestinal/hepatobiliary side effects include: anorexia, cholestatic jaundice, colitis, constipation, enterocolitis, and flatulence, gastric ulceration with and without haemorrhage, mild hepatic toxicity, hepatitis, hepatorenal syndrome, pyrosis, pancreatitis and steatorrhea.

Skin and subcutaneous tissue disorders: angioedema, edema of the larynx, erythema multiforme, facial edema, Lyell's syndrome (toxic epidermal necrolysis), perspiration, pruritus, rash, Stevens-Johnson syndrome, urticaria and dermatitis exfoliative[60]

Renal and urinary disorders: dysuria, hematuria, renal failure including papillary necrosis and tubulointerstitial nephritis[57], glomerulonephritis[60], nephrotic syndrome[60]

General disorders and administration site conditions: edema[60]

Investigations: urobilinogen urine (false-positive)[60], liver function test abnormal[60]

Paediatric patients

General disorders and administration site conditions: hypothermia[55]

*Reports are associated with ≥12 months of mefenamic acid therapy and the anaemia is reversible with discontinuation of therapy.

4.9. OVERDOSE

Following accidental over dosage, the stomach should be emptied immediately by inducing emesis or by gastric lavage, followed by administration of activated charcoal.[29] Vital functions should be monitored and supported. Hemodialysis is of little value since mefenamic acid and its metabolites are firmly bound to plasma proteins.

Seizures, acute renal failure, coma, confusional state,[57] vertigo,[57] and hallucination[57] have been reported with mefenamic acid overdoses. Overdose has led to fatalities.

5. PHARMACOLOGICAL PROPERTIES

5.1. PHARMACODYNAMIC PROPERTIES

Mechanism of Action

Mefenamic acid is a nonsteroidal agent with demonstrated anti-inflammatory, analgesic, and antipyretic activity in laboratory animals.[1,2] Mefenamic acid was found to inhibit prostaglandin synthesis and to compete for binding at the prostaglandin receptor sites in animal models.[3]

5.2. PHARMACOKINETIC PROPERTIES

Absorption

Mefenamic acid is rapidly absorbed from the gastrointestinal tract.[31,32] Following administration of a one gram oral dose to adults, peak plasma levels of 10 μg/mL occur in 1 to 4 hours, with a half-life of 2 hours. Plasma levels are proportional to dose, following multiple doses, with no drug accumulation. One gram of mefenamic acid administered four times daily produces peak blood levels of 20 μg/mL by the second day of administration.[4,5]

Distribution

Mefenamic acid is extensively bound to plasma proteins.[31,32]

Metabolism

Mefenamic acid metabolism is predominantly mediated via cytochrome P450 (CYP) 2C9 in the liver. Patients who are known or suspected to be poor CYP2C9 metabolizers based on previous history/experience with other CYP2C9 substrates should be administered mefenamic acid with caution as they may have abnormally high plasma levels due to reduced metabolic clearance.[56]

Elimination

Following a single oral dose, 52% to 67% of the dose was recovered from the urine as unchanged drug or one of two metabolites. Assay of stools over 3 days accounted for 20% to 25% of the dose, chiefly as unconjugated metabolite II.[4,5]

5.3. PRECLINICAL SAFETY DATA

Rats given up to 10 times the human dose showed decreased fertility, delay in parturition, and a decreased rate of survival to weaning. No fetal abnormalities were observed in this study and in another study in dogs receiving 10 times the human dose.

6. PHARMACEUTICAL PARTICULARS

6.1. LIST OF EXCIPIENTS

Not available

6.2. INCOMPATIBILITIES

Not available

6.3. SHELF LIFE

PONSTAN® Tablets 250 mg: 5 years
PONSTAN® Forte Tablets 500 mg: 5 years
PONSTAN® Flash Tablets 250 mg: 3 years
PONSTAN® Suspension 50 mg/5 mL: 4 years

6.4. SPECIAL PRECAUTIONS FOR STORAGE

Avoid exposure to heat and sunlight. Keep in a dry place.

