



No. 08-035079- -00003-0000

Fecha: 2008-11-25 14:38:26 Dep. 2020 NUECREACION
Tra