

## PRODUCT MONOGRAPH

 **MEZAVANT**<sup>®\*</sup>

mesalamine

1.2g Delayed- and Extended-Release Tablets

Lower Gastrointestinal Anti-Inflammatory

Shire Canada Inc.  
2250 Alfred-Nobel Blvd., Suite 500  
Saint-Laurent, Québec  
H4S 2C9

Date of Revision:  
03 May 2011

\*MEZAVANT is a registered trade-mark used under licence from Giuliani International Limited

## TABLE OF CONTENTS

<b>PART I: HEALTH PROFESSIONAL INFORMATION.....</b>	<b>3</b>
SUMMARY PRODUCT INFORMATION .....	3
INDICATIONS AND CLINICAL USE.....	3
CONTRAINDICATIONS .....	4
WARNINGS AND PRECAUTIONS.....	4
ADVERSE REACTIONS.....	6
DRUG INTERACTIONS.....	9
DOSAGE AND ADMINISTRATION.....	10
OVERDOSAGE .....	11
ACTION AND CLINICAL PHARMACOLOGY .....	11
STORAGE AND STABILITY.....	16
DOSAGE FORMS, COMPOSITION AND PACKAGING .....	16
<b>PART II: SCIENTIFIC INFORMATION.....</b>	<b>17</b>
PHARMACEUTICAL INFORMATION.....	17
CLINICAL TRIALS.....	17
DETAILED PHARMACOLOGY .....	25
TOXICOLOGY .....	26
REFERENCES .....	27
<b>PART III: CONSUMER INFORMATION.....</b>	<b>28</b>



mesalamine Delayed- and Extended-Release Tablets

## PART I: HEALTH PROFESSIONAL INFORMATION

### SUMMARY PRODUCT INFORMATION

Route of Administration	Dosage Form / Strength	Clinically Relevant Nonmedicinal Ingredients
Oral	Delayed- and extended-release tablet 1.2g	None. <i>For a complete listing see Dosage Forms, Composition and Packaging section.</i>

### INDICATIONS AND CLINICAL USE

MEZAVANT (mesalamine delayed- and extended-release tablets) is indicated for:

- Induction of remission (clinical and endoscopic) in patients with active, mild to moderate ulcerative colitis
- Maintenance of clinical and endoscopic remission (mucosal healing) in patients with ulcerative colitis.

#### **Geriatrics (≥65 years of age):**

Clinical trials of MEZAVANT did not include sufficient numbers of patients aged 65 years and over to determine whether they respond differently from younger patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients. Results of a single-dose study on the comparative pharmacokinetic profiles in elderly healthy subjects versus young healthy subjects indicate that systemic exposure to mesalamine increased by up to approximately 2-fold in elderly subjects (>65 years) compared with younger adult subjects (18-35 years) after a 4.8g single dose of MEZAVANT. Systemic exposures in individual subjects were inversely correlated with renal function as assessed by estimated creatinine clearance. The potential impact on the safe use of MEZAVANT in the elderly population in clinical practice should be considered (see **Warnings and Precautions – Special Populations, Geriatrics, and Action and Clinical Pharmacology – Pharmacokinetics, Absorption**).

#### **Pediatrics (<18 years of age):**

The safety and effectiveness of mesalamine has not been established in children.

## CONTRAINDICATIONS

- Patients who are hypersensitive to any salicylates (including mesalamine) or to any ingredient in the formulation or component of the container. For a complete listing, see the **Dosage Forms, Composition and Packaging** section of the Product Monograph.

## WARNINGS AND PRECAUTIONS

### **General**

The majority of patients who are intolerant or hypersensitive to sulfasalazine can take mesalamine preparations without risk of similar reactions. However, caution should be exercised when treating patients allergic to sulfasalazine.

Mesalamine has been associated with an acute intolerance syndrome that may be difficult to distinguish from a flare of inflammatory bowel disease. Although the exact frequency of occurrence has not been determined, it has occurred in 3% of patients in controlled clinical trials of mesalamine or sulfasalazine. Symptoms include cramping, acute abdominal pain and bloody diarrhea, sometimes fever, headache and rash. If acute intolerance syndrome is suspected, prompt withdrawal is required.

Patients should be instructed to swallow MEZAVANT tablets whole, taking care not to break the outer coating. The outer coating is designed to remain intact until at least pH 7, normally in the terminal ileum, to protect the active ingredient, mesalamine, and ensure its availability throughout the colon.

Administration of a single dose of MEZAVANT 4.8g with a high-fat meal in healthy volunteers increased systemic exposure of mesalamine compared to results in the fasted state (see **Dosage and Administration, Drug Interactions – Drug-Food Interactions**).

### **Cardiovascular**

Mesalamine induced cardiac hypersensitivity reactions (myocarditis and pericarditis) have been reported rarely with MEZAVANT and other mesalamine-containing preparations. Caution should be taken in prescribing this medication to patients with conditions predisposing to the development of myocarditis or pericarditis.

### **Gastrointestinal**

Organic or functional obstruction in the upper gastrointestinal tract may delay onset of action of the product.

Adequate care should be given to patients treated with 5-ASA that have active peptic ulcers.

Acute intolerance syndrome: See **General** sub-section above.

### **Hepatic/Biliary/Pancreatic**

No information is available on the use of MEZAVANT in patients with hepatic impairment, and therefore, caution is recommended in these patients.

### **Renal**

Reports of renal impairment, including minimal change in nephrology, and acute or chronic interstitial nephritis have been associated with mesalamine medications and pro-drugs of mesalamine. For any patient with known renal dysfunction, caution should be exercised and MEZAVANT should be used only if the benefits outweigh the risks. It is recommended that all patients have an evaluation of renal function prior to initiation of therapy and periodically while on treatment.

### **Special Populations**

**Pregnant Women:** There are no adequate and well-controlled studies of mesalamine in pregnant women. Mesalamine is known to cross the placental barrier. MEZAVANT should only be used during pregnancy if the benefits outweigh the risks.

**Nursing Women:** Low concentrations of mesalamine and higher concentrations of its N-acetyl metabolite have been detected in human breast milk. While there is limited experience of lactating women using mesalamine, caution should be exercised if MEZAVANT is administered to a nursing mother and used only if the benefits outweigh the risks.

**Pediatrics (<18 years of age):** Safety and effectiveness of MEZAVANT in pediatric patients who are less than 18 years of age have not been established.

**Geriatrics (≥65 years of age):** Clinical trials of MEZAVANT did not include sufficient numbers of patients aged 65 years and over to determine whether they respond differently from younger patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients. Results of a single-dose study on the comparative pharmacokinetic profiles in elderly healthy subjects versus young healthy subjects indicate that systemic exposure to mesalamine increased by up to approximately 2-fold in elderly subjects (>65 years) compared with younger adult subjects (18-35 years) after a 4.8g single dose of MEZAVANT (see **Action and Clinical Pharmacology – Pharmacokinetics, Absorption**). Systemic exposures in individual subjects were inversely correlated with renal function as assessed by estimated creatinine clearance. The potential impact on the safe use of MEZAVANT in the elderly population in clinical practice should be considered. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concurrent disease or other drug therapy.

## **ADVERSE REACTIONS**

### **Adverse Drug Reaction Overview**

MEZAVANT tablets have been evaluated in 1368 ulcerative colitis patients in controlled and open-label studies.

In the pooled safety analysis of patients with ulcerative colitis who participated in the clinical studies, the majority of subjects did not experience adverse drug reactions associated with MEZAVANT. Of the events reported, the majority were mild or moderate in severity. The most frequently reported adverse drug reactions within the pooled safety analysis of the ulcerative colitis patient clinical studies were colitis, headache, abdominal pain, liver function test abnormal, diarrhea and nausea.

### **Clinical Trial Adverse Drug Reactions**

*Because clinical trials are conducted under very specific conditions the adverse reaction rates observed in the clinical trials may not reflect the rates observed in practice and should not be compared to the rates in the clinical trials of another drug. Adverse drug reaction information from clinical trials is useful for identifying drug-related adverse events and for approximating rates.*

### **Induction of Remission, including clinical remission and mucosal healing:**

In two 8-week placebo-controlled clinical studies involving 621 (Safety Population) ulcerative colitis patients, 356 received 2.4g/day or 4.8g/day MEZAVANT tablets. More adverse events occurred in the placebo group (119) than in each of the MEZAVANT treatment groups (109 in 2.4g/day, 92 in 4.8g/day). The most common adverse events with MEZAVANT were headache (4.5%) and flatulence (3.4%). A lower percentage of the 356 MEZAVANT patients discontinued therapy due to adverse events compared to placebo (2.2% vs. 7.3%). The most frequent adverse event leading to discontinuation from MEZAVANT therapy was exacerbation of ulcerative colitis (0.8%).

