A compound of formula (I) wherein X is CH=CH, CH$_2$O wherein the oxygen atom is bound to ring B or OCH$_2$ wherein the oxygen atom is bound to ring A; Y is hydrogen, straight or branched C1-C6 alkyl or a pharmaceutically acceptable inorganic cation; R1 is ethyl or cyclopentyl; and R2 and R3 are the same or different and are selected from F, Cl, Br, CF$_3$ and OCF$_3$. The compound is useful for the treatment of autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia. A pharmaceutical composition. A method for preparing the compound.
NEW COMPOUNDS, METHODS FOR THEIR PREPARATION AND USE THEREOF

FIELD OF THE INVENTION

The present invention relates to novel anthranilic acid derivatives, which are stable towards oxidation by human cytochrome P450 and are potent inhibitors of dihydroorotate dehydrogenase (DHODH), to be used for clinical treatment of autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia. These compounds and pharmaceutical compositions of this invention are particularly useful for preventing and treating acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease. More particularly, the present invention relates to novel derivatives suitable for the treatment of rheumatoid arthritis and transplant rejection.

BACKGROUND OF THE INVENTION

Rheumatoid Arthritis (RA) is a chronic inflammatory disease of unknown cause that leads to pain, stiffness, swelling and limitation in the motion and function of multiple joints. If left untreated, RA can produce serious destruction of joints that frequently leads to permanent disability. RA currently has a worldwide distribution with an estimated prevalence of 0.5 to 1%.

The main symptom of RA is the persistent inflammation of the joints, usually in a symmetric distribution. This inflammation leads to the destruction of cartilage, bone erosion and structural changes in the joint, which may range from minimal joint damage to debilitating disease. Some patients also experience the effects of RA in places other than the joints.

RA is a chronic disorder for which no cure currently exists. The major goals of treatment are to reduce pain and discomfort, prevent deformities, and minimize loss of joint function to maintain a productive and active life. For treatment to be considered successful, inflammation must be suppressed. Many pathways involved in the generation of the disease have been recognised and some of these have been unequivocally identified as important by therapeutic proof of principle studies. Major pharmacological treatments for RA include, but are not limited to, analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and disease modifying anti-rheumatic drugs (DMARDs), including biologicals.
NSAIDs are typically given at the onset of symptoms and serve to reduce inflammation and pain thereby improving function. NSAIDs relieve symptoms but do not slow disease progression, so patients will eventually need additional or replacement therapies. Thus, DMARDs are typically added to the treatment regimen soon after diagnosis. The goal of DMARD use is to slow down the progression of disease. Methotrexate (MTX) (Merck Index 12th Ed., #6065) is currently the most commonly prescribed first-line DMARD. However, the administration of MTX has been associated with serious side effects such as skin reactions, pulmonary pneumonitis, gastrointestinal disturbances, hepatotoxicity and renal toxicity. The second leading oral DMARD is leflunomide (ARAVERA®). However, as with MTX, leflunomide has been shown to have serious side effects including hepato- and haematological toxicity as well as pulmonary pneumonitis.

A number of biologicals have recently been approved for clinical treatment of RA. These drugs (proteins, e.g., monoclonal antibodies) prevent in general pro-inflammatory cytokines, in particular TNF-\( \alpha \) and IL-1, from interacting with their receptors. Biologicals are often added to the treatment regimen once DMARD therapy is no longer adequate, or side effects have become unmanageable. The most commonly prescribed biologicals, e.g., infliximab (REMICADE®), block tissue necrosis factor-alpha (TNF-\( \alpha \)), which is a pro-inflammatory cytokine produced by macrophages and lymphocytes. The pro-inflammatory effects of TNF-\( \alpha \) suggest that inhibition of TNF-\( \alpha \) would be clinically useful in RA. Indeed, clinical trial data has confirmed the efficacy of these TNF inhibitors in relieving the signs and symptoms of RA. However, these biologicals have potential severe side effects including severe infections, sepsis, tuberculosis and fatal liver toxicity.

Dihydroorotate dehydrogenase (DHODH) catalyzes the conversion of dihydroorotate to orotate concurrent with the reduction of ubiquinone. DHODH controls the rate limiting step in the de novo pyrimidine biosynthesis. DHODH inhibition results in decreased cellular levels of ribonucleotide uridine monophosphate (rUMP), thus arresting proliferating cells in the G1 phase of the cell cycle. The inhibition of de novo pyrimidine nucleotide synthesis is of great interest in view of the observations that lymphocytes seem not to be able to undergo clonal expansion when this pathway is blocked.

Two major compound classes of mammalian DHODH inhibitors have been described in the literature. These are represented by brequinar (Merck Index 12th Ed., #1394), of formula
and the active metabolite All '1726 of leflunomide, of formula

\[
\begin{align*}
&\text{O} \\
&\text{O} \\
&\text{N} \\
&\text{F} \\
&\text{F} \\
&\text{F} \\
&\text{CH}_3 \\
&\text{F} \\
&\text{F} \\
&\text{O} \\
&\text{O} \\
&\text{H} \\
&\text{R}_2 \\
&\text{R}_3 \\
&\text{X} \\
&\text{Y} \\
&\text{R}_1
\end{align*}
\]

Proof of concept for DHODH inhibition has been established for brequinar. Indeed, biochemical and x-ray crystallographic studies have demonstrated that brequinar is a competitive inhibitor versus the co-factor ubiquinone.

WO 2005/075410 discloses anthranilic acid derivatives of general formula (A)

\[
\begin{align*}
&\text{R}_1 \text{H} \\
&\text{O} \\
&\text{O} \text{-Y} \\
&\text{X} \\
&\text{R}_2 \\
&\text{R}_3 \\
&\text{H} \\
\end{align*}
\]

Said patent application concerns compounds which inhibit DHODH, useful for preventing and treating acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease. The type and position of the R2/R3 substitution are stated to be crucial for a strong DHODH inhibition. Compounds wherein R2 /R3 are lipophilic substituents with high π-values in the range of 0.5 to 2 (Kubinyi, 1993) are said to display maximal inhibition. Moreover, monosubstitution, i.e., R3 is hydrogen, is indicated to be superior to disubstitution, the position of the monosubstitution being important for the effect. Thus, in monosubstituted compounds the ortho-substitution is stated to be superior to meta-substitution, and far superior to substitution in the para-position. In a preferred embodiment of
WO 2005/075410 X is CH2, O, S, CH=CH, OCH2, CH2O or CH2S, and R2 and R3 are the same or different and represent hydrogen or substituents in the 2-, 3- or 5-positions. In a more preferred embodiment of WO 2005/075410 X is OCH2, Y is hydrogen, R2 is a substituent in the ortho-position and is trifluoromethyl, and R3 is hydrogen. In a further preferred embodiment of said application X is O, Y is hydrogen, and R2 and R3 are substituents in the meta- and meta'-positions, and are trifluoromethyl.

EP0497740 discloses benzylxoyphenyl derivatives of general formula (B)

\[
\begin{array}{c}
\text{R1} \\
\text{CH2} \\
\text{O} \\
\text{R6} \\
\text{R5}
\end{array}
\]

Said patent concerns compounds possessing antihyperproliferative/anti-inflammatory and anticancer activity. In a preferred group of compounds R1 and R3 are methoxy, and the benzyloxy moiety is in meta-position in respect to R6. R6 is carboxy or an ester group, R5 is hydroxy or acetylamino, especially hydroxy.

EP0815087 discloses trisubstituted phenyl derivatives of general formula (C)

\[
\begin{array}{c}
\text{R2} \\
\text{R1} \\
\text{W} \\
\text{R3} \\
\text{R4}
\end{array}
\]

Said patent concerns compounds for the treatment of inflammatory and proliferative skin diseases and cancer. The compounds are to be administered topically or in divided doses up to four times a day. In the most preferred compounds R1 and R2 are methoxy, W is CH2CH2, and R3 and R4 together with the phenyl ring form a condensed ring system.

Research Disclosure, 1998, 409(May), P561-P562 (No. 40953) discloses synthetic analogues of the natural product lavendustin A, of general formula (D)

\[
\begin{array}{c}
\text{R1} \\
\text{COR3} \\
\text{R2} \\
\text{R4}
\end{array}
\]

\[
\begin{array}{c}
\text{R3}
\end{array}
\]
Compounds are disclosed wherein Rl and R2 are the same or different and represent alkoxy, alkyl or alkenyloxy, R3 is i.a. alkoxy and R4 is i.a. acylamino.

Gennari et al., (1994) reported an anaerobic degradation in soil of 2-nitrophenoxy acids used as herbicides, e.g., acifluorfen, (Merck Index 12th Ed., #111) that gives compound E

There is no teaching in the literature disclosing the use of compound E as a pharmaceutical agent.

SUMMARY OF THE INVENTION
A primary objective of the present invention is to provide structurally novel anthranilic acid derivatives, which by virtue of their pharmacological profile, with high potency in experimental models and low level of side effects, are considered to be of value in the treatment of autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia.

In particular, according to one aspect, the invention aims to provide compounds that show a substantial stability towards oxidation by human cytochrome P450 and that inhibit DHODH.

Furthermore, the invention aims to provide a pharmaceutical composition containing a therapeutically effective amount of a compound according to the invention, as well as the use of a compound of the invention for the treatment and prevention of diseases, in particular diseases where there is an advantage in inhibiting DHODH.

According to an important aspect of the invention, compounds are provided that may be used for preventing and treating, but not restricted to, acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease.
In one embodiment, the present invention provides compounds suitable for the treatment of rheumatoid arthritis and transplant rejection.