6.5. HOW SUPPLIED

PONSTAN® Tablets 250 mg – 60 x 10's blister pack in carton
PONSTAN® Forte Tablets 500 mg – 20 x 10's blister pack in carton
PONSTAN® Flash Tablets 250 mg – 10 x 10's blister pack in carton
PONSTAN® Suspension 50 mg/5 mL – 60 mL in glass bottle

Ponstan/LPD/PK-04
According to CDS Version 14 Dated 01 November 2019; Supersedes CDS Version 13 Dated: 15 August 2018

Marketed by:
Pfizer Pakistan Limited
B-2, S.I.T.E.,
Karachi

*Please visit our website **www.pfizerpro.com.pk** for latest version of Product leaflet.*

7. REFERENCES

1. Winder CV, Wax J, Scotti RA *et al*. Anti-inflammatory, antipyretic and antinociceptive properties of N-(2,3-xylyl) anthranilic acid (mefenamic acid). *J Pharmacol Exp Ther* 1962; 138:405-413.

2. Wax J, Winder CV, Tessman DK *et al*. Comparative activities, tolerances and safety of nonsteroidal anti-inflammatory agents in rats. *J Pharmacol Exp Ther* 1975; 192:172-178.

3. Ferreira SH, Moncada S, Vane JR. Prostaglandins and the mechanism of analgesia produced by aspirin-like drugs. *Br J Pharmac* 1973; 49:86-97.

4. Winder CV, Kaump DH, Glazko AJ *et al*. Experimental observations of flufenamic, mefenamic, and meclofenamic acids. in *Fenamates in Medicine*. A Symposium, London 1966; *Annals of Physical Medicine*, Supplement 1967; 7-49.

5. BGA monograph for mefenamic acid. Bundesanzeiger: 28; February 1986.

6. Stockman A, Varigos GA, Muirden KD *et al*. Comparison of effectiveness of mefenamic acid and ibuprofen in treatment of rheumatoid arthritis. *Med J Aust* 1976; 820-821.

7. Leslie RDG. Mefenamic acid compared with ibuprofen in treatment of rheumatoid arthritis. *J Int Med Res* 1977; 5:161-163.

8. Stephens WH, El-Ghobarey AF, Macleod MM, *et al*. A double-blind, crossover trial of mefenamic acid, sulindac and flurbiprofen in rheumatoid arthritis. *Curr Med Res Opin* 1979; 5(10):754-758.

9. Jaffe GV, Grimshaw JJ, Owen-Reece AR. A controlled study of mefenamic acid in osteoarthritis. *Br J Clin Pract* 1982; 36(2):55-58.

10. Aylward M, Maddock J, Lewis PA *et al*. Mefenamic acid and diclofenac sodium in osteoarthritis of the weight bearing joints: a double blind comparison. *Br J Clin Pract* 1985; 39:135-139.

11. Barnard-Jones K, Davies RW, Lalla O *et al*. Mefenamic acid versus ibuprofen in osteoarthritis-a double-blind crossover study. *Br J Clin Pract* 1986; 40(12):528-531.

12. Cass LF, Frederick WS. Experiments in relief of clinical pain with N-(2,3-xylyl)-anthranilic acid (CI - 473; mefenamic acid). *J Pharmacol Exp Ther* 1963; 139:172-176.

13. Evans DP, Burke MS, Newcombe RG. Medicines of choice in low back pain. *Curr Med Res Opin* 1980; 6(8):540-547.

14. Rowe NH, Shekter MA, Turner JL *et al*. Control of pain resulting from endodontic therapy: a double-blind, placebo-controlled trial. *Oral Surg Oral Med* 1980; 50(3):257-263.

15. Budoff PW. Use of mefenamic acid in the treatment of primary dysmenorrhea. *JAMA* 1979; 241:2713-2716.

16. Fraser IS, Pearse C, Shearman RP *et al*. Efficacy of mefenamic acid in patients with a complaint of menorrhagia. *Obstet Gynecol* 1981; 58(5):543-551.

17. Haynes PJ, Flint APF, Hodgson H *et al*. Studies in menorrhagia: (a) mefenamic acid, (b) endometrial prostaglandin concentrations. *Int J Gynaecol Obstet* 1980; 17:567-572.

18. Fraser IS, McCarron G, Markham R *et al*. Long-term treatment of menorrhagia and mefenamic acid. *Obstet Gynecol* 1983; 61(1):109-112.

19. Mira M, McNeil D, Fraser IS *et al*. Mefenamic acid in the treatment of premenstrual syndrome. *Obstet Gynecol* 1986; 68(3):395-398.

20. Jakubowicz DL, Godard E, Dewhurst J. The treatment of premenstrual tension with mefenamic acid: analysis of prostaglandin concentrations. *Br J Obstet Gynaecol* 1984; 91:78-84.

21. Wood C, Jakubowicz D. The treatment of premenstrual symptoms with mefenamic acid. *Br J Obstet Gynaecol* 1980; 87:627-630.