The majority of adverse events in the double-blind, placebo-controlled trials were mild or moderate in severity. The percentage of patients with severe adverse events was higher in the placebo treatment group (6.1% in placebo, 1.1% in MEZAVANT 2.4g/day, 2.2% in MEZAVANT 4.8g/day). The most common severe adverse events were gastrointestinal disorders which were mainly symptoms associated with ulcerative colitis. Pancreatitis occurred in less than 1% of patients during clinical trials and resulted in discontinuation of therapy with MEZAVANT in patients experiencing this event.

Overall, the percentage of patients who experienced any adverse event was similar across treatment groups. Treatment-related adverse events occurring in MEZAVANT or placebo groups at a frequency of at least 1% in two Phase 3, 8-week, double-blind, placebo-controlled trials are listed in [Table 1](#).

<b>Table 1: Treatment-Related Adverse Events in Two Phase 3 Trials Experienced by at least 1% of the MEZAVANT Group and at a Rate Greater than Placebo</b>			
<b>Event<sup>b</sup></b>	<b>MEZAVANT<sup>a</sup> 2.4g/day n=177 (%)</b>	<b>MEZAVANT<sup>a</sup> 4.8g/day n=179 (%)</b>	<b>Placebo<sup>a</sup> n=179 (%)</b>
<b>Gastrointestinal Disorders</b>			
Flatulence	3%	2%	2%
<b>Investigations</b>			
Increased alanine aminotransferase	1%	1%	0%
<b>Nervous System Disorders</b>			
Headache	3%	2%	0%
<b>Skin and Subcutaneous Tissue Disorders</b>			
Pruritus	1%	1%	0%
Alopecia	0%	1%	0%

<sup>a</sup> Percentages are based on the number of patients in the safety population for each treatment group.

<sup>b</sup> Treatment-related adverse events for which the placebo rate equals or exceeds the rate for MEZAVANT are abdominal pain, decreased weight (placebo only), dizziness, dyspepsia, nausea, and ulcerative colitis.

The following treatment-related adverse events, presented by body system, were reported infrequently (less than 1%) by MEZAVANT-treated ulcerative colitis patients in controlled trials.

**Less Common Clinical Trial Adverse Drug Reactions (<1%)**

**Cardiac Disorders:** *Uncommon:* tachycardia

**Ear and Labyrinth Disorders:** *Uncommon:* ear pain

**Gastrointestinal Disorders:** *Uncommon:* abdominal distension, diarrhea, pancreatitis, rectal polyp, vomiting

**General Disorders and Administration Site Conditions:** *Uncommon:* asthenia, face edema, fatigue, pyrexia

**Investigations:** *Uncommon:* elevated total bilirubin, thrombocytopenia

**Musculoskeletal and Connective Tissue Disorders:** *Uncommon:* arthralgia, back pain

**Nervous System Disorders:** *Uncommon:* somnolence, tremor

**Respiratory, Thoracic and Mediastinal Disorders:** *Uncommon:* pharyngolaryngeal pain

**Skin and Subcutaneous Tissue Disorders:** *Uncommon:* acne, rash, urticaria

**Vascular Disorders:** *Uncommon:* hypertension, hypotension.

### **Pooled Safety Analysis**

In the pooled safety analysis of patients with ulcerative colitis who participated in the clinical studies (short- and long-term, n=1368), the majority of subjects did not experience treatment-emergent adverse events associated with MEZAVANT. Of the events reported, the majority were mild or moderate in severity. The most frequently reported adverse drug reactions within the pooled safety analysis of the ulcerative colitis patient clinical studies were colitis, headache, abdominal pain, liver function test abnormal, diarrhea and nausea. Adverse drug reactions observed during clinical trials (pooled safety analysis) are listed in [Table 2](#).

<b>System/Organ Class</b>	<b>Incidence Category</b>	<b>Adverse Drug Reaction</b>
Blood and Lymphatic System Disorders	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Thrombocytopenia
Cardiac Disorders	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Tachycardia
Ear and Labyrinth Disorders	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Ear pain
Gastrointestinal Disorders	Common ( $\geq 1\%$ and $< 10\%$ )	Abdominal distension, Abdominal pain, Colitis, Diarrhea, Dyspepsia, Flatulence, Nausea, Vomiting
	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Pancreatitis, Rectal polyp
General Disorders and Administration Site Conditions	Common ( $\geq 1\%$ and $< 10\%$ )	Asthenia, Fatigue, Pyrexia
	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Face edema
Hepatobiliary Disorders	Common ( $\geq 1\%$ and $< 10\%$ )	Liver Function Test abnormal (e.g. ALT, AST, Bilirubin)
Musculoskeletal and Connective Tissue Disorders	Common ( $\geq 1\%$ and $< 10\%$ )	Arthralgia (which may be associated with myalgia), Back pain
Nervous System Disorders	Common ( $\geq 1\%$ and $< 10\%$ )	Headache
	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Dizziness, Somnolence, Tremor
Respiratory, Thoracic and Mediastinal Disorders	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Pharyngolaryngeal pain
Skin and Subcutaneous Tissue Disorders	Common ( $\geq 1\%$ and $< 10\%$ )	Pruritus, Rash
	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Acne, Alopecia, Urticaria
Vascular Disorders	Common ( $\geq 1\%$ and $< 10\%$ )	Hypertension
	Uncommon ( $\geq 0.1\%$ and $< 1\%$ )	Hypotension

### **Adverse Events Seen with MEZAVANT During Post-Marketing Surveillance**

**Blood and Lymphatic System Disorders:** leucopenia, neutropenia.

**Cardiac Disorders:** myocarditis, pericarditis

**Hepatobiliary Disorders:** hepatitis

**Renal and Urinary Disorders:** interstitial nephritis

**Respiratory, Thoracic and Mediastinal Disorders:** hypersensitivity pneumonitis (including interstitial pneumonitis, allergic alveolitis, eosinophilic pneumonitis).

### **Additional Adverse Events Seen with Other Mesalamine Products**

**Blood and Lymphatic System Disorders:** agranulocytosis, aplastic anemia, pancytopenia

**Hepatobiliary Disorders:** cholelithiasis

**Musculoskeletal and Connective Tissue Disorders:** systemic lupus erythematosus-like syndrome

**Nervous System Disorders:** neuropathy

**Renal and Urinary Disorders:** nephrotic syndrome

**Respiratory, Thoracic and Mediastinal disorders:** bronchospasm

**Skin and Subcutaneous Tissue Disorders:** angioedema.

### **Abnormal Hematologic and Clinical Chemistry Findings**

In the pivotal studies conducted, there has been no notable change from baseline in mean hematology and biochemistry parameters.

## **DRUG INTERACTIONS**

### **Drug-Drug Interactions**

No investigations of interaction between MEZAVANT and other drugs have been performed. However, there have been reports of interactions between products containing mesalamine and other drugs. The concurrent use of mesalamine with known nephrotoxic agents, including non-steroidal anti-inflammatory drugs (NSAIDs) and azathioprine may increase the risk of renal reactions. In patients receiving azathioprine or 6-mercaptopurine, concurrent use of mesalamine can increase the potential for blood disorders, especially leucopenia.

### **Drug-Food Interactions**

Administration of a single dose of MEZAVANT 4.8g with a high-fat meal\* in healthy volunteers resulted in further delay in absorption and plasma concentrations of mesalamine were detectable 4 hours following dosing. However, high-fat meal increased systemic exposure of mesalamine (mean  $C_{max}$ :  $\uparrow 91\%$ ; mean AUC:  $\uparrow 16\%$ ) compared to results in the fasted state; consideration should be given to this observation when prescribing to patients expected to consume high-fat meals. However, MEZAVANT was administered with food, part of an unrestricted diet, in the pivotal Phase 3 trials.

---

\* The high-fat meal, or equivalent, was two eggs fried in butter, two strips of bacon, two slices of toast with butter, four ounces (113g) of hash brown potatoes and eight ounces (237mL) of whole milk.