Thus, according to one aspect the present invention provides compounds of formula (I)

\[
\begin{align*}
R_1 & \quad \text{NH} \quad \text{O} \quad \text{O} \quad \text{Y} \\
& \quad \text{(I)} \\
\end{align*}
\]

wherein

- X is CH=CH, CH_2O wherein the oxygen is bound to ring B or OCH_2 wherein the oxygen is bound to ring A;
- Y is hydrogen, straight or branched C1-C6 alkyl or a pharmaceutically acceptable inorganic cation;
- R1 is ethyl or cyclopropyl; and
- R2 and R3 are the same or different and are selected from F, Cl, Br, CF3 and OCF3.

In one particular embodiment of the invention, X is CH_2O wherein the oxygen is bound to ring B.

In another particular embodiment of the invention, X is OCH_2 wherein the oxygen is bound to ring A.

In still a further embodiment of the invention, X is CH=CH.

In one embodiment of the invention, R2 is CF_3 or OCF_3.

In one embodiment of the invention, Y is a pharmaceutically acceptable cation selected from e.g. Li\(^+\), Na\(^+\), K\(^+\), Mg\(^{2+}\), Ca\(^{2+}\) and Zn\(^{2+}\).

In one embodiment of the invention, in which Y is a divalent cation, the salt contains two anthranilic acid derivative moieties for each cation Y.
In another embodiment, in which $Y$ is a divalent cation, the salt comprises one negative monovalent counterion, e.g. a halogen or a bicarbonate ($\text{HC}$(V)) anion, e.g. $\text{Cl}^-$ or $\text{Br}^-$, and one anthranilic acid derivative moiety for each cation $Y$.

In one embodiment of the invention, $Y$ is a straight or branched C1-C6 alkyl group, e.g. a straight or branched C1-C4 alkyl group, or a straight or branched C1-C3 alkyl group.

In one preferred embodiment of the invention $X$ is $\text{CH}_2\text{O}$ wherein the oxygen is bound to ring $B$;

$Y$ is hydrogen, straight or branched C1-C6 alkyl or a pharmaceutically acceptable inorganic cation;

$R_1$ is ethyl or cyclopropyl; and

$R_2$ and $R_3$ are the same or different and are selected from F, Cl, Br, CF3 and OCF3.

In one preferred embodiment of the invention, $X$ is $\text{CH}_2\text{O}$ wherein the oxygen is bound to ring $B$;

$Y$ is hydrogen or a pharmaceutically acceptable inorganic cation;

$R_1$ is ethyl or cyclopropyl; and

$R_2$ and $R_3$ are the same or different and are selected from F, Cl, Br, CF3 and OCF3.

In another preferred embodiment of the invention $X$ is $\text{CH}_2\text{O}$ wherein the oxygen is bound to ring $B$;

$Y$ is hydrogen, straight or branched C1-C6 alkyl or a pharmaceutically acceptable inorganic cation;

$R_1$ is ethyl or cyclopropyl;

$R_2$ is CF3 or OCF3; and

$R_3$ is F, Cl, Br, CF3 or OCF3.

In still another preferred embodiment of the invention $X$ is $\text{CH}_2\text{O}$ wherein the oxygen is bound to ring $B$;

$Y$ is hydrogen or a pharmaceutically acceptable inorganic cation;

$R_1$ is ethyl or cyclopropyl;

$R_2$ is CF3 or OCF3; and

$R_3$ is F, Cl, Br, CF3 or OCF3.
Some of the most preferred compounds of formula (I) are:

- 5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid;
- 5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid;
- 5-(2-Bromo-4-chloro-phenoxymethyl)-2-propionylamino-benzoic acid;
- 5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid;
- 5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid;
- 5-[(E)-2-(2,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid; and
- 5-[(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid.

Further aspects and embodiments of the invention will present themselves to the skilled person in the light of the following detailed description and are as defined in the claims.

DETAILED DESCRIPTION OF THE INVENTION

The compounds of formula (I) unexpectedly displayed extraordinary resistance towards oxidation by the human cytochrome P450 enzymes in conjunction with potent inhibition of the DHODH enzyme. In contrast to this, compounds of formula (A) according to the above-mentioned WO 2005/075410 wherein R3 is hydrogen and R2 is ortho or meta have been found to be extensively metabolised by human cytochrome P450 enzymes, primarily the CYP2C9 isoform. There is no rat or mouse orthologue of the human CYP2C9 enzyme. These in vivo findings are reflected in in vitro liver microsome preparations where T1/2 is >200 minutes for rat, 150 minutes for mouse and 3 minutes for human. The P450 enzymes exhibit broad substrate specificity and the same oxidation are in general catalysed by alternative enzymes in preclinical species. However, for the compounds of this invention a pronounced across species variation in oxidation activity is seen in vitro in microsomes from various species including human and consequently preclinical in vivo models fail to predict the metabolic and pharmacokinetic behaviour of these compounds in human. Therefore, human liver microsomes comprising the important cytochrome P450 enzymes have been used for predicting pharmacokinetic properties of these compounds in human.

Table 1 illustrates the impact of substitution pattern on the metabolic stability and the DHODH inhibitory potency.
Table 1

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<th>Type</th>
<th>X</th>
<th>ortho</th>
<th>meta</th>
<th>para</th>
<th>meta'</th>
<th>R1</th>
<th>Jurkat IC50 (μM)</th>
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### Table 1

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<th>meta</th>
<th>para</th>
<th>meta'</th>
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**Notes:**

- \( t_{1/2} \) equal to "stable" indicates that that no degradation could be confirmed in the assay
- n.d. = not determined
- Et = ethyl

\[ C-propyl = cyclo-propyl \]

In those of the compounds shown in Table 1 that are according to the invention (INV 1-31), "ortho" and "meta" correspond to R3, while "para" corresponds to R2.

As pointed out herein above, one important object of the invention is to provide compounds that show a substantial stability towards oxidation by human cytochrome P450 and that inhibit DHODH.
In order to obtain continuous plasma drug exposure after once-daily administration to human, compounds demonstrating a substantial in vitro metabolic stability towards oxidation by cytochrome P450, e.g. a half-life (t½) longer than 70 min in the human in vitro system used are preferred. A metabolic stability half-life of longer than 70 minutes corresponds to a predicted hepatic extraction ratio of less than 0.3, which is considered as low according to Rowland et al. (Rowland M and Tozer T.N., (1995), in Clinical Pharmacokinetics Concepts and Applications, third edition, Williams & Wilkins, USA, p. 163).

Thus, by a compound having a "substantial stability towards oxidation by human cytochrome P450" is meant that the compound has a stability towards oxidation by human cytochrome P450, that preferably allows treatment of a mammal subject, such as a human subject, by administration of a therapeutically effective dose only once or twice a day, more preferably by a once-daily administration.

In one embodiment of the invention, compounds according to formula (I) as herein defined are provided having a substantial in vitro metabolic stability towards oxidation by cytochrome P450, e.g. a half-life (t½) longer than about 70 minutes, or longer than about 100 minutes, longer than about 200 minutes or even longer than about 300 minutes, e.g. a half-life within the range of from 70 to 500 minutes, or 100 to 400 minutes, or even longer, when tested in the human in vitro system as described in the present application.

In another embodiment of the invention, a pharmaceutical composition is provided comprising a therapeutically effective amount of a compound according to formula (I) as herein defined, which compound has a substantial in vitro metabolic stability towards oxidation by cytochrome P450, e.g. a half-life (t½) longer than about 70 minutes, or longer than about 100 minutes, longer than about 200 minutes or even longer than about 300 minutes, e.g. a half-life within the range of from 70 to 500 minutes, e.g. 100 to 400 minutes, or even longer, when tested in the human in vitro system as described in the present application.

For the purpose of the present invention, "a therapeutically effective amount" should be construed in the conventional sense, i.e. as an amount sufficient to provide a health benefit to the subject being treated. Such a health benefit may be e.g. a curing of the disorder, a slowing down of its progression, or a relief of any symptom of the disorder.
According to one aspect of the invention, there is provided the use of the compounds of the invention for preparing a medicament suitable for the treatment of disorders that are beneficially influenced by inhibiting DHODH.

In one embodiment, the medicament is for the treatment of disorders selected from autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia.

In another embodiment, the disorders are selected from acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease, in particular rheumatoid arthritis and transplant rejection.

In one embodiment, the invention provides the use of the compounds of the invention for preparing a medicament suitable for the treatment of disorders as mentioned herein above, by daily or bi-daily administration of a therapeutically effective amount of the compounds to a mammal in need of such treatment, more preferably by daily administration.

SYNTHETIC METHODS

The compounds of general formula (I) may be prepared e.g. by the following methods:

Method A

In method A, the compounds of formula I wherein X is OCH₂ wherein the oxygen is bound to ring A are prepared by reacting a compound of formula II, with a benzylic reagent wherein A is a leaving group, e.g., bromide, chloride, mesyloxy or tosyloxy.
The reaction may be carried out in a suitable solvent such as a polar aprotic solvent, e.g., acetone, acetonitrile or DMF in the presence of an alkali metal carbonate, e.g., potassium carbonate. If $Y$ is a C1-C6 alkyl group, the acid function may be obtained by simple alkaline hydrolysis of the ester functionality. The acid function may be converted into the corresponding salt by reaction with a suitable base.

Method B

\[
\begin{align*}
\text{R}_1\text{H} & \quad \text{O} \quad \text{N} \quad \text{O} \quad \text{Y} \\
\text{R}_1\text{H} & \quad \text{O} \quad \text{N} \quad \text{O} \quad \text{Y} \\
\end{align*}
\]

(IV)

In method B, the compounds of formula I wherein $X$ is CH$_2$O wherein the oxygen is bound to ring B are prepared by reacting a compound of formula IV with a phenol V in a suitable solvent such as a polar aprotic solvent, e.g., acetone, acetonitrile or DMF in the presence of an alkali metal carbonate, e.g., potassium carbonate. If $Y$ is a C1-C6 alkyl group, the acid function may be obtained by simple alkaline hydrolysis of the ester functionality. The acid function may be converted into the corresponding salt by reaction with a suitable base.