22. Ulbrich I. [Double-blind study to test the antipyretic action of mefenamic acid in children compared to a standard therapy]. *Therapiewoche* 1971; 36:2661-69.

23. O'Brien, JR. Effect of anti-inflammatory agents on platelets. *The Lancet* April 1968; pp 894-895.

24. Weiss CF, Harris ST, Barrow WB *et al*. Mefenamic acid-an antipyretic for use in children. *J Pediatrics* 1968; 72(6):867-870.

25. Diana FJ, Veronich K, Kapoor AL. Binding of nonsteroidal anti-inflammatory agents and the effect on binding of racemic warfarin and its enantiomers to human serum albumin. *J Pharm Sci* 1989; 78(3):195-199.

26. Shelley RK. Lithium toxicity and mefenamic acid. A possible interaction and the role of prostaglandin inhibition. *Br J Psychiatry* Dec 1987, 151:847-8.

27. MacDonald J, Neale TJ. Toxic interaction of lithium and mefenamic acid. BMJ, Nov 1988, 297(6559): 1339.

28. Buchanan RA, Eaton CJ, Koeff ST *et al*. The breast milk excretion of mefenamic acid. *Curr Ther Res* 1968; 10:592-596.

29. Corby DG, Decker WJ. Management of acute poisoning with activated charcoal. *Pediatrics* 1974; 54(3):324-328.

30. Martindale's The Extra Pharmacopoeia, 31st edition. London, 1996; pp. 58-59.

31. Anonymous. Mefenamic Acid. *American Hospital Formulary Service – Drug Information 2003* (accessed on-line via STAT!-Ref Medical Information). McEvoy GK, Litvak K, Welsh OH, *et al.* (Eds). American Society of Health-System Pharmacists, Inc.: Bethesda, Maryland; 2003; pg. 7. URL:http://online.statref.com/Document.aspx?DocId=758&FxId=1&SessionId=1E9D27KLLKTLPOEL&Scroll=1&Index=0

32. Anonymous. Mefenamic Acid Monograph. *Martindale – The Complete Drug Reference* (accessed on-line via Drug Knowledge and Healthcare Series® Thomson Micromedex Corporate Solutions). Sweetman SC, *et al.* (Eds). Last revised November 1, 2001; p. 4. URL: http://csi.micromedex.com/fraMain.asp?Mnu=21

33. Anonymous. Mefenamic Acid. *American Hospital Formulary Service – Drug Information 2003* (accessed on-line via STAT!-Ref Medical Information). McEvoy GK, Litvak K, Welsh OH, *et al.* (Eds). American Society of Health-System Pharmacists, Inc.: Bethesda, Maryland; 2003; pg. 5. URL: http://online.statref.com/Document.aspx?DocId=758&FxId=1&SessionId=1E9D27KLLKTLPOEL&Scroll=1&Index=0

34. Anonymous. Meclofenamate, Mefenamic Acid Contraindications/Precautions. *Harrison's Online – Drug Database 2001-2003*. Braunwald E, Fauci AS, Isselbacher KJ, *et al.* (Eds). The McGraw Hill Companies: 2001-2003; pg. 2. URL: http://www.accessmedicine.com/cgi-bin/external_source_db.cgi?url=http%3A%2F%2Fcp.gsm.com%2Fdirect%2Fgetmono.asp%3Fcaller%3Dhill%26option%3D1%26cpnum%3D368%26monotype%3Dfull&book=HARRISONS

35. Worldwide Labeling Safety Report: Pruritus, Pruritus Generalised, and Mefenamic Acid, 25 November 2003.

36. Pfizer Inc. Clinical Expert Report to support revisions to the Mefenamic acid Core Data Sheet., March 14, 2007.

37. FDA Proposed NSAID Package Insert Labeling Template 1 (Revised xx05)

38. Morgan T, Anderson A. Interaction of indomethacin with felodipine and enalapril. J Hypertension Suppl. 1993;11(5):338S-339S.

39. The sixth report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. National Institute of Health publication No. 99-4080. 1997:1-64.

40. Frishman WH. Effects of nonsteroidal anti-inflammatory drug therapy on blood pressure and peripheral edema. Am J Cardiology 2002; 89 (suppl): 18D-25D.

41. Sturrock ND, Struthers AD. Non-steroidal anti-inflammatory drugs and angiotensin converting enzyme inhibitors: a commonly prescribed combination with variable effects on renal function. Br J Clin Pharmacol 1993;35:343-348.