### **Drug-Herb Interactions**

Interactions with herbal products have not been established.

### **Drug-Laboratory Interactions**

Interactions with laboratory tests have not been established.

## **DOSAGE AND ADMINISTRATION**

### **Recommended Dose and Dosage Adjustment**

MEZAVANT is intended for once-daily, oral administration with food. The tablets should be swallowed whole with liquid and should not be crushed or chewed.

The recommended dose for the induction of remission in patients with mild to moderate ulcerative colitis is two to four 1.2g tablets to be taken once daily for a total daily dose of 2.4 to 4.8g. No difference in remission rates was noted between doses of 2.4g/day and 4.8g/day, but trends in improvement in the sigmoidoscopy score and clinical improvement (reduction in UC-DAI from baseline of  $\geq 3$  points) was noted at 4.8g/day dose versus 2.4g/day (see **Clinical Trials** section in Part II of the Product Monograph). The studies were not powered to look at differences between MEZAVANT dosing regimens of 2.4g/day and 4.8g/day. Similar efficacy was shown when a total daily dose of 2.4g of MEZAVANT was given as one dose (QD) or when given in two divided doses (BID).

The recommended dose for the maintenance of clinical and endoscopic remission (mucosal healing) is two 1.2g tablets to be taken once daily for a total daily dose of 2.4g.

Administration of a single dose of MEZAVANT 4.8g with a high-fat meal in healthy volunteers increased systemic exposure of mesalamine compared to results in the fasted state; consideration should be given to this observation when prescribing to patients expected to consume high-fat meals. However, MEZAVANT was administered with food, part of an unrestricted diet, in the pivotal Phase 3 trials (see **Drug Interactions - Drug-Food Interactions, Action and Clinical Pharmacology – Pharmacokinetics, Absorption**).

**Children:** The safety and effectiveness of mesalamine has not been established in children. As for tablets needing to be swallowed whole, consideration should be given to the ability to swallow the intact tablet.

**Elderly:** In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concurrent disease or other drug therapy.

### **Missed Dose**

If a dose of this medication has been missed, it should be skipped and taken as usual the next day.

## OVERDOSAGE

MEZAVANT is an aminosalicylate, and symptoms of salicylate toxicity may include tinnitus, vertigo, headache, confusion, drowsiness, sweating, hyperventilation, vomiting, and diarrhea. Severe intoxication may lead to disruption of electrolyte balance and blood-pH, hyperthermia, and dehydration.

Conventional therapy for salicylate toxicity may be beneficial in the event of acute overdose. Fluid and electrolyte imbalance should be corrected by the administration of appropriate intravenous therapy. Adequate renal function should be maintained.

For management of suspected drug overdose, contact your regional Poison Control Center

## ACTION AND CLINICAL PHARMACOLOGY

The MEZAVANT tablet contains a core of mesalamine (5-aminosalicylic acid), 1.2g, formulated with MMX Multi Matrix System<sup>®\*</sup> technology. MMX<sup>®\*</sup> uses a gastro-resistant film of methacrylic acid copolymers, Type A and Type B, which are designed to delay the initial release of mesalamine until exposure to approximately pH 7 and above, normally in the terminal ileum. A consistent and sustained release was observed across the pH range 6.8 to 7.2. The MMX technology also uses a matrix of lipophilic and hydrophilic excipients which facilitate the delayed and extended delivery of effective concentrations of mesalamine through the entire colon, with limited systemic absorption.

### Mechanism of Action

The mechanism of action of mesalamine is not fully understood, but appears to have a topical anti-inflammatory effect on the colonic epithelial cells.

Mucosal production of arachidonic acid metabolites, both through the cyclooxygenase and lipoxygenase pathways, is increased in patients with chronic inflammatory bowel disease, and it is possible that mesalamine diminishes inflammation by blocking cyclooxygenase and inhibiting prostaglandin production in the colon.

Mesalamine has the potential to inhibit the activation of nuclear factor kappa B (NFκB) and consequently the production of key pro-inflammatory cytokines. More recently, it has been proposed that impairment of PPAR-γ nuclear receptors (γ-form of peroxisome proliferator-activated receptors) may be implicated in ulcerative colitis. PPAR-γ receptor agonists have shown efficacy in ulcerative colitis and evidence has been accumulating that the mechanism of action of mesalamine may be mediated by PPAR-γ receptors.

---

\*MMX Multi Matrix System and MMX are registered trade-marks used under licence from Cosmo Technologies, Inc.

### **Pharmacodynamics**

The pharmacodynamic actions of mesalamine occur in the colonic/rectal mucosa local to the delivery of drug from MEZAVANT into the lumen. There is information suggesting that severity of colonic inflammation in ulcerative colitis patients treated with mesalamine is inversely correlated with mucosal concentrations of mesalamine. However, plasma concentrations representing systemically absorbed mesalamine are not believed to contribute extensively to efficacy.

### **Pharmacokinetics**

The pharmacokinetic information in this section is based on data from Phase 1 studies with MEZAVANT and from studies carried out with other formulations of mesalamine.

MEZAVANT contains a 1.2g core of mesalamine formulated in a multi-matrix system. This system is coated with methacrylic acid copolymers Type A and Type B, which are designed to dissolve at pH 7 and above, facilitating the extended delivery of effective concentrations of mesalamine through the entire colon with limited systemic absorption.

**Absorption:** The total absorption of mesalamine from MEZAVANT 2.4g or 4.8g given once daily for 14 days to healthy volunteers was found to be approximately 21-22% of the administered dose. Steady-state was achieved generally by 2 days after dosing.

Gamma-scintigraphy studies have shown that a single dose of MEZAVANT 1.2g (one tablet) passed rapidly and intact through the upper gastrointestinal tract of fasted healthy volunteers. Scintigraphic images showed a trail of radiolabelled tracer throughout the colon and rectum, indicating that mesalamine had distributed throughout the targeted site of action. Complete disintegration of MEZAVANT and complete release of mesalamine occurred after approximately 17.4 hours. Availability of mesalamine in the colon begins at 6 hours after dosing and continues beyond 24 hours post-dose. Following a single dose of MEZAVANT 4.8g, detectable levels of mesalamine remain in the plasma for up to 72 hours post-dose.

In a single- and multiple-dose pharmacokinetic study, MEZAVANT 2.4 or 4.8g was administered once daily with standard meals in 56 healthy volunteers (28 per dose group). Plasma concentrations of mesalamine were detectable after 4 hours and were maximal by 8 hours after the single dose. Accumulation was found to be between 1.7- and 2.4-fold and was independent of dose. This extent of accumulation was only modestly greater (1.1- to 1.4-fold) than predictable from single-dose pharmacokinetics.

After a single dose of MEZAVANT, total systemic exposure of 5-ASA appeared to increase slightly more than dose proportionately, with area under the plasma concentration-time curve (AUC) increasing approximately 2.5-fold for a 2-fold dose increase from 2.4g to 4.8g. However there was no evidence of steady-state systemic exposure increasing more than proportionately with dose.

In a single-dose study, MEZAVANT 1.2g, 2.4g and 4.8g were administered in the fasted state to healthy subjects. Plasma concentrations of mesalamine were detectable after 2 hours and reached a maximum by 9-12 hours on average for the doses studied. The pharmacokinetic parameters are highly variable among subjects (see [Table 3](#)). Mesalamine systemic exposure in terms of area under the plasma concentration-time curve (AUC) was slightly more than dose proportional between 1.2g and 4.8g MEZAVANT. Maximum plasma concentrations ( $C_{max}$ ) of mesalamine increased approximately dose proportionately between 1.2g and 2.4g and sub-proportionately between 2.4g and 4.8g MEZAVANT, with the dose-normalized value at 4.8g representing, on average, 74% of that at 2.4g based on geometric means.