Method C

\[
\begin{align*}
\text{R}_1\text{H} & \quad \text{O} \quad \text{N} \quad \text{O} \quad \text{Y} \\
\text{R}_1\text{H} & \quad \text{O} \quad \text{N} \quad \text{O} \quad \text{Y} \\
\end{align*}
\]

(VI)

(VII)

(I)
In method C, compounds of formula I wherein X is CH=CH are prepared by reacting a compound of formula VI with a styrene VII (Heck-reaction) with palladium catalysis in a suitable solvent such as a polar aprotic solvent, e.g., DMF, in the presence of an alkali metal carbonate, e.g., potassium carbonate. If Y is a C1-C6 alkyl group, the acid function may be obtained by simple alkaline hydrolysis of the ester functionality. The acid function may be converted into the corresponding salt by reaction with a suitable base.

Method D

\[
\begin{align*}
\text{R1} & \quad \text{N} \quad \text{O} \quad \text{O} \quad \text{Y} \\
\text{H} & \quad \text{N} \quad \text{O} \quad \text{O} \\
\text{H} & \quad \text{N} \quad \text{O} \\
\end{align*}
\]

(VIII)

\[
\begin{align*}
\text{R1} & \quad \text{N} \quad \text{O} \quad \text{O} \quad \text{Y} \\
\text{H} & \quad \text{N} \quad \text{O} \quad \text{O} \\
\text{H} & \quad \text{N} \quad \text{O} \\
\text{Br} &
\end{align*}
\]

(IV)

In method D, compounds of formula VIII are transformed to the corresponding 5-benzyl bromide IV by reaction with 1,3-dibromo-5,5-dimethyl hydantoin (CAS No.: 77-48-5) (Patil, SD, Jones C, Nair MG, Galivan J, Maley F, Kisliuk RL, Gaumont Y, Duch D, Ferone R, J. Med. Chem., 1989, 32, 1284-89).

Method E

\[
\begin{align*}
\text{H}_2\text{N} & \quad \text{O} \quad \text{O} \\
\text{H}_2\text{N} & \quad \text{O} \\
\text{R1} & \quad \text{A} \\
\end{align*}
\]

(IX)

In method E, compounds of the general formula IX (e.g. II (W=OH), VI (W=Br) and VIII (W=CEB)) are prepared from commercially available 5-substituted anthranilic acids. Reaction of such an acid with an anhydrous alcohol in the presence of thionyl chloride (SOCl₂, CAS No.: 7719-09-7) provides the anthranilic ester. Suitable acylating reagents to transform the anthranilic ester to the amide (IX) are for example acid anhydrides and acyl chlorides (A is a leaving group).
Method F

In method F, phenols of the general formula V, e.g. non-commercially available phenols, are prepared from commercially available amines by diazotation followed by boiling in 33% sulfuric acid.

Synthetic Procedures

In general, nuclear magnetic resonances were recorded at 400 MHz using Bruker ARX 400 spectrometer. The spectra were obtained in CDCl₃, CDCl₃ + TFA or D₆-DMSO and the shift scale was referenced to the shift of TMS, defined as 0.00 ppm. Abbreviations used in the description of NMR spectra are: s = singlet, d = doublet, t = triplet, q = quartet, dd = double doublet, dt = double triplet, m = multiplet and b = broad signal. In the Examples below AutoNom Standard was used to generate the compound names.

Example 1

2,4-(Bis-trifluoromethyl)-phenol (Method F)

To an ice-cold solution of 2,4-bis(trifluoromethyl)-aniline (1.26 g, 5.50 mmol) in sulphuric acid (33%, 40 ml) was added a solution of sodium nitrite (0.46 g, 6.67 mmol) in water (2 ml). After 3 h at 0°C urea (0.10 g, 1.67 mmol) was added and the reaction mixture was stirred at 0°C for an additional ten minutes. The reaction mixture was then added to boiling sulphuric acid (33%, 100 ml) and refluxed for 1h. The reaction mixture was allowed to reach room temperature and was then extracted with ethyl acetate. The organic phase was washed first with water and then with brine, dried over sodium sulphate, filtered and evaporated to dryness. The crude product was chromatographed on silica gel using heptane/ethyl acetate (4/1) as eluent to give 0.29 g (23%) of the title compound. IH NMR (CDCl₃) δ 7.08 (d, IH), 7.17 (bs, IH), 7.67 (dd, IH), 7.80 (d, IH).
Example 2
5-(2,4-Dichloro-benzyloxy)-2-propionylamino-benzoic acid (Method A)
A mixture of 5-hydroxy-2-propionyl-carbonyl-amino-benzoic acid methyl ester (200 mg, 0.90 mmol), 2,4-dichloro-benzyl bromide (235 mg, 0.99 mmol) and potassium carbonate (411 mg, 2.97 mmol) in acetone (5 ml) was heated to reflux. After 4 hours, the reaction mixture was allowed to reach room temperature, was acidified with 1 M HCl and the resulting precipitate collected by filtration, washed with water and dried under vacuum to give pure 5-(2,4-dichloro-benzyloxy)-2-propionylamino-benzoic acid methyl ester (254 mg, 66%). This was hydrolysed in ethanol (3 mL) and 1.0 M NaOH (3 mL) overnight and then acidified with 1.0 M HCl. The resulting precipitate was collected by filtration, washed with water and dried under vacuum (223 mg, 91%). IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.24 (s, 2H), 7.31 (dd, IH), 7.49 (dd, IH), 7.54 (d, IH), 7.64 (d, 2H), 7.70 (d, IH), 8.38 (d, IH), 10.80 (s, IH), 13.66 (bs, IH).

In essentially the same manner the following compounds were obtained from the corresponding starting materials:
5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
IH-NMR (DMSO-d6) δ 0.81 (d, 4H), 1.66 (m, IH), 5.22 (s, 2H), 7.26 (dd, IH), 7.49 (d, IH), 7.71 (d, IH), 7.95 (d, IH), 8.29 (d, IH), 10.96 (s, IH), 13.64 (bs, IH)

5-(4-Fluoro-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (CDCl3+TFA) δ : 1.35 (t, 3H), 2.62 (q, 2H), 5.27 (s, 2H), 7.31 (dd, IH), 7.46 (dd, IH), 7.70-7.74 (m, 2H), 8.58 (d, IH), 10.77 (s, IH)

5-(2,4-Bis-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.37 (s, 2H), 7.32 (dd, IH), 7.54 (d, IH), 8.04 (d, IH), 8.11 (s, IH), 8.15 (d, IH), 8.39 (d, IH), 10.80 (s, IH), 13.60 (bs, IH)

5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.24 (s, 2H), 7.29 (dd, IH), 7.51 (d, IH), 7.78-7.84 (m, 2H), 7.87 (s, IH), 8.39 (d, IH), 10.80 (s, IH), 13.60 (bs, IH)
5-(2-Chloro-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.14 (s, 2H), 7.26-7.32 (m, 2H), 7.52-7.55 (m, 2H), 7.67 (dd, IH), 8.39 (d, IH), 10.80 (s, IH), 13.60 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-2-trifluoromethyl-benzyloxy)-benzoic acid
IH-NMR (DMSO-d6) δ 0.84 (d, 4H), 1.70 (m, IH), 5.22 (s, 2H), 7.27 (dd, IH), 7.51 (d, IH), 7.61 (dt, IH), 7.71 (dd, IH), 7.84 (dd, IH), 8.31 (d, IH), 11.00 (s, IH), 13.72 (bs, IH)

5-(2-Bromo-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.13 (s, 2H), 7.29-7.35 (m, 2H), 7.54 (d, IH), 7.64-7.70 (m, 2H), 8.09 (s, IH), 8.39 (d, IH), 10.81 (s, IH), 13.69 (bs, IH)

5-(2-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.28 (s, 2H), 7.33 (dd, IH), 7.56 (d, IH), 7.66 (d, IH), 7.76 (d, IH), 7.81 (t, IH), 8.39 (d, IH), 10.80 (s, IH), 13.69 (bs, IH)

5-(2-Bromo-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.24 (s, 2H), 7.33 (dd, IH), 7.56 (d, IH), 7.80-7.86 (m, 2H), 8.09 (s, IH), 8.39 (d, IH), 10.81 (s, IH), 13.70 (bs, IH)

5-(4-Chloro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.22 (s, 2H), 7.31 (dd, IH), 7.55 (d, IH), 7.75-7.79 (m, 2H), 7.96 (s, IH), 8.39 (d, IH), 10.80 (s, IH), 13.69 (bs, IH)

5-(3,4-Dibromo-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.37 (q, 2H), 5.12 (s, 2H), 7.28 (dd, IH), 7.41 (dd, IH), 7.53 (d, IH), 7.79 (d, IH), 7.86 (d, IH), 8.39 (d, IH), 10.85 (s, IH), 13.68 (bs, IH)

5-(4-Bromo-3-chloro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.37 (q, 2H), 5.13 (s, 2H), 7.29 (dd, IH), 7.37 (dd, IH), 7.53 (d, IH), 7.73 (d, IH), 7.80 (d, IH), 8.39 (d, IH), 10.84 (s, IH), 13.69 (bs, IH)
5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.11 (t, 3H), 2.37 (q, 2H), 5.22 (s, 2H), 7.27 (dd, IH), 7.50 (d, IH), 7.72 (d, IH), 7.95 (d, IH), 7.97 (s, IH), 8.37 (d, IH), 10.82 (s, IH), 13.69 (bs, IH)