42. Wolfe MM, Lichtenstein DR, Singh G. Gastrointestinal toxicity of nonsteroidal antiinflammatory drugs. *N Engl J Med*. 1999; 340:1888-99.

43. Singh G, Triadafilopoulos G. Epidemiology of NSAID induced gastrointestinal complications. *J Rheumatol*. 1999; 26(suppl 56): 18-24.

44. Gabriel SE, Jaakkimainen L, Bombardier C. Risk for serious gastrointestinal complications related to use of nonsteroidal anti-inflammatory drugs. Ann Intern Med 1991: 115:787-96.

45. Kovarik JM, Kurki P, Mueller E, Guerret M, Markert E, Alten R, Zeidler H, Genth-Stolzenburg S. Diclofenac combined with cyclosporine in treatment refractory rheumatoid arthritis: longitudinal safety assessment and evidence of a pharmacokinetic/dynamic interaction. Journal of Rheumatology 1996;23(12):2033.

46. Harris KP, Jenkins D, Walls J. Nonsteroidal antiinflammatory drugs and cyclosporine: a potentially serious adverse interaction. Transplantation 1988;46:598-599.

47. Deray G, Le Hoang P, Aupetit B *et al*. Enhancement of cyclosporine A nephrotoxicity by diclofenac (letter). Clin Nephrol 1987; 27:213-214.

48. Branthwaite JP, Nicholls A. Cyclosporine and diclofenac interaction in rheumatoid arthritis (letter). Lancet 1991; 337:252.

49. Maiche AG. Acute renal failure due to concomitant action of methotrexate and indomethacin (letter). Lancet 1986; 1:1390.

50. Singh RR, Malaviya AN, Pandey JN *et al*. Fatal interaction between methotrexate and naproxen (letter). Lancet 1986; 1:1390.

51. Thyss A, Milano G, Kubar J *et al*. Clinical and pharmacokinetic evidence of a life-threatening interaction between methotrexate and ketoprofen. Lancet 1986; 1:256-258.

52. Daly H, Boyle J, Roberts C *et al*. Interaction between methotrexate and non-steroidal anti-inflammatory drugs. Lancet 1986; 1: 559.

53. Sheiner PA, Mor E, Chodoff L *et al*. Acute renal failure associated with the use of ibuprofen in two liver transplant recipients on FK506. Transplantation 1994; 57:1132-113.

54. Mohan, J. Mefenamic Acid and Aseptic Meningitis. Safety Analysis Report. Pfizer, Inc. June 28, 2004.

55. Pfizer Inc. Clinical Overview to support revisions to the mefenamic acid Core Data Sheet. January 8, 2009.

56. Pfizer Inc. Clinical Overview to support revisions to the mefenamic acid Core Data Sheet. June 3, 2009.

57. Pfizer Inc. Clinical Overview to support revisions to the mefenamic acid Core Data Sheet. October 19, 2011.

58. Clinical Overview to support revision to the Mefenamic acid Core Data Sheet, (Decreased Fertility) June 2012

59. Clinical Overview to support revision to the Mefenamic acid Core Data Sheet, (Spontaneous abortion) June 2012

60. Clinical Overview to support revisions to the Mefenamic Acid Core Data Sheet, (Section 4.8, Undesirable Effects) June 2012

61. Clinical Overview to support the addition of drug interactions in sections 4.4 and/or 4.5 of the Core Data Sheet and Reference Safety Document June 2014

62. Clinical Overview to support the addition of cardiovascular warnings in Section 4.4 of the Core Data Sheets/Pfizer Reference Labels, November 2016

63. Clinical Overview to support the addition of alcohol use gastrointestinal (GI) risk in section 4.4 of the Core Data Sheets/Pfizer Reference Labels, November 2016

64. Clinical Overview to support update to Pregnancy Section of the Core Data sheets, October 2016

65. Clinical Overview to support the addition of Oligohydramnios Risk in Pregnancy Section of the Core Data Sheets/Pfizer Reference Labels, November 2016

66. 2.5 Clinical Overview, Celecoxib and Non-Selective Nonsteroidal Anti-Inflammatory Drugs: Updates to Section 4.4 “Special Warnings and Precautions for Use – Gastrointestinal (GI) Effects” of the Core Data Sheet, August 2018.

67. 2.5 Clinical Overview, Updates to the Section 4.4 Special Warnings and Precautions for Use – Skin Reactions Subsection of the Core Data Sheet, October 2019.