Parameter <sup>1</sup> of Mesalamine	MEZAVANT 1.2g n=47	MEZAVANT 2.4g n=48	MEZAVANT 4.8g n=48
AUC <sub>0-t</sub> (ng.h/mL)	9039 <sup>+</sup> (5054)	20538 (12980)	41434 (26640)
AUC <sub>0-∞</sub> (ng.h/mL)	9578 <sup>•</sup> (5214)	21084 (13185)	44775 <sup>#</sup> (30302)
C <sub>max</sub> (ng/mL)	857 (638)	1595 (1484)	2154 (1140)
T <sub>max</sub> * (h)	9.0** (4.0-32.1)	12.0 (4.0-34.1)	12.0 (4.0-34.0)
T <sub>lag</sub> * (h)	2.0** (0-8.0)	2.0 (1.0-4.0)	2.0 (1.0-4.0)
T <sub>1/2</sub> (h) (Terminal Phase)	8.56 <sup>•</sup> (6.38)	7.05 <sup>§</sup> (5.54)	7.25 <sup>#</sup> (8.32)

<sup>1</sup> Arithmetic mean of parameter values are presented except for T<sub>max</sub> and T<sub>lag</sub>

\* Median (min, max); +n=43, •n=27, §n=33, #n=36, \*\*n=46

Administration of a single dose of MEZAVANT 4.8g with a high-fat meal resulted in further delay in absorption and plasma concentrations of mesalamine were detectable 4 hours following dosing. However, a high-fat meal increased systemic exposure of mesalamine (mean C<sub>max</sub>: ↑91%; mean AUC: ↑16%) compared to results in the fasted state.

In a single-dose pharmacokinetic study of MEZAVANT, 4.8g was administered in the fasted state to 71 healthy male and female volunteers [28 young (18-35 years); 28 elderly (65-75 years); 15 elderly (>75 years)]. Increased age resulted in increased systemic exposure (up to approximately 2-fold, based on AUC<sub>0-t</sub>, AUC<sub>0-∞</sub> and C<sub>max</sub>) to mesalamine and its metabolite, N-acetyl-5-aminosalicylic acid, but did not affect the percentage of mesalamine absorbed (see [Table 4](#)). Increased age resulted in a slower apparent elimination of mesalamine, though there was high between-subject variability. Systemic exposures in individual subjects were inversely correlated with renal function as assessed by estimated creatinine clearance.

<b>Parameter of 5-ASA</b>	<b>Young Subjects (18-35yrs) n=28</b>	<b>Elderly Subjects (65-75yrs) n=28</b>	<b>Elderly Subjects (&gt;75yrs) n=15</b>
AUC <sub>0-t</sub> (ng.h/mL)	51570 (23870)	73001 (42608)	65820 (25283)
AUC <sub>0-∞</sub> (ng.h/mL)	58057 <sup>b</sup> (22429)	89612 <sup>c</sup> (40596)	63067 <sup>d</sup> (22531)
C <sub>max</sub> (ng/mL)	2243 (1410)	4999 (4381)	4832 (4383)
t <sub>max</sub> <sup>a</sup> (h)	22.0 (5.98 – 48.0)	12.5 (4.00 – 36.0)	16.0 (4.00 – 26.0)
t <sub>lag</sub> <sup>a</sup> (h)	2.00 (1.00 – 6.00)	2.00 (1.00 – 4.00)	2.00 (2.00 – 4.00)
t <sub>1/2</sub> (h), terminal phase	5.68 <sup>b</sup> (2.83)	9.68 <sup>c</sup> (7.47)	8.67 <sup>d</sup> (5.84)
Renal clearance (L/h)	2.05 (1.33)	2.04 (1.16)	2.13 (1.20)

Arithmetic mean (SD) data are presented, n = number of subjects

<sup>a</sup> Median (min - max), <sup>b</sup>n=15, <sup>c</sup>n=16, <sup>d</sup>n=13

**Distribution:** Following dosing of MEZAVANT, the distribution profile of mesalamine is presumed to be the same as that for other mesalamine-containing products. Mesalamine has a relatively small volume of distribution of approximately 18L, confirming minimal extravascular penetration of systemically-available drug, which is consistent with the absence of any significant secondary pharmacology. Mesalamine is 43% bound to plasma proteins when in vitro plasma concentrations are 2.5µg/mL.

**Metabolism:** The only major metabolite of mesalamine (5-aminosalicylic acid) is N-acetyl-5-aminosalicylic acid, which is pharmacologically inactive. Its formation is brought about by N-acetyltransferase (NAT) activity in the liver and in the cytosol of intestinal mucosal cells, principally by NAT-1. Although this enzyme is known to be subject to genetic polymorphism, NAT-1 genotypes have been shown not to be predictive of mesalamine efficacy or toxicity.

**Excretion:** Elimination of mesalamine is mainly via the renal route following metabolism to N-acetyl-5-aminosalicylic acid (acetylation). However, there is also limited excretion of the parent drug in urine. Of the approximately 21-22% of the dose absorbed, less than 8% of the dose was excreted unchanged in the urine at steady-state, compared with greater than 13% for N-acetyl-5-aminosalicylic acid. The apparent terminal half-lives for mesalamine and its major metabolite after administration of MEZAVANT 2.4g and 4.8g were, on average, 7-9 hours and 8-12 hours, respectively.

### **Special Populations and Conditions**

**Pediatrics:** No information is available in patients who are less than 18 years of age (see **Warnings and Precautions – Special Populations, Pediatrics**).

**Geriatrics:** Systemic exposure to mesalamine increased by up to approximately 2-fold in elderly subjects (>65 years) compared with younger adult subjects (18-35 years) after a 4.8g single dose of MEZAVANT (see **Action and Clinical Pharmacology - Pharmacokinetics, Absorption**). Systemic exposures in individual subjects were inversely correlated with renal function as assessed by estimated creatinine clearance. The potential impact on the safe use of MEZAVANT in the elderly population in clinical practice should be considered (see **Warnings and Precautions – Special Populations, Geriatrics**).

**Gender:** No consistent trend on gender effect was observed in the clinical trials.

**Race:** No pharmacokinetic information is available that examines MEZAVANT in different races.

**Hepatic Insufficiency:** No information is available for patients with hepatic impairment (see **Warnings and Precautions – Hepatic/Biliary/Pancreatic, Adverse Reactions**).

**Renal Insufficiency:** No information is available for patients with mild, moderate and severe renal impairment (see **Warnings and Precautions - Renal, Adverse Reactions**).

**Genetic Polymorphism:** Mesalamine is principally metabolised by NAT-1. Although this enzyme is known to be subject to genetic polymorphism, NAT-1 genotypes have been shown not to be predictive of mesalamine efficacy or toxicity.

## **STORAGE AND STABILITY**

Store at room temperature 15°C to 25°C; excursions permitted to 30°C.

## **DOSAGE FORMS, COMPOSITION AND PACKAGING**

MEZAVANT tablets are available as red-brown ellipsoidal film-coated tablets containing 1.2g of mesalamine, and debossed on one side with S476.

The MEZAVANT delayed- and extended-release tablet contains a core of 5-aminosalicylic acid (5-ASA; mesalamine), 1200mg, formulated with MMX Multi Matrix System technology. MMX uses a gastro-resistant film of methacrylic acid copolymers, Type A and Type B, which are designed to delay the initial release of mesalamine until exposure to approximately pH 7 and above, normally in the terminal ileum. A consistent and sustained release was observed across the pH range 6.8 to 7.2. The MMX technology also uses a matrix of lipophilic and hydrophilic excipients which facilitate the delayed and extended delivery of effective concentrations of mesalamine through the entire colon with limited systemic absorption.

The inactive ingredients of MEZAVANT tablets are carnauba wax, magnesium stearate, metacrylic acid copolymer types A and B, polyethylene glycol (macrogol) 6000, red ferric oxide (E172), silica (colloidal hydrated), sodium carboxymethylcellulose, sodium starch glycolate (type A), stearic acid, talc, titanium dioxide (E171), and triethylcitrate.

MEZAVANT tablets do not contain gluten or lactose.

MEZAVANT tablets are supplied in opaque high density polyethylene (HDPE) bottles of 60 or 120 tablets with child-resistant closure.

## PART II: SCIENTIFIC INFORMATION

### PHARMACEUTICAL INFORMATION

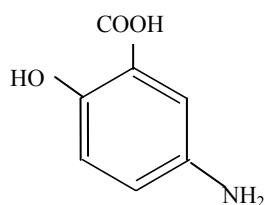
#### Drug Substance

Proper name: mesalamine

Chemical name: 5-amino-2-hydroxybenzoic acid

Molecular formula and molecular mass:  $C_7H_7NO_3$  153.14

Structural formula:



Physicochemical properties: Mesalamine is an almost white to light pink/gray/brown powder or crystals that decomposes at 280°C and is very slightly soluble in water.  
The pH of 2.5% aqueous suspension is 3.5-4.5.  
pKa value: 5.8

### CLINICAL TRIALS

#### Active, Mild to Moderate Ulcerative Colitis:

Two similarly designed, randomized, double-blind, placebo-controlled trials were conducted in adult patients with active, mild to moderate ulcerative colitis. Study SPD476-301 assessed the efficacy and safety of MEZAVANT 2.4g/day (1.2g given twice daily) and 4.8g/day (given once daily) against placebo in 280 patients. Study SPD476-302 assessed the safety and efficacy of MEZAVANT 2.4g/day and 4.8g/day (both given once daily) against placebo in 341 patients. A pH-dependent delayed-release mesalamine 2.4g/day (administered as two 400mg tablets given three times daily) was included in this study as a reference arm; the study was not designed to demonstrate non-inferiority of MEZAVANT against pH-dependent delayed-release mesalamine.