5-(2,4-Difluoro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.11 (t, 3H), 2.37 (q, 2H), 5.12 (s, 2H), 7.13 (dt, IH), 7.27-7.34 (m, 2H), 7.53 (d, IH), 7.62 (q, IH), 8.37 (d, IH), 10.83 (s, IH), 13.68 (bs, IH)

5-(4-Chloro-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.11 (t, 3H), 2.37 (q, 2H), 5.14 (s, 2H), 7.29 (dd, IH), 7.34 (dd, IH), 7.50-7.54 (m, 2H), 7.57 (d, IH), 7.59 (t, IH), 8.37 (d, IH), 10.82 (s, IH), 13.68 (bs, IH)

5-(4-Bromo-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.11 (t, 3H), 2.37 (q, 2H), 5.13 (s, 2H), 7.29 (dd, IH), 7.46 (dd, IH), 7.50 (dd, IH), 7.59 (t, IH), 8.37 (d, IH), 10.81 (s, IH), 13.66 (bs, IH)

5-(2-Chloro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Bromo-4-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Dibromo-benzyloxy)-2-propionylamino-benzoic acid
5-(3,4-Bis-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Fluoro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-3-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Bromo-4-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Dibromo-benzyloxy)-2-propionylamino-benzoic acid
5-(3,4-Bis-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Fluoro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.20 (s, 2H), 7.30 (dd, IH), 7.54 (d, IH), 7.57 (d, IH), 7.84-7.87 (m, IH), 7.89 (d, IH), 8.39 (d, IH), 10.81 (s, IH), 13.66 (bs, IH)

5-(4-Bromo-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.24 (s, 2H), 7.31 (dd, IH), 7.56 (dd, IH), 7.64-7.68 (m, 2H), 7.71 (s, IH), 8.40 (d, IH), 10.81 (s, IH), 13.67 (bs, IH)

5-(3,4-Difluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-3-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-3-fluoro-benzyloxy)-2-propionylamino-benzoic acid

5-(3-Chloro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid

5-(3-Chloro-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.37 (q, 2H), 5.11 (s, 2H), 7.28 (dd, IH), 7.44 (t, IH), 7.46-7.49 (m, IH), 7.53 (d, IH), 7.69 (dd, IH), 8.38 (d, IH), 10.80 (s, IH), 13.66 (bs, IH)

5-(3,4-Dichloro-benzyloxy)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.37 (q, 2H), 5.15 (s, 2H), 7.29 (dd, IH), 7.46 (dd, IH), 7.53 (d, IH), 7.67 (d, IH), 7.74 (dd, IH), 8.38 (d, IH), 10.79 (s, IH), 13.65 (bs, IH)

5-(3-Bromo-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid

5-(3-Bromo-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid

5-(3-Bromo-4-chloro-benzyloxy)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.14 (s, 2H), 7.29 (dd, IH), 7.50 (dd, IH), 7.53 (d, IH), 7.66 (d, IH), 7.87 (d, IH), 8.38 (d, IH), 10.79 (s, IH), 13.68 (bs, IH)

5-(3-Chloro-4-trifluoromethoxy-benzyloxy)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.38 (q, 2H), 5.18 (s, 2H), 7.31 (dd, IH), 7.55 (d, IH), 7.58 (dd, IH), 7.62 (dd, IH), 7.80 (d, IH), 8.38 (d, IH), 10.80 (s, IH), 13.68 (bs, IH)

5-(2,4-Bis-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.82 (d, 4H), 1.70 (m, IH), 5.36 (s, 2H), 7.28 (dd, IH), 7.52 (d, IH), 8.03 (d, IH), 8.10 (s, IH), 8.14 (d, IH), 8.31 (d, IH), 11.04 (s, IH), 13.70 (bs, IH)

5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.83 (d, 4H), 1.70 (m, IH), 5.23 (s, 2H), 7.26 (dd, IH), 7.50 (d, IH), 7.78-7.83 (m, 2H), 7.87 (d, IH), 8.30 (d, IH), 11.02 (s, IH), 13.66 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(2-fluoro-4-trifluoromethyl-benzyloxy)-benzoic acid

IH-NMR (DMSO-d6) δ 0.83 (d, 4H), 1.70 (m, IH), 5.26 (s, 2H), 7.30 (dd, IH), 7.55 (d, IH), 7.64 (d, IH), 7.74 (d, IH), 7.80 (t, IH), 8.31 (d, IH), 11.02 (s, IH), 13.69 (bs, IH)
2-(Cyclopropanecarbonyl-amino)-5-(2,4-difluoro-benzyloxy)-benzoic acid

IH-NMR (DMSO-d6) δ 0.83 (d, 4H), 1.70 (m, IH), 5.12 (s, 2H), 7.13 (dt, IH), 7.27 (dd, IH), 7.31 (dt, IH), 7.53 (d, IH), 7.62 (q, IH), 8.30 (d, IH), 11.02 (s, IH), 13.66 (bs, IH)

5-(4-Chloro-2-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.82 (d, 4H), 1.70 (m, IH), 5.14 (s, 2H), 7.27 (dd, IH), 7.33 (dd, IH), 7.50 (dd, IH), 7.52 (d, IH), 7.59 (t, IH), 8.30 (d, IH), 11.02 (s, IH), 13.67 (bs, IH)

5-(4-Bromo-2-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.84 (d, 4H), 1.70 (m, IH), 5.13 (s, 2H), 7.27 (dd, IH), 7.46 (dd, IH), 7.50-7.54 (m, 2H), 7.61 (dd, IH), 8.30 (d, IH), 11.02 (s, IH), 13.68 (bs, IH)

5-(2-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

5-(2-Chloro-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.84 (d, 4H), 1.69 (m, IH), 5.13 (s, 2H), 7.25-7.30 (m, 2H), 7.51-7.54 (m, 2H), 7.66 (dd, IH), 8.30 (d, IH), 11.02 (s, IH), 13.68 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(2,4-dichloro-benzyloxy)-benzoic acid

IH-NMR (DMSO-d6) δ 0.84 (d, 4H), 1.70 (m, IH), 5.15 (s, 2H), 7.28 (dd, IH), 7.48 (dd, IH), 7.52 (d, IH), 7.62 (d, IH), 7.69 (d, IH), 8.31 (d, IH), 11.03 (s, IH), 13.69 (bs, IH)

5-(4-Bromo-2-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

5-(2-Bromo-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.84 (d, 4H), 1.70 (m, IH), 5.22 (s, 2H), 7.30 (d, IH), 7.79-7.84 (m, 2H), 8.07 (s, IH), 8.32 (d, IH), 11.03 (s, IH), 13.70 (bs, IH)

5-(2-Bromo-4-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

5-(4-Bromo-2-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid

2-(Cyclopropanecarbonyl-amino)-5-(2,4-dibromo-benzyloxy)-benzoic acid

5-(2-Bromo-4-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3,4-Bis-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-3-trifluoromethyl-benzyloxy)-benzoic acid
5-(4-Chloro-3-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Bromo-3-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3-fluoro-4-trifluoromethyl-benzyloxy)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-difluoro-benzyloxy)-benzoic acid
5-(4-Chloro-3-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Bromo-3-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Chloro-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-dichloro-benzyloxy)-benzoic acid
5-(4-Bromo-3-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Bromo-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Bromo-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Bromo-4-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-dibromo-benzyloxy)-benzoic acid

Example 3

5-(2,4-Dichloro-phenoxymethyl)-2-propionylamino-benzoic acid (Method B)

A mixture of 5-bromomethyl-2-propionylamino-benzoic acid methyl ester (200 mg, 0.67 mmol), 2,4-dichloro-phenol (119 mg, 0.73 mmol) and potassium carbonate (278 mg, 2.01 mmol) in acetone (5 ml) was heated to reflux. After 4 hours, the reaction mixture was allowed to reach room temperature, was acidified with 1 M HCl and the resulting precipitate collected by filtration, washed with water and dried under vacuum to give pure 5-(2,4-dichloro-phenoxymethyl)-2-propionylamino-benzoic acid methyl ester (184 mg, 72%). This was hydrolysed in ethanol (3 mL) and 1.0 M NaOH (3 mL) overnight and then acidified with 1.0 M HCl. The resulting precipitate was collected by filtration, washed with water and dried under vacuum (165 mg, 93 %). IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.42 (q, 2H), 5.21 (s, 2H), 7.27 (d, IH), 7.39 (dd, IH), 7.60 (d, IH), 7.66 (dd, IH), 8.09 (d, IH), 8.53 (d, IH), 11.18 (s, IH), 13.71 (bs, IH).