**Maintenance of remission:**

A multicenter, randomized, double-blind, double-dummy, parallel-group, non-inferiority, active comparator study (SPD476-304) was designed to assess the number of subjects who remained in endoscopic remission (maintenance of mucosal healing) following 6 months of study treatment. Subjects were randomized in a 1:1 ratio to receive either MEZAVANT 2.4g/day administered once daily (QD) or pH-dependent delayed-release mesalamine 1.6g/day administered as two 400mg tablets given twice daily (BID).

**Study demographics and trial design**

<b>Study #</b>	<b>Trial design</b>	<b>Dosage, route of administration and duration</b>	<b>Study subjects (n=number)</b>	<b>Mean age (Range)</b>	<b>Gender</b>
SPD476-301	Randomized, double-blind, placebo-controlled trial conducted in subjects with active, mild to moderate UC to assess the efficacy and safety of MEZAVANT.	2.4g/day administered as 1.2g twice daily and 4.8g/day administered once daily Oral 8 weeks	262 <sup>a</sup>	41.5 (18-76)	M=51.5% F=48.5%
SPD476-302	Randomized, double-blind, placebo-controlled trial conducted in subjects with active, mild to moderate UC to assess the safety and efficacy of MEZAVANT. This study included a comparator, pH-dependent delayed release mesalamine, as an internal reference arm.	2.4g/day and 4.8g/day administered once daily pH-dependent delayed-release mesalamine 2.4g/day, administered as 2x400mg three times daily	341 <sup>a</sup>	43.2 (18-78)	M=47.5% F=52.5%
SPD476-304	Randomized, double-blind, double-dummy, parallel-group, non-inferiority, active comparator study conducted in subjects with mild to moderate UC to assess the number of subjects who remained in endoscopic remission following six (6) months of study treatment.	2.4g/day administered once daily pH-dependent delayed-release mesalamine 1.6g/day in divided dose, administered as 0.8g twice daily (BID)	679 <sup>b</sup>	45.4 (18-85)	M=50.8% F=49.2%

<sup>a</sup> Based on ITT population

<sup>b</sup> Based on Per Protocol population

## **Study results**

### **Induction of remission, including clinical remission and mucosal healing:**

The primary efficacy endpoint in studies SPD476-301 and SPD476-302 was to compare the percentage of patients in remission, a composite endpoint indicative of clinical remission and mucosal healing, after 8 weeks of treatment for the MEZAVANT treatment groups vs. placebo. Remission was defined as an Ulcerative Colitis Disease Activity Index (UC-DAI) score of  $\leq 1$ . To be considered in remission, a subject was required to have no blood in stools and normal stool frequency. Also, they could have either a Physician Global Assessment of 1 (mild disease) or improvement of the mucosal appearance that lead to a maximum sigmoidoscopy score of 1 (mild erythema, decreased vascularity, minimal granularity) as long as there had been at least a 1-point drop from baseline in the sigmoidoscopy score. The scoring system used for sigmoidoscopy was modified to be more stringent than the standard UC-DAI system, which allows patients with mild friability to be given a sigmoidoscopy score of 1. Results for the primary variable of remission in study SPD476-301 are shown in [Table 6](#). Both MEZAVANT 2.4g/day (1.2g given twice daily) and 4.8g/day (given once daily) demonstrated superiority over placebo. Results for study SPD476-302 are also shown in [Table 6](#). Both MEZAVANT 2.4g/day and 4.8g/day (both given once daily) demonstrated superiority over placebo.

**Table 6: Summary of Primary Efficacy Results for Studies SPD476-301 and SPD476-302 in Mild to Moderate, Active Ulcerative Colitis – ITT Population**

	SPD476-301			SPD476-302			
	Placebo n=85	MEZAVANT 2.4g/day BID n=88	MEZAVANT 4.8g/day QD n=89	Placebo n=86	MEZAVANT 2.4g/day QD n=84	MEZAVANT 4.8g/day QD n=85	pH-dependent delayed-release mesalamine <sup>a</sup>  2.4g/day (0.8g given TID) n=86
Number of subjects in remission*							
n (%)	11 (12.9)	30 (34.1)	26 (29.2)	19 (22.1)	34 (40.5)	35 (41.2)	28 (32.6)
Comparison of active vs. placebo <sup>‡</sup>							
Odds ratio		3.48	2.78		2.40	2.47	1.70
CI		1.44, 8.41	1.27, 6.06		1.23, 4.69	1.15, 5.30	0.86, 3.36
p-value <sup>†</sup>		0.001	0.009		0.010	0.007	0.124

<sup>a</sup> pH-dependent delayed-release mesalamine was included in this study as a reference arm; the study was not designed to demonstrate non-inferiority of MEZAVANT against pH-dependent delayed-release mesalamine.

\* Remission was defined as an Ulcerative Colitis Disease Activity Index (UC-DAI) score of  $\leq 1$ . To be considered in remission, a subject was required to have no blood in stools and normal stool frequency. Also, they could have either a Physician Global Assessment of 1 (mild disease) or improvement of the mucosal appearance that lead to a maximum sigmoidoscopy score of 1 (mild erythema, decreased vascularity, minimal granularity) as long as there had been at least a 1-point drop from baseline in the sigmoidoscopy score. The scoring system used for sigmoidoscopy was modified to be more stringent than the standard UC-DAI system, which allows patients with mild friability to be given a sigmoidoscopy score of 1.

<sup>‡</sup> Values from the chi-squared test.

<sup>†</sup> Study-wise false-positive error rate was controlled using the Bonferroni-Holm method. The treatment comparison with the smaller p-value was evaluated at the 0.025 significance level. If this was significant, the treatment comparison with the larger p-value was evaluated at the 0.05 significance level. Confidence Intervals (CI) presented are analogous to the significance level, i.e., 97.5% and 95%.

The studies were not powered to look at differences between MEZAVANT doses. There was no statistically significant difference in remission rates between MEZAVANT 2.4g/day twice daily and MEZAVANT 4.8g/day once daily or between MEZAVANT 2.4g/day once daily and MEZAVANT 4.8g/day once daily. The secondary efficacy parameters, including clinical improvement and change in UC-DAI score and its components (including assessment of treatment failure, clinical remission and sigmoidoscopy) supported the primary findings by demonstrating statistical significance over placebo (results are shown in Table 7 and Table 8). There was no statistically significant difference between MEZAVANT 2.4g/day and 4.8g/day dose groups in clinical improvement, clinical remission and sigmoidoscopic improvement; however, MEZAVANT 4.8g/day showed trends for improved efficacy over MEZAVANT 2.4g/day after 8 weeks of treatment in terms of sigmoidoscopic outcome (one of four components of the UC-DAI) and clinical improvement (defined as a drop in the UC-DAI score of at least 3 points).

<b>Table 7: Study SPD476-301: Secondary Efficacy Results (% Patients)</b>			
<b>Secondary Efficacy Endpoints</b>	<b>MEZAVANT 2.4g/day (Given 1.2g BID) n=88</b>	<b>MEZAVANT 4.8g/day (Given QD) n=89</b>	<b>Placebo n=85</b>
<b>Clinical Improvement<sup>a</sup></b> <i>(reduction in UC-DAI score from baseline of <math>\geq 3</math> points)</i>	55.7%***	59.6%***	25.9%
<b>Treatment Failure<sup>a</sup></b> <i>(unchanged, worsened, or missing UC-DAI scores)</i>	28.4%***	24.7%***	54.1%
<b>Clinical Remission<sup>a</sup></b> <i>(scores of 0 for stool frequency and rectal bleeding)</i>	37.5%**	32.6%*	18.8%
<b>Sigmoidoscopic Improvement<sup>a</sup></b>	64.8%**	71.9%***	36.5%
<b>Change from baseline in UC-DAI score</b> <i>(least squares mean change)</i>	-2.71***	-3.46***	-0.79

<sup>a</sup> the % data represents the proportion of subjects.

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001 (each vs. placebo)

Clinical Improvement, Treatment Failure and Clinical Remission: p-value from the chi-squared test.

Sigmoidoscopic Improvement: p-value from the Mantel-Haenszel chi-squared test with the alternative hypothesis of linear association.

Change from baseline in UC-DAI score: ANCOVA with change from baseline as the response variable and baseline UC-DAI score, treatment group and pooled centre as explanatory variables.

<b>Table 8: Study SPD476-302: Secondary Efficacy Results (% Patients)</b>				
<b>Secondary Efficacy Endpoints</b>	<b>MEZAVANT 2.4g/day (Given QD) n=84</b>	<b>MEZAVANT 4.8g/day (Given QD) n=85</b>	<b>pH-dependent delayed-release mesalamine<sup>a</sup> 2.4g/day (0.8g given TID) n=86</b>	<b>Placebo n=86</b>
<b>Clinical Improvement<sup>b</sup></b> <i>(reduction in UC-DAI score from baseline of <math>\geq 3</math> points)</i>	60.7%**	64.7%***	55.8%*	39.5%
<b>Treatment Failure<sup>b</sup></b> <i>(unchanged, worsened, or missing UC-DAI scores)</i>	21.4%***	20.0%***	27.9%**	47.7%
<b>Clinical Remission<sup>b</sup></b> <i>(scores of 0 for stool frequency and rectal bleeding)</i>	41.7%**	41.2%**	33.7% <sup>NS</sup>	22.1%
<b>Sigmoidoscopic Improvement<sup>b</sup></b>	70.2%***	76.5%***	60.5%*	41.9%
<b>Change from baseline in UC-DAI score</b> <i>(least squares mean change)</i>	-3.34**	-3.58**	-3.11*	-1.94

<sup>a</sup> pH-dependent delayed-release mesalamine was included in this study as a reference arm and was not designed to demonstrate non-inferiority of MEZAVANT against pH-dependent delayed-release mesalamine.

<sup>b</sup> the % data represents the proportion of subjects.

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001 (each vs. placebo); NS: p>0.05 (vs. placebo)

Clinical Improvement, Treatment Failure and Clinical Remission: p-value from the chi-squared test.

Sigmoidoscopic Improvement: p-value from the Mantel-Haenszel chi-squared test with the alternative hypothesis of linear association.

Change from baseline in UC-DAI score: ANCOVA with change from baseline as the response variable and baseline UC-DAI score, treatment group and pooled centre as explanatory variables.

### **Maintenance of remission, including clinical remission and mucosal healing:**

The primary efficacy endpoint in study SPD476-304 was the proportion of subjects in endoscopic remission at Month 6 using the Per Protocol population. Endoscopic remission (mucosal healing) was defined by a modified UC-DAI endoscopy component score of  $\leq 1$ . MEZAVANT met the primary endpoint of non-inferiority of -10% versus pH-dependent delayed-release mesalamine in the proportion of subjects in endoscopic remission (maintenance of mucosal healing) at 6 months.

<b>Table 9 Summary of Primary Efficacy Results for Study SPD476-304 in Mild to Moderate Ulcerative Colitis</b>		
<b>Analysis of the Proportion of Subjects in Endoscopic Remission at Month 6 (Mucosal Healing) (Per Protocol Population)</b>		
		<b>MEZAVANT 2.4g/day (given QD) n=343</b>
Month 6	Subjects in endoscopic remission* (n, %)	287 (83.7)

\* Endoscopic remission (mucosal healing) was defined by a modified UC-DAI endoscopy component score of  $\leq 1$ . The scoring system used for sigmoidoscopy was modified to be more stringent than the standard UC-DAI system, which allows patients with mild friability to be given a sigmoidoscopy score of 1.

The proportion of subjects who reached remission in this study using MEZAVANT 2.4g/day QD (83.7%) was similar to that seen using the comparator (pH-dependent delayed-release mesalamine 1.6g/d [0.8g BID]; 81.5%).

Secondary endpoint analyses demonstrated that MEZAVANT achieved a similarly high proportion of subjects in endoscopic remission (mucosal healing) with no or mild symptoms, clinical remission, improved or same endoscopy scores, and improved or same Physician Global Assessment scores, as compared to pH-dependent delayed-release mesalamine as well as similar changes in modified UC-DAI scores.

A randomized, open-label extension study to studies SPD476-301 and SPD476-302 was designed to assess the long-term safety and tolerability of MEZAVANT 2.4g/d administered once daily and in 2 divided doses (1.2g BID) in the maintenance of ulcerative colitis in remission over 12 months. This study, study SPD476-303, included an 8-week Acute Extension Phase during which MEZAVANT 4.8g/d dose was administered BID, and a 12-month Maintenance Phase during which MEZAVANT 2.4g/d dose was administered either (1.2g) BID or QD. Efficacy was a secondary objective of this extension study.

The 12-month safety results from the SPD476-303 study are consistent with previously reported safety data. The efficacy endpoints were time to relapse for the Maintenance Phase; and the percentage of subjects in remission at the end of the study for the Acute and Maintenance phases.

Time to relapse was defined as the time at which a subject withdrew from the Maintenance Phase due to a requirement for alternative ulcerative colitis medication denoted by “Lack of Efficacy/Relapse.” The proportion of subjects withdrawing due to a need for alternative ulcerative colitis medication in the Maintenance Phase Efficacy population was low. Both treatment groups had similar times to relapse for the duration of the Maintenance Phase. At 12 months (360 days), the proportion of subjects who had not relapsed (i.e., relapse-free) was approximately 88% in the MEZAVANT 2.4g/d QD group and 92% in the MEZAVANT 1.2g BID (total 2.4g/d) group.

Remission was defined as modified UC-DAI score  $\leq 1$  with a score of 0 for rectal bleeding and stool frequency, and at least a 1-point reduction from parent study baseline in the sigmoidoscopy score. Overall 59.5% of subjects achieved remission at the end of the Acute Extension Phase (Month 2). At Month 12 of the Maintenance Phase, 64.4% of subjects in the MEZAVANT 2.4g/d QD group and 68.5% of subjects in the MEZAVANT 1.2g BID (total 2.4g/d) group met the strict remission criteria; no statistically significant differences were observed between treatment groups.

An open-label study (SPD476-404) was designed to assess clinical recurrence related to compliance with treatment with MEZAVANT 2.4g/day given once daily for the maintenance of quiescent ulcerative colitis. Subjects entered the 12-month Maintenance Phase either directly or after completion of an 8-week acute phase. The primary analysis was the proportion of subjects with clinical recurrence at Month 6 of the Maintenance Phase. 76.5% of subjects who had sufficient data to calculate clinical recurrence at Month 6 did not have disease recurrence after 6 months of maintenance treatment with MEZAVANT.

The results of the secondary efficacy parameters (clinical recurrence at 12 months, proportion of subjects with quiescent ulcerative colitis, endoscopic remission, and time to clinical recurrence) supported the primary findings of consistently maintaining quiescence of ulcerative colitis through 12 months of maintenance treatment with MEZAVANT. Another study objective was also to assess health-related quality of life (QoL) at baseline of the Acute Phase, Week 8 Acute Phase/Baseline Maintenance Phase, 6 months, and 12 months. Non-quiescent UC subjects who received MEZAVANT treatment during the Acute Phase showed statistically and clinically significant improvement on almost all measured aspects of health-related QoL measures using the three questionnaires (Medical Outcomes Study 12 Item Short Form Health Survey, the Short Inflammatory Bowel Disease Questionnaire, and the Work Productivity and Activity Impairment Questionnaire: Specific Health Problem v2.0), particularly on physical role, disease-related QoL (such as pain, urgency, and anxiety), and work productivity loss and activity impairment.

### **Pharmacokinetics:**

In a parallel-group, two-period pharmacokinetic study of MEZAVANT 2.4g/day or 4.8g/day, where single and multiple doses were administered once daily with standard meals in 56 healthy volunteers (28 per dose group), plasma concentrations of mesalamine were detectable after 4 hours and were maximal by 8 hours after the single dose. Steady-state was achieved generally by 2 days after dosing. Accumulation was found to be between 1.7- and 2.4-fold and was independent of dose. This extent of accumulation was only modestly greater (1.1- to 1.4-fold) than predictable from single-dose pharmacokinetics. There was no evidence of steady-state systemic exposure increasing more than proportionately with dose. The principal pharmacokinetic parameters are presented in [Table 10](#).