In essentially the same manner the following compounds were obtained from the corresponding starting materials:
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.12 (t, 3H), 2.41 (q, 2H), 5.17 (s, 2H), 7.19 (dt, IH), 7.25 (dd, IH), 7.45 (dd, IH), 7.66 (dd, IH), 8.08 (d, IH), 8.52 (d, IH), 11.15 (s, IH), 13.72 (bs, IH)

5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.12 (t, 3H), 2.42 (q, 2H), 5.30 (s, 2H), 7.43 (d, IH), 7.70 (m, 2H), 7.86 (d, IH), 8.11 (d, IH), 8.54 (d, IH), 11.16 (s, IH), 13.75 (bs, IH)

5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.12 (t, 3H), 2.42 (q, 2H), 5.22 (s, 2H), 7.32-7.39 (m, 2H), 7.59 (d, IH), 7.67 (dd, IH), 8.09 (d, IH), 8.53 (d, IH), 11.15 (s, IH), 13.73 (bs, IH)

5-(2-Bromo-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.13 (t, 3H), 2.43 (q, 2H), 5.18 (s, 2H), 7.24 (d, IH), 7.58 (d, IH), 7.68 (dd, IH), 8.09 (d, IH), 8.53 (d, IH), 11.14 (s, IH), 13.74 (bs, IH)

5-(2-Bromo-4-chloro-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.13 (t, 3H), 2.43 (q, 2H), 5.21 (s, 2H), 7.23 (d, IH), 7.44 (d, IH), 7.68 (dd, IH), 7.73 (s, IH), 8.10 (d, IH), 8.53 (d, IH), 11.13 (s, IH), 13.74 (bs, IH)

5-(2-Bromo-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.13 (t, 3H), 2.43 (q, 2H), 5.31 (s, 2H), 7.40 (d, IH), 7.70 (dd, IH), 7.76 (d, IH), 7.99 (s, IH), 8.12 (d, IH), 8.54 (d, IH), 11.15 (s, IH), 13.77 (bs, IH)

5-(4-Bromo-2-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.13 (t, 3H), 2.42 (q, 2H), 5.28 (s, 2H), 7.34 (d, IH), 7.63 (dd, IH), 7.79 (s, IH), 7.84 (d, IH), 8.09 (d, IH), 8.52 (d, IH), 11.12 (s, IH), 13.70 (bs, IH)

5-(2,4-Bis-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) $\delta$ 1.13 (t, 3H), 2.42 (q, 2H), 5.39 (s, 2H), 7.57 (d, IH), 7.65 (dd, IH), 7.93 (d, IH), 8.06 (dd, IH), 8.12 (d, IH), 8.54 (d, IH), 11.13 (s, IH), 13.78 (bs, IH)
5-(4-Fluoro-2-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.26 (s, 2H), 7.39 (dd, IH), 7.51-7.57 (m, 2H), 7.63 (dd, IH), 8.10 (d, IH), 8.53 (d, IH), 11.16 (s, IH), 13.70 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-2-trifluoromethyl-phenoxymethyl)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.25 (s, 2H), 7.39 (dd, IH), 7.40-7.57 (m, 2H), 7.61 (dd, IH), 8.09 (d, IH), 8.46 (d, IH), 11.44 (s, IH), 13.71 (bs, IH)

5-(2-Chloro-4-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.25 (s, 2H), 7.39 (dd, IH), 7.40-7.57 (m, 2H), 7.61 (dd, IH), 8.09 (d, IH), 8.46 (d, IH), 11.44 (s, IH), 13.71 (bs, IH)

5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.31 (s, 2H), 7.44 (d, IH), 7.67 (dd, IH), 7.72 (dd, IH), 8.12 (d, IH), 8.47 (d, IH), 11.43 (s, IH), 13.75 (bs, IH)

5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.88 (d, 4H), 1.74 (m, IH), 5.23 (s, 2H), 7.33-7.40 (m, 2H), 7.61 (d, IH), 7.66 (dd, IH), 8.10 (d, IH), 8.47 (d, IH), 11.41 (s, IH), 13.76 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(2,4-dichloro-phenoxymethyl)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.21 (s, 2H), 7.27 (t, IH), 7.46 dd, IH), 7.64 (dd, IH), 8.09 (d, IH), 8.46 (d, IH), 11.41 (s, IH), 13.74 (bs, IH)

5-(4-Fluoro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.42 (q, 2H), 5.16 (s, 2H), 7.35-7.39 (m, 2H), 7.45 (t, IH), 7.67 (dd, IH), 8.07 (d, IH), 8.53 (d, IH), 11.18 (s, IH), 13.73 (bs, IH)

5-(4-Chloro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.41 (q, 2H), 5.19 (s, 2H), 7.34 (dd, IH), 7.44 (d, IH), 7.65 (d, IH), 7.67 (dd, IH), 8.07 (d, IH), 8.53 (d, IH), 11.17 (s, IH), 13.76 (bs, IH)
5-(3-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.12 (t, 3H), 2.42 (q, 2H), 5.09 (s, 2H), 7.01 (dt, IH), 7.26 (dd, IH), 7.34 (t, IH), 7.65 (dd, IH), 8.04 (d, IH), 8.53 (d, IH), 11.14 (s, IH), 13.73 (bs, IH)

5-(3-Bromo-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.15 (s, 2H), 7.14 (d, IH), 7.46-7.49 (m, 2H), 7.67 (dd, IH), 8.07 (d, IH), 8.54 (d, IH), 11.16 (s, IH), 13.74 (bs, IH)

5-(4-Bromo-3-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.13 (s, 2H), 6.98 (d, IH), 7.35 (s, IH), 7.66 (d, 2H), 8.05 (d, IH), 8.54 (d, IH), 11.17 (s, IH), 13.76 (bs, IH)

5-(3-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.16 (s, 2H), 7.1 (d, IH), 7.38 (s, IH), 7.51 (d, IH), 7.68 (dd, IH), 8.07 (d, IH), 8.54 (d, IH), 11.14 (s, IH), 13.75 (bs, IH)

5-(3-Chloro-4-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.10 (s, 2H), 7.03 (dt, IH), 7.28 (dd, IH), 7.35 (t, IH), 7.64 (dd, IH), 8.05 (d, IH), 8.48 (d, IH), 11.38 (s, IH), 13.74 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-3-trifluoromethyl-phenoxymethyl)-benzoic acid
IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.17 (s, 2H), 7.37-7.40 (m, 2H), 7.46 (t, IH), 8.08 (d, IH), 8.47 (d, IH), 11.41 (s, IH), 13.75 (bs, IH)

5-(4-Chloro-2-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(2-Fluoro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(2,4-Difluoro-phenoxymethyl)-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.18 (s, 2H), 7.23 (ddd, IH), 7.29 (t, IH), 7.46 (dd, IH), 7.65 (dd, IH), 8.07 (d, IH), 8.53 (d, IH), 11.24 (s, IH), 13.77 (bs, IH)
5-(4-Bromo-2-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.17 (s, 2H), 7.24 (t, IH), 7.35 (ddd, IH), 7.56 (dd, IH), 7.65 (dd, IH), 8.07 (d, IH), 8.53 (d, IH), 11.23 (s, IH), 13.74 (bs, IH)

5-(4-Bromo-2-chloro-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.21 (s, 2H), 7.21 (d, IH), 7.50 (dd, IH), 7.66 (dd, IH), 7.69 (d, IH), 8.09 (d, IH), 8.53 (d, IH), 11.16 (s, IH), 13.77 (bs, IH)

5-(2,4-Dibromo-phenoxymethyl)-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.13 (t, 3H), 2.42 (q, 2H), 5.21 (s, 2H), 7.18 (d, IH), 7.54 (dd, IH), 7.67 (dd, IH), 7.82 (d, IH), 8.09 (d, IH), 8.53 (d, IH), 11.18 (s, IH), 13.73 (bs, IH)

5-(3,4-Bis-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(4-Bromo-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3-Fluoro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3,4-Difluoro-phenoxymethyl)-2-propionylamino-benzoic acid

5-(4-Chloro-3-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid

5-(4-Bromo-3-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3,4-Dichloro-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3-Bromo-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3-Bromo-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3-Bromo-4-chloro-phenoxymethyl)-2-propionylamino-benzoic acid

5-(3,4-Dibromo-phenoxymethyl)-2-propionylamino-benzoic acid

5-(2,4-Bis-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.39 (s, 2H), 7.57 (d, IH), 7.63 (dd, IH), 7.94 (d, IH), 8.06 (dd, IH), 8.12 (d, IH), 8.48 (d, IH), 11.41 (s, IH), 13.72 (bs, IH)

5-(4-Chloro-2-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Bromo-2-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.28 (s, 2H), 7.34 (d, IH), 7.61 (dd, IH), 7.78 (d, IH), 7.84 (dd, IH), 8.09 (d, IH), 8.46 (d, IH), 11.40 (s, IH), 13.70 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(2-fluoro-4-trifluoromethyl-phenoxymethyl)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.15 (s, 2H), 7.02 (tt, IH), 7.25-7.33 (m, 2H), 7.64 (dd, IH), 8.06 (dd, IH), 8.47 (d, IH), 11.39 (s, IH), 13.76 (bs, IH)

5-(4-Chloro-2-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.18 (s, 2H), 7.23 (d, IH), 7.29 (t, IH), 7.46 (dd, IH), 7.64 (dd, IH), 8.07 (d, IH), 8.47 (d, IH), 11.43 (s, IH), 13.73 (bs, IH)

5-(4-Bromo-2-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.17 (s, 2H), 7.24 (t, IH), 7.35 (dt, IH), 7.56 (dd, IH), 7.64 (dd, IH), 8.07 (d, IH), 8.47 (d, IH), 11.44 (s, IH), 13.75 (bs, IH)

5-(2-Bromo-4-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.31 (s, 2H), 7.39 (d, IH), 7.67 (dd, IH), 7.75 (dd, IH), 7.98 (d, IH), 8.12 (d, IH), 8.48 (d, IH), 11.42 (s, IH), 13.73 (bs, IH)

5-(2-Bromo-4-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.18 (s, 2H), 7.23-7.27 (m, 2H), 7.58 (dd, IH), 7.66 (dd, IH), 8.10 (d, IH), 8.47 (d, IH), 11.39 (s, IH), 13.73 (bs, IH)
5-(2-Bromo-4-chloro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.21 (s, 2H), 7.24 (d, IH), 7.43 (dd, IH), 7.65 (dd, IH), 7.72 (d, IH), 8.10 (d, IH), 8.47 (d, IH), 11.38 (s, IH), 13.75 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(2,4-dibromo-phenoxymethyl)-benzoic acid
IH-NMR (DMSO-d6) δ 0.87 (d, 4H), 1.73 (m, IH), 5.20 (s, 2H), 7.18 (d, IH), 7.54 (dd, IH), 7.65 (dd, IH), 7.81 (d, IH), 8.09 (d, IH), 8.47 (d, IH), 11.37 (s, IH), 13.74 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-benzoic acid

5-(4-Chloro-3-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

Example 4

5-[(E)-2-(2,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid (Method C)

A mixture of 5-bromomethyl-2-propionylamino-benzoic acid methyl ester (172 mg, 0.60 mmol), 2,4-dichloro-1-vinyl-benzene (125 mg, 0.72 mmol), potassium carbonate (100 mg, 0.66 mmol), tri-butyl amine (160 µl, 0.66 mmol) and bis(tri-phenyl-phosphino)palladium (II) di-chloride in DMF (3 ml) was heated to 130°C. After 30 minutes, the reaction mixture was
allowed to reach room temperature, acidified with 2 M HCl and the resulting precipitate collected by filtration, washed with water and dried under vacuum to give crude 5-[(E)-2-(2,4-dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid methyl ester. This was hydrolysed in ethanol (3 mL) and 1.0 M NaOH (3 mL) overnight and then acidified with 1.0 M HCl. The resulting precipitate was collected by filtration, washed with water and dried under vacuum (136 mg, 62% total yield). IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.43 (q, 2H), 7.32 (d, IH), 7.37 (d, IH), 7.44 (dd, IH), 7.63 (d, IH), 7.87-7.91 (m, IH), 8.17 (d, IH), 8.57 (d, IH), 11.19 (s, IH), 13.80 (bs, IH)

In essentially the same manner the following compounds were obtained from the corresponding starting materials:

5-[(E)-2-(4-Fluoro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.44 (q, 2H), 7.25 (dd, IH), 7.36 (d, IH), 7.62 (dt, IH), 7.65 (dd, IH), 7.85 (dd, IH), 8.06 (dd, IH), 8.16 (d, IH), 8.57 (d, IH), 11.20 (s, IH), 13.79 (bs, IH)

5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.45 (q, 2H), 7.33 (dd, IH), 7.59 (d, IH), 7.93 (dd, IH), 8.03 (s, IH), 8.09 (d, IH), 8.21 (d, IH), 8.26 (d, IH), 8.60 (d, IH), 11.22 (s, IH), 13.83 (bs, IH)

5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.44 (q, 2H), 7.26-7.34 (m, 3H), 7.49 (dd, IH), 7.90 (dd, IH), 7.94 (dd, IH), 8.16 (d, IH), 8.57 (d, IH), 11.17 (s, IH), 13.75 (bs, IH)

5-[(E)-2-(2,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.44 (q, 2H), 7.14 (dt, IH), 7.20 (d, IH), 7.27-7.34 (m, 2H), 7.86 (q, IH), 7.90 (dd, IH), 8.15 (d, IH), 8.56 (d, IH), 11.16 (s, IH), 13.79 (bs, IH)

5-[(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.44 (q, 2H), 7.14 (dt, IH), 7.20 (d, IH), 7.77-7.80 (m, 2H), 7.86 (dd, IH), 8.04 (d, IH), 8.16 (d, IH), 8.58 (d, IH), 11.19 (s, IH), 13.81 (bs, IH)
5-[(E)-2-(2-Fluoro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 1.14 (t, 3H), 2.44 (q, 2H), 7.30 (d, IH), 7.53 (d, IH), 7.61 (d, IH), 7.71 (d, IH), 7.97 (dd, IH), 8.04 (t, IH), 8.21 (d, IH), 8.58 (d, IH), 11.20 (s, IH), 13.81 (bs, IH)

5-

2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(4-fluoro-2-trifluoromethyl-phenyl)-vinyl]-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 0.89 (d, 4H), 1.75 (m, IH), 7.27 (dd, IH), 7.37 (d, IH), 7.61 (dt, IH), 7.65 (dd, IH), 7.85 (d, IH), 8.07 (dd, IH), 8.16 (d, IH), 8.51 (d, IH), 11.40 (s, IH), 13.82 (bs, IH)

5-[(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 0.89 (d, 4H), 1.75 (m, IH), 7.24 (dd, IH), 7.44 (d, IH), 7.78-7.81 (m, 2H), 7.85 (dd, IH), 8.04 (d, IH), 8.17 (d, IH), 8.51 (d, IH), 11.41 (s, IH), 13.86 (bs, IH)

5-[(E)-2-(4-Chloro-3-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 1.14 (t, 3H), 2.44 (q, 2H), 7.35 (d, IH), 7.51 (d, IH), 7.73 (d, IH), 7.89 (dd, IH), 7.94 (dd, IH), 8.09 (d, IH), 8.23 (d, IH), 8.57 (d, IH), 11.18 (s, IH), 13.78 (bs, IH)

5-[(E)-2-(4-Fluoro-3-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 1.14 (t, 3H), 2.44 (q, 2H), 7.33 (d, IH), 7.43 (d, IH), 7.53 (dd, IH), 7.86 (dd, IH), 7.98 (m, IH), 8.02 (d, IH), 8.21 (d, IH), 8.56 (d, IH), 11.17 (s, IH), 13.76 (bs, IH)

5-[(E)-2-(3-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 1.14 (t, 3H), 2.44 (q, 2H), 7.22 (d, IH), 7.34 (d, IH), 7.43 (t, IH), 7.62 (m, IH), 7.84 (dd, IH), 7.88 (dd, IH), 8.17 (d, IH), 8.55 (d, IH), 11.16 (s, IH), 13.78 (bs, IH)

5-[(E)-2-(3-Fluoro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid
IH-NMR (DMSO-d$_6$) $\delta$ 1.14 (t, 3H), 2.44 (q, 2H), 7.32 (d, IH), 7.55 (d, IH), 7.62 (d, IH), 7.74-7.80 (m, 2H), 7.90 (dd, IH), 8.22 (d, IH), 8.58 (d, IH), 11.20 (s, IH), 13.81 (bs, IH)
5-[(E)-2-(3-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.44 (q, 2H), 7.24 (d, IH), 7.42 (d, IH), 7.56 (d, IH), 7.68 (dd, IH), 7.86 (dd, IH), 7.96 (d, IH), 8.19 (d, IH), 8.56 (d, IH), 11.18 (s, IH), 13.77 (bs, IH)

5-[(E)-2-(3,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.44 (q, 2H), 7.22 (d, IH), 7.42 (d, IH), 7.59-7.64 (m, 2H), 7.86 (dd, IH), 7.91 (d, IH), 8.19 (d, IH), 8.56 (d, IH), 11.18 (s, IH), 13.77 (bs, IH)

5-[(E)-2-(4-Chloro-2-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid

IH-NMR (DMSO-d6) δ 1.14 (t, 3H), 2.43 (q, 2H), 7.21 (d, IH), 7.33 (dd, IH), 7.39 (d, IH), 7.48 (dd, IH), 7.84 (t, IH), 7.91 (dd, IH), 8.17 (d, IH), 8.56 (d, IH), 11.28 (s, IH), 13.77 (bs, IH)

5-[(E)-2-(2-Chloro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid

5-[(E)-2-(3,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid

5-[(E)-2-(3,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid

5-[(E)-2-(4-Chloro-3-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid

5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid

IH-NMR (DMSO-d6) δ 0.89 (d, 4H), 1.75 (m, IH), 7.32 (dd, IH), 7.58 (d, IH), 7.90 (dd, IH), 8.02 (s, IH), 8.09 (d, IH), 8.21 (d, IH), 8.26 (d, IH), 8.54 (d, IH), 11.52 (s, IH), 13.79 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(2-fluoro-4-trifluoromethyl-phenyl)-vinyl]-benzoic acid

IH-NMR (DMSO-d6) δ 0.89 (d, 4H), 1.75 (m, IH), 7.30 (dd, IH), 7.54 (d, IH), 7.61 (d, IH), 7.71 (d, IH), 7.95 (dd, IH), 8.04 (t, IH), 8.21 (d, IH), 8.52 (d, IH), 11.48 (s, IH), 13.77 (bs, IH)

2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(4-Chloro-2-fluoro-phenyl)-vinyl]-benzoic acid

IH-NMR (DMSO-d6) δ 0.88 (d, 4H), 1.74 (m, IH), 7.15 (dt, IH), 7.20 (d, IH), 7.27-7.35 (m, 2H), 7.83-7.90 (m, 2H), 8.15 (d, IH), 8.49 (d, IH), 11.43 (s, IH), 13.80 (bs, IH)
Pharmacological and Pharmacokinetic Methods

Inhibition of T-cell proliferation

Inhibition of T cell proliferation was studied in a functional assay. A human T lymphoblast cell line (Jurkat) was cultured in the presence and absence, respectively, of DHODH inhibiting compounds. Jurkat cells were seeded in microtiterplates at a concentration of 5 x
$10^5$/mL in RPMI 1640 growth media supplemented with ultraglutamin, 10% fetal calf serum, 1 mM sodium pyruvat, 10 mM HEPES and 0.1 mg/mL gentamycin. A dilution series often different concentrations of inhibitor was added to the wells and the plates were kept in a cell incubator for 3 days. At the beginning of the last 4 hours period, the cultures were pulsed with 10 µl/well O.1Ci/mmol 3H-TdR and then harvested on filter papers and counted with a β-counter. The IC50 values for each compound were calculated from the obtained dose response curves. Adding uridine to a concentration of about 50 µM in the wells monitored the specificity for the mechanism i.e. the inhibition of cell proliferation is due to DHODH inhibition and not to a general cell toxicity of the compounds. This addition of uridine reverses the anti-proliferative effect by bypassing the DHODH enzyme using an external source of pyrimidine. Results in respect of a number of compounds of the invention are reported as Jurkat IC50 (in µM in Table 1).