**Table 10: Principal Pharmacokinetic Parameters of 5-ASA following Administration of MEZAVANT in a 2.4g/day and 4.8g/day Single and Multiple Dose Study**

Study/Dose	t <sub>lag</sub> (h) (mean±SD)	t <sub>max</sub> (h) (mean±SD)	C <sub>max</sub> (ng/mL) (mean±SD)	AUC <sub>0-t</sub> (ng.h/mL) (mean±SD)	AUC <sub>0-∞</sub> (ng.h/mL) (mean±SD)	t <sub>½</sub> (h) (mean±SD)	% Dose absorbed
2.4 g single dose n=28	5.2 ± 3.9	13.2 ± 10.0	2932 ± 2957	18573 ± 10969 (t=up to 120h)	19852 ± 11740	7.41 ± 4.65	25.2 ± 10.4
2.4g/day QD multiple dose (Day 14 data) n=28	0.0 ± 0.0	9.07 ± 5.37	2918 ± 2164	22319 ± 13697 (t=24h)	N/A	N/A	22.4 ± 9.25
4.8 g single dose n=28	4.9 ± 4.2	14.4 ± 9.68	4385 ± 3033	47785 ± 22421 (t=up to 120h)	48141 ± 25627	6.28 ± 5.31	27.0 ± 12.6
4.8/day QD multiple dose (Day 14 data) n=28	0.21 ± 0.83	9.60 ± 3.78	5280 ± 3146	49559 ± 23780 (t=24h)	N/A	N/A	20.8 ± 11.6

N/A Not Applicable

## DETAILED PHARMACOLOGY

In regard to the exact mechanism of action of mesalamine, it is not clear which of the many actions of the compound is responsible for its therapeutic effects in Inflammatory Bowel Disease. For example, mesalamine has been shown to possess anti-oxidant properties in a range of systems in vitro. It also stimulates phospholipase D activity which may inhibit pro-inflammatory events. Mesalamine has also been shown to inhibit the production of the metabolites of arachidonic acid, particularly leukotriene B<sub>4</sub> (LTB<sub>4</sub>), an important mediator in chronic inflammatory diseases.

Mesalamine has the potential to inhibit the activation of nuclear factor kappa B (NFκB) and consequently the production of key pro-inflammatory cytokines. More recently, it has been proposed that impairment of PPAR-γ nuclear receptors (γ-form of peroxisome proliferator-activated receptors) may be implicated in ulcerative colitis. PPAR-γ receptor agonists have shown efficacy in ulcerative colitis and evidence has been accumulating that the mechanism of action of mesalamine may be mediated by PPAR-γ receptors. However it may be a combination of all such actions, which ultimately culminates in the drug's efficacy.

The pharmacodynamic actions of mesalamine occur in the colonic/rectal mucosa local to the delivery of drug from MEZAVANT into the lumen. There is information suggesting that severity of colonic inflammation in ulcerative colitis patients treated with mesalamine is inversely correlated with mucosal concentrations of mesalamine. However, plasma concentrations representing systemically absorbed mesalamine are not believed to contribute extensively to efficacy.

No animal studies of absorption, distribution, metabolism and excretion of mesalamine following administration of MEZAVANT have been conducted. However, numerous non-clinical drug metabolism and pharmacokinetic studies as well as clinical pharmacokinetics studies on various mesalamine formulations have been reported in the literature.

## **TOXICOLOGY**

### **Carcinogenesis, Mutagenesis, Impairment of Fertility:**

In a 104-week dietary carcinogenicity study of mesalamine, CD-1 mice were treated with doses up to 2500mg/kg/day and it was not tumorigenic. This dose is 2.2 times the maximum recommended human dose (based on body surface area comparison) of MEZAVANT. Furthermore, in a 104-week dietary carcinogenicity study in Wistar rats, mesalamine up to a dose of 800mg/kg/day was not tumorigenic. This dose is 1.4 times the recommended human dose (based on body surface area comparison) of MEZAVANT.

No evidence of mutagenicity was observed in an in vitro Ames test or an in vivo mouse micronucleus test.

No effects on fertility or reproductive performance were observed in male or female rats at oral doses of mesalamine up to 296mg/kg/day. Semen abnormalities and infertility in men, which have been reported in association with sulfasalazine, have not been seen with other mesalamine products during controlled clinical trials.

### **Pregnancy – Teratogenic Effects:**

Reproduction studies have been performed in rats at doses up to 480mg/kg/day and have revealed no evidence of teratogenic effects or harm to the fetus due to mesalamine. Animal reproduction studies are not always predictive of human response.

## REFERENCES

1. Frieri G, Giacomelli R, Pimpo M, Palumbo G, Passacantando A, Pantaleoni G, Caprilli R. Mucosal 5-aminosalicylic acid concentration inversely correlates with severity of colonic inflammation in patients with ulcerative colitis. *Gut*. 2000;47(3):410-4.
2. Hussain FN, Ajjan RA, Riley SA. Dose loading with delayed-release mesalazine: a study of tissue drug concentrations and standard pharmacokinetic parameters. *Br J Clin Pharmacol*. 2000;49(4):323-30.
3. Azad Khan AK, Piris J, Truelove SC. An experiment to determine the active therapeutic moiety of sulphasalazine. *Lancet*. 1977;2(8044):892-5.
4. Tornhamre S, Edenius C, Smedegard G, Sjöquist B, Lindgren JA. Effects of sulfasalazine and a sulphasalazine analogue on the formation of lipoxygenase and cyclooxygenase products. *Eur J Pharmacol*. 1989;169:225-234.
5. Fretland DJ, Djuric SW, Gaginella TS. Eicosanoids and inflammatory bowel disease: regulation and prospects for therapy. *Prostaglandins Leukot Essent Fatty Acids*. 1990;41:215-233.
6. Lim W-C, Hanauer SB. Controversies with aminosalicylates in inflammatory bowel disease. *Rev Gastro Dis*. 2004;4(3):104-117.
7. Bondesen S, Hegnhøj J, Larsen F, Hansen SH, Hansen CP, Rasmussen SN. Pharmacokinetics of 5-aminosalicylic acid in man following administration of intravenous bolus and per os slow-release formulation. *Dig Dis Sci*. 1991;36(12):1735-40.
8. Myers B, Evans DN, Rhodes J, Evans BK, Hughes BR, Lee MG, Richens A, Richards D. Metabolism and urinary excretion of 5-amino salicylic acid in healthy volunteers when given intravenously or released for absorption at different sites in the gastrointestinal tract. *Gut*. 1987;28(2):196-200.
9. Zhou SY, Fleisher D, Pao LH, Li C, Winward B, Zimmermann EM. Intestinal metabolism and transport of 5-aminosalicylate. *Drug Metab Dispos*. 1999;27(4):479-85.
10. De Vos M. Clinical pharmacokinetics of slow release mesalazine. *Clin Pharmacokinet*. 2000;39(2):85-97. Review.
11. Brogden RN, Sorkin EM. Mesalazine. A review of its pharmacodynamic and pharmacokinetic properties, and therapeutic potential in chronic inflammatory bowel disease. *Drugs*. 1989;38(4):500-23. Review.
12. Kamm MA, Lichtenstein GR, Sandborn WJ, Schreiber S, Lees K, Barrett K, Joseph R. Effect of extended MMX mesalamine therapy for acute, mild-to-moderate ulcerative colitis. *Inflamm Bowel Dis*. 2009;15(1):1-8.
13. Kamm MA, Lichtenstein GR, Sandborn WJ, Schreiber S, Lees K, Barrett K, Joseph R. Randomized trial of once- or twice-daily MMX mesalazine for maintenance of remission in ulcerative colitis. *Gut*. 2008;57:893-902.

**PART III: CONSUMER INFORMATION****MEZAVANT<sup>®\*</sup>****mesalamine Delayed- and Extended-Release Tablets**

This leaflet is part III of a three-part "Product Monograph" published when MEZAVANT was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about MEZAVANT. Contact your doctor or pharmacist if you have any questions about the drug.