Metabolic stability in human liver microsomes

The metabolic stability of the test compounds was determined using human liver microsomes. Incubations were performed with a compound concentration of 0.5 µM and a protein concentration of 1 mg/mL in 50 mM sodium phosphate buffer at physiological pH (7.4) and temperature (37°C). The incubation mixture was preincubated at 37°C prior to addition of NADPH (1 mM, final concentration). At several time points during 60 minutes, aliquots were removed and added to a 96 well plate placed on dry ice and deep-frozen. Samples were analyzed with LC-MS for concentration of parent compound. From the slope of the log[parent compound] vs. incubation time regression line, the in vitro half-life ($W_1$) was determined. The intrinsic clearance (CLint) can be calculated using a modified Michaelis-Menten relationship, i.e., $CLint = \ln 2/W_1$. The CLint can then be converted to CL by using the well-stirred model of hepatic extraction. A value of 1.24 L/h/kg of the hepatic blood flow in man can be used. Results in respect of a number of compounds of the invention are reported as $t\frac{1}{2}$ (in minutes) in Table 1.

WO 2005/075410 discloses anthranilic acid derivatives that are stated to inhibit DHODH.

However, when tested in in vitro systems based on human cells, compounds of WO 2005/075410 were found to have very short oxidation half-life and/or low T-cell anti-proliferative effect (cf. Table 1). On the other hand, the present inventors now have found a number of ortho, para- or meta, para-disubstituted anthranilic acid derivatives having a substantially enhanced stability towards oxidation by human P450 cytochrome in combination
with a high T-cell anti-proliferative effect. This finding is very surprising and could not have been foreseen by the skilled person on the basis of teachings of WO 2005/075410 which, as pointed out herein above, while teaching the importance of the substitution pattern, stresses that di-substitution should imperatively be in the ortho,meta-, ortho,meta'- or meta,meta'-positions.

EP0497740 discloses compounds that are stated to be useful as antihyperproliferative/antiinflammatory and anti cancer agents. The compound disclosed as most preferred is 5-(2,5-dimethoxy-benzyloxy)-2-hydroxy-benzoic acid methyl ester. The present inventors found 5-(2,5-dimethoxy-benzyloxy)-2-hydroxy-benzoic acid to be inactive as DHODH inhibitor. EP0497740 also discloses the compound 2-acetylamino-5-(2,5-dimethoxy-benzyloxy)-benzoic acid methyl ester, which inhibits cell proliferation. This anti-proliferative effect, however, is unrelated to DHODH inhibition. The compound 2-acetylamino-5-(2,5-dimethoxy-benzyloxy)-benzoic acid (termed compound REF-8) has been tested and found to display only a weak inhibitory effect on T-cell proliferation, and a short half-life in human beings, cf. Table 1.

EP08 15087 discloses compounds structurally related to compounds of formula (I) that are stated to be useful for the treatment of proliferative and/or inflammatory disorders and cancer, e.g., 2-acetylamino-5-[2-(2,5-dimethoxy-phenyl)-ethyl]-benzoic acid methyl ester, 2-Acetylamino-5-[2-(2,5-dimethoxy-phenyl)-ethyl]-benzoic acid (termed compound REF-9) has been tested and found to display a very weak inhibitory effect on T-cell proliferation, cf. Table 1.

The inhibition of T cell proliferation was studied in a human T lymphoblast cell line (Jurkat). The IC50 value for each compound was calculated from the dose response curve. The IC50 values of representative compounds are shown in Table 1. Adding uridine was used to monitor the specificity of the DHODH mechanism. The metabolic stability was studied in human liver microsomes. The metabolic stability expressed as t1/2 (minutes) is shown in Table 1. Table 1 exemplifies the invention, without limiting the scope thereof.

Pharmaceutically acceptable salts of the compounds of formula (I) can be prepared by reacting the free acid with a base in water or in an organic solvent. Lists of suitable salts found in Remington: The Science and Practice of Pharmacy. 21st Edition. Philadelphia, PA.
Lippincott Williams & Wilkins. 2005. Effective quantities of the compounds of this invention are preferably administered to a patient in need of such treatment according to usual routes of administration and formulated in usual pharmaceutical compositions comprising an effective amount of the active ingredient and a suitable pharmaceutically acceptable carrier. Such compositions may take a variety of forms, e.g., solutions, suspensions, emulsions, tablets, capsules, and powders prepared for oral administration, sterile solutions for parental administration, and suppositories for rectal administration or suitable topical formulations. Conventional procedures for the selection and preparation of suitable pharmaceutical formulations are described, for example, in Pharmaceutics, The Science of Dosage Form Design (2001) Edited by Aulton, Michael E. (ISBN: 0443055173).

A suitable daily dose for use in the treatment of a disease selected from autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia is contemplated to vary between 0.005 mg/kg to about 10 mg/kg body weight, in particular between 0.025 mg/kg to 2 mg/kg body weight, depending upon the specific condition to be treated, the age and weight of the specific patient, and the specific patient's response to the medication. The exact individual dosage, as well as the daily dosage, will be determined according to standard medical principles under the direction of a physician.
1. A compound of formula (I)

\[
\begin{align*}
\text{R1} & \quad \text{N} \\
& \quad \text{O} \\
& \quad \text{O} \\
& \quad \text{Y} \\
& \quad \text{R3} \\
& \quad \text{R2} \\
\end{align*}
\]

(1)

wherein
- \( X \) is \( \text{CH}=\text{CH}, \text{CH}_2\text{O} \) wherein the oxygen is bound to ring B or \( \text{OCH}_2 \) wherein the oxygen is bound to ring A;
- \( Y \) is hydrogen, straight or branched C1-C6 alkyl or a pharmaceutically acceptable inorganic cation;
- \( R_1 \) is ethyl or cyclopropyl; and
- \( R_2 \) and \( R_3 \) are the same or different and are selected from F, Cl, Br, CF3 and OCF3.

2. A compound according to claim 1, wherein \( X \) is \( \text{CH}_2\text{O} \) wherein the oxygen is bound to ring B.

3. A compound according to claim 1 or claim 2, wherein \( R_2 \) is \( \text{CF}_3 \) or \( \text{OCF}_3 \).

4. A compound according to any one of the claims 1-3, wherein \( Y \) is selected from \( \text{Li}^+, \text{Na}^+, \text{K}^+, \text{Mg}^{2+}, \text{Ca}^{2+} \) and \( \text{Zn}^{2+} \).

5. A compound selected from
- 5-(2,4-Dichloro-benzyloxy)-2-propionlamino-benzoic acid
- 5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
- 5-(4-Fluoro-2-trifluoromethyl-benzyloxy)-2-propionlamino-benzoic acid
- 5-(2,4-Bis-trifluoromethyl-benzyloxy)-2-propionlamino-benzoic acid
- 5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-propionlamino-benzoic acid
- 5-(2-Chloro-4-fluoro-benzyloxy)-2-propionlamino-benzoic acid
- 2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-2-trifluoromethyl-benzyloxy)-benzoic acid
- 5-(2-Bromo-4-fluoro-benzyloxy)-2-propionlamino-benzoic acid
- 5-(2-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionlamino-benzoic acid
- 5-(2-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionlamino-benzoic acid
5-(2-Bromo-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3,4-Dibromo-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-3-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Difluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Bromo-4-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Dibromo-benzyloxy)-2-propionylamino-benzoic acid
5-(3,4-Bis-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Fluoro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Chloro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Chloro-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Chloro-4-trifluoromethoxy-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Bis-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2-fluoro-4-trifluoromethyl-benzyloxy)-benzoic acid
5-(4-Chloro-2-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Bromo-2-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2,4-dichloro-benzyloxy)-benzoic acid
5-(4-Bromo-2-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Bromo-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Bromo-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Bromo-4-chloro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2,4-dibromo-benzyloxy)-benzoic acid
5-(3,4-Bis-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-3-trifluoromethyl-benzyloxy)-benzoic acid
5-(4-Chloro-3-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Chloro-3-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-3-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-difluoro-benzyloxy)-benzoic acid
5-(4-Chloro-3-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-3-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Chloro-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-dichloro-benzyloxy)-benzoic acid
5-(4-Bromo-3-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-3-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Bromo-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(3-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-dibromo-benzyloxy)-benzoic acid
5-(2,4-Dichloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(3,4-dibromo-benzyloxy)-benzoic acid
5-(4-Bromo-2-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2,4-Bis-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Fluoro-2-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-2-trifluoromethyl-phenoxymethyl)-benzoic acid
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Fluoro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Bromo-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-3-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2,4-Difluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-2-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-2-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-2-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3,4-Dibromo-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3,4-Bis-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Fluoro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3,4-Difluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-3-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-3-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3,4-Dichloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Bromo-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Bromo-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Bromo-4-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3,4-Dibromo-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2,4-Bis-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Chloro-2-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Bromo-2-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2-Cyclopropanecarbonyl-amino)-5-(2-fluoro-4-trifluoromethyl-phenoxy)methyl)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-(2,4-difluoro-phenoxy)methyl)-benzoic acid,
5-(4-Chloro-2-fluoro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Bromo-2-fluoro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Bromo-2-chloro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2-Bromo-4-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2-Bromo-4-fluoro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2-Bromo-4-chloro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-(2,4-dibromo-phenoxy)methyl)-benzoic acid
5-(2-Chloro-4-trifluoromethoxy-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(3,4-Bis-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Chloro-3-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Bromo-3-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-(3-fluoro-4-trifluoromethyl-phenoxy)methyl)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-(3,4-difluoro-phenoxy)methyl)-benzoic acid,
5-(4-Chloro-3-fluoro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Bromo-3-fluoro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(3-Chloro-4-trifluoromethoxy-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(3-Chloro-4-fluoro-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Chloro-2-trifluoromethyl-phenoxy)methyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(3-Bromo-4-chloro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-(3,4-dibromo-phenoxymethyl)-benzoic acid,
5-[(E)-2-(2,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Fluoro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Fluoro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-3-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Fluoro-3-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3-Fluoro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-2-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Chloro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-3-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(2-fluoro-4-trifluoromethyl-phenyl)-vinyl] -2-propionylamino-benzoic acid,
5-[(E)-2-(3,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(4-fluoro-3-trifluoromethyl-phenyl)-vinyl]-benzoic acid,
5-[(E)-2-(4-Chloro-3-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(3-fluoro-4-trifluoromethyl-phenyl)-vinyl]-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(3,4-difluoro-phenyl)-vinyl]-benzoic acid,
5-[(E)-2-(4-Chloro-3-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-[(E)-2-(3-Chloro-4-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
and
5-[(E)-2-(3,4-dichloro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
or a pharmaceutically acceptable salt thereof.

6. A compound according to claim 5, selected from
5-(2,4-Dichloro-benzyloxy)-2-propionylamino-benzoic acid
20 5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Fluoro-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Bis-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Chloro-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
25 2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-2-trifluoromethyl-benzyloxy)-benzoic acid
5-(2-Bromo-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Bromo-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
30 5-(3,4-Dibromo-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-3-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Difluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Chloro-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Fluoro-3-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Fluoro-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Chloro-4-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(3,4-Dichloro-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Bromo-4-chloro-benzyloxy)-2-propionylamino-benzoic acid
5-(3-Chloro-4-trifluoromethoxy-benzyloxy)-2-propionylamino-benzoic acid
5-(2,4-Bis-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2-fluoro-4-trifluoromethyl-benzyloxy)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2,4-difluoro-benzyloxy)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2,4-dichloro-phenoxymethyl)-benzoic acid
5-(2-Bromo-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Bromo-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-fluoro-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid
5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(4-Bromo-2-fluoro-benzyloxy)-2-propionylamino-benzoic acid
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(2,4-dichloro-phenoxymethyl)-benzoic acid
5-(4-Fluoro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Bromo-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-3-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid
5-(3-Chloro-4-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid
2-(Cyclopropanecarbonyl-amino)-5-(4-fluoro-3-trifluoromethyl-phenoxymethyl)-benzoic acid
5-(2,4-Difluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Chloro-2-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-2-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(4-Bromo-2-chloro-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2,4-Dibromo-phenoxymethyl)-2-propionylamino-benzoic acid
5-(2,4-Bis-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid

5-(4-Bromo-2-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,

2-(Cyclopropanecarbonyl-amino)-5-(2,4-difluoro-phenoxymethyl)-benzoic acid,
5-(4-Chloro-2-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Bromo-2-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Bromo-2-chloro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2-Bromo-4-trifluoromethyl-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2,4-Dibromo-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-(cyclopropanecarbonyl-amino)-benzoic acid,

2-(Cyclopropanecarbonyl-amino)-5-(2,4-dibromo-phenoxymethyl)-benzoic acid
5-[(E)-2-(2,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Fluoro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,

5-[(E)-2-(2,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-[(E)-2-(4-Chloro-3-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Fluoro-3-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3-Fluoro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(3,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(4-Chloro-2-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Chloro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-[(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(2-fluoro-4-trifluoromethyl-phenyl)-vinyl]-benzoic acid,
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(2,4-difluoro-phenyl)-vinyl]-benzoic acid,
5-[(E)-2-(4-Chloro-2-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-[(E)-2-(4-Chloro-2-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-[(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-benzoic acid, and
2-(Cyclopropanecarbonyl-amino)-5-[(E)-2-(2,4-dichloro-phenyl)-vinyl]-benzoic acid, or a pharmaceutically acceptable salt thereof.

7. A compound according to claim 6, selected from
5-(4-Bromo-2-trifluoromethyl-benzyloxy)-2-(cyclopropanecarbonyl-amino)-benzoic acid,
5-(4-Chloro-2-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid,
5-(2-Bromo-4-trifluoromethyl-benzyloxy)-2-propionylamino-benzoic acid,
5-(2,4-Dichloro-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2,4-Bis-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(4-Fluoro-2-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(4-Fluoro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(4-Chloro-3-trifluoromethyl-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(3-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(3-Bromo-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(4-Chloro-3-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(3-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(E)-2-(2,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(4-Fluoro-2-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(2,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(4-Chloro-3-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(4-Chloro-3-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3-Fluoro-4-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(4-Chloro-2-trifluoromethyl-phenyl)-vinyl]-2-(cyclopropanecarbonyl-amino)-

8. A compound according to claim 7, selected from
5-(2-Chloro-4-fluoro-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Chloro-4-trifluoromethoxy-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(2-Bromo-4-chloro-phenoxymethyl)-2-propionylamino-benzoic acid,
5-(E)-2-(2,4-Bis-trifluoromethyl-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(2-Chloro-4-fluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(2,4-Difluoro-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3-Chloro-4-trifluoromethoxy-phenyl)-vinyl]-2-propionylamino-benzoic acid,
5-(E)-2-(3,4-Dichloro-phenyl)-vinyl]-2-propionylamino-benzoic acid, or a pharmaceutically
acceptable salt thereof.

9. A compound according to any of the claims 1-8, for use as a medicament.
10. A pharmaceutical composition comprising a compound according to any of the claims 1-8 as an active ingredient, in association with pharmaceutically acceptable excipients.

11. A pharmaceutical composition according to claim 10 wherein the active ingredient is present in an amount so as to give a daily dosage of from 0.005 mg/kg to 10 mg/kg body weight, in particular from 0.025 mg/kg to 2 mg/kg body weight.

12. A pharmaceutical composition according to claim 10 or claim 11, in the form of a solution, suspension, emulsions, tablet, capsule, or powder for oral administration, a sterile solution for parental administration, a suppository for rectal administration or a topical formulation.

13. A pharmaceutical composition according to any one of the claims 10-12, for the treatment of a disorder selected from autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia.

14. A pharmaceutical composition according to claim 13, wherein the disorder is selected from acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease.

15. A compound according to any of the claims 1-8 for the treatment of a disorder or condition selected from autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia in a mammal.

16. A compound according to claim 15, wherein the disorder is selected from acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease.

17. The use of a compound according to any of the claims 1-8 in the manufacturing of a medicament for the treatment of a disorder or condition selected from autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia in a mammal.
18. The use according to claim 17, wherein the disorder is selected from acute and chronic inflammation, rheumatoid arthritis, multiple sclerosis, type-1 diabetes, inflammatory bowel disease, psoriasis, transplant rejection and malignant neoplastic disease.

19. A method of preparing a compound according to claim 1, wherein X in formula (I) is OCH₂, by

\[
\text{(H) reacting a compound of formula (II), with a compound of formula (III), wherein A is a leaving group; or}
\]

wherein X in formula (I) is CH₂O, by

\[
\text{(IV) reacting a compound of formula (IV) with a compound of formula (V); or}
\]

wherein X in formula (I) is CH=CH, by
reacting a compound of formula (VI) with a compound of formula (VII).

20. A method according to claim 19, wherein Y in formulae (II), (IV) and (VI) is a C1-C6 alkyl group; said method optionally comprising hydrolysing the ester moiety COOY to a carboxylic acid moiety and optionally reacting the thus obtained acid moiety with a suitable base so as to transform said acid moiety into a carboxylic acid salt of a pharmaceutically acceptable cation.

21. A method of treating a disorder or condition selected from autoimmune diseases, inflammatory diseases, organ transplant rejection and malignant neoplasia in a mammal, comprising administering to the mammal in need of such treatment a therapeutically effective amount of a compound according to claim 1.
INTERNATIONAL SEARCH REPORT

International application No
PCT/SE2008/050126

A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, BEILSTEIN Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>EP 0 497 740 A (SANDOZ LTD [CH]; SANDOZ AG [DE]; SANDOZ AG [AT]) 5 August 1992 (1992-08-05) cited in the application page 12, line 30 - page 14, line 26; claims 1,9; example 15</td>
<td>1-21</td>
</tr>
<tr>
<td>A</td>
<td>WO 96/28430 A (SANDOZ LTD [CH]; SANDOZ AG [DE]; SANDOZ AG [AT]; NUSSEBAUMER PETER [NL]) 19 September 1996 (1996-09-19) cited in the application page 34, line 1 - page 37, line 2; claims 1,11,12; examples 2,3,45,46</td>
<td>1-21</td>
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D. Further documents are listed in the continuation of Box C. [x] See patent family annex.

* Special categories of cited documents:

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'R' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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*x* document member of the same patent family

Date of the actual completion of the international search 28 May 2008

Date of mailing of the international search report 04/06/2008

Names and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016

Authorized officer

Seufert, Gudrun

Form PCT/ISW210 (second sheet) (April 3005)
### INTERNATIONAL SEARCH REPORT

**Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. **I X J Claims Nos.:**
   - Because they relate to subject matter not required to be searched by this Authority, namely:
     - Although claim 21 is directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

2. **J J Claims Nos.:**
   - Because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **J Claims Nos.:**
   - Because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. II  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. **J As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.**

2. **J As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of additional fees.**

3. **J As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:**

4. **J No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:**

### Remark on Protest

- The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.

- The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.

- No protest accompanied the payment of additional search fees.
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