**ABOUT THIS MEDICATION**What the medication is used for:

MEZAVANT tablets contain mesalamine, which is an anti-inflammatory drug for the treatment of ulcerative colitis and/or to help maintain remission (mucosal healing) in patients with ulcerative colitis. Ulcerative colitis is a disease of the large bowel (colon) and back passage (rectum), where the lining of the gut becomes red and swollen (inflamed) resulting in symptoms of frequent and bloody stools together with stomach cramps.

What it does:

It is believed that MEZAVANT blocks the production and action of certain substances (cyclooxygenase, prostaglandins and others) involved in producing inflammation. MEZAVANT acts throughout the colon and rectum to treat this inflammation and reduces symptoms, such as bloody stools and diarrhea.

When it should not be used:

- If you are allergic to this drug or its ingredients or components of the container (see What the nonmedicinal ingredients are)
- If you are allergic to a family of drugs known as salicylates [which includes acetylsalicylic acid (i.e., Aspirin<sup>†</sup>)].

What the medicinal ingredient is:

mesalamine

What the important nonmedicinal ingredients are:

carnauba wax, magnesium stearate, metacrylic acid copolymer types A and B, red ferric oxide (E172), polyethylene glycol (macrogol) 6000, silica (colloidal hydrated), sodium carboxymethylcellulose, sodium starch glycolate (type A), stearic acid, talc, titanium dioxide (E171) and triethylcitrate

MEZAVANT tablets do not contain gluten or lactose.

What dosage forms it comes in:

1200mg (1.2g) delayed and extended-release tablets

**WARNINGS AND PRECAUTIONS**

BEFORE you use MEZAVANT, talk to your doctor or pharmacist if:

- You have a narrowing or blockage of the upper digestive tube (e.g., pyloric stenosis).
- You have any kidney or liver problems.
- You have digestive (peptic) ulcers.
- You have had previously inflammation of the heart (which may be the results of an infection of the heart).
- Since mesalamine crosses the placenta in pregnancy and is excreted in breast milk in small quantities, due care should be taken if using MEZAVANT in pregnancy or while breast-feeding. If you are pregnant, think you might be pregnant or are breast-feeding you should ask your doctor for advice about taking MEZAVANT.
- You have had previous allergy (hypersensitivity reaction) to sulfasalazine (an ingredient in other medicines used to treat ulcerative colitis).
- You have had any allergies to this drug or its ingredients or components of the container.

**INTERACTIONS WITH THIS MEDICATION**

The concomitant use of mesalamine with drugs known to affect the kidney, including some anti-inflammatory drugs (NSAIDs) and azathioprine may increase the risk of renal (kidney) reactions.

In patients receiving azathioprine or 6-mercaptopurine, concurrent use of mesalamine can increase the possibility of having abnormal blood components.

**PROPER USE OF THIS MEDICATION**Usual adult dose:

Always take MEZAVANT as your doctor has told you. You should check with your doctor or pharmacist if you are not sure.

MEZAVANT should be taken with food. The tablets should be swallowed whole with liquid and should not be chewed or crushed.

Overdose:

In case of drug overdose, contact a health care practitioner, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

Missed Dose:

If you forget to take your tablets then take them as usual the next day. Do not take a double dose to make up for a forgotten tablet.

<sup>†</sup> Aspirin is a registered trade-mark of The Bayer Company, Inc.

**SIDE EFFECTS AND WHAT TO DO ABOUT THEM**

Like all medicines, MEZAVANT can cause side effects, although not everybody gets them. The most frequently reported adverse events within clinical studies were inflamed colon, headache, abdominal pain (stomach pain), liver function tests abnormal, loose / frequent stools (diarrhea) and nausea (feeling sick).

Other commonly reported adverse reactions or side effects (>1% to <10%) are: painful or bloated stomach, indigestion, gas, vomiting, weakness, fever, joint pain, muscle pain, back pain, rash, high blood pressure, feeling sleepy or tired.

Other less common side effects (seen in less than 1 in 100 patients) are: reduced number of platelets (a blood clotting cell), exacerbation of ulcerative colitis, dizziness, rectal polyp (a non-cancerous growth in the back passage causing symptoms such as constipation and bleeding), trembling or shaking, ear or throat pain, racing heartbeat, acne, hives, fatigue (feeling extremely tired), swollen face, an inflamed pancreas (associated with pain in upper abdomen and back and feeling sick), hair loss, low blood pressure.

The following side effects have been identified with post-marketing use of MEZAVANT: low white blood cell counts, inflammation of the heart muscle and lining around the heart; inflammation of the liver; kidney problems (such as inflammation and scarring of the kidney); inflammation of lungs due to allergic reaction.

The following additional side effects are associated with other medicines containing mesalamine. These are: low blood cell counts (red blood cells, white blood cells or platelets); neuropathy (abnormal or damaged nerves giving a sensation of numbness and tingling); difficulty in breathing; gall stones; allergic swelling of tongue, lips and around eyes; skin redness.

If any of the side effects become serious or persist, or if you notice any side effects not listed in this leaflet, please tell your doctor or pharmacist.

**SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM**

Symptom / effect		Talk with your doctor or pharmacist		Stop taking drug and call your doctor or pharmacist
		Only if severe	In all cases	
Uncommon	<b>Blood problems</b> and symptoms such as unexplained bruising, unusual bleeding (for example, nose bleeds), fever, sore throat.		√	
Uncommon	<b>Pancreatitis</b> (inflamed or swollen pancreas) and symptoms such as abdominal pain and feeling sick.		√	
With other similar drugs	<b>Acute Intolerance Syndrome</b> - symptoms include cramping, acute stomach pain, bloody and excessive stools (diarrhea), fever, headache and rash. These symptoms could be a sign of a serious condition which occurs rarely but means your treatment would have to be stopped immediately.		√	
With other similar drugs	<b>Allergic reaction</b> - symptoms include swelling of the mouth, throat, difficulty in breathing and rash.		√	
Rare reports from post-marketing experience	<b>Hepatitis</b> (inflammation of the liver) - symptoms include jaundice (yellowing of the skin and eyes) and flu-like symptoms.		√	

**SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM**

Symptom / effect		Talk with your doctor or pharmacist		Stop taking drug and call your doctor or pharmacist
		Only if severe	In all cases	
Rare reports from post-marketing experience	<b>Myocarditis/ Pericarditis</b> (inflammation of the heart muscle and lining around the heart) – symptoms include abnormal heartbeat, chest pain that may resemble a heart attack, fatigue, fever and other signs of infection including headache, muscle aches, sore throat, diarrhea, or rashes, joint pain or swelling, leg swelling, shortness of breath.		√	
Rare reports from post-marketing experience	<b>Kidney problems</b> (such as inflammation and scarring of the kidney) – symptoms include blood in the urine, fever, increased or decreased urine output, mental status changes (drowsiness, confusion, coma), nausea, vomiting, rash, swelling of the body, weight gain (from retaining fluid).		√	
Rare reports from post-marketing experience	<b>Hypersensitivity pneumonitis</b> (inflammation of lungs due to an allergic reaction) – symptoms include fever, cough, chills, and shortness of breath.		√	

*This is not a complete list of side effects. For any unexpected effects while taking MEZAVANT, contact your doctor or pharmacist.*

**HOW TO STORE IT**

Store at room temperature (15°C to 25°C).

Keep out of the reach and sight of children.

**REPORTING SUSPECTED SIDE EFFECTS**

You can report any suspected adverse reactions with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at [www.healthcanada.gc.ca/medeffect](http://www.healthcanada.gc.ca/medeffect)
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:
  - Fax toll-free to 1-866-678-6789, or
  - Mail to: Canada Vigilance Program  
Health Canada  
Postal Locator 0701C  
Ottawa, ON K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada Web site at [www.healthcanada.gc.ca/medeffect](http://www.healthcanada.gc.ca/medeffect)

*NOTE: Should you require information related to the management of side effects, contact your health professional. The Canada Vigilance Program does not provide medical advice.*

**MORE INFORMATION**

More information can be found on the internet at: <http://www.mezavant.ca>

This document plus the full product monograph, prepared for health professionals can be provided by contacting the sponsor, Shire Canada Inc. at: 1-800-268-2772

This leaflet was prepared by Shire Canada Inc.  
2250 Alfred-Nobel Blvd., Suite 500  
Saint-Laurent, Québec H4S 2C9

\*MEZAVANT is a registered trade-mark used under license from Giuliani International Limited.

Last revised: 03 May 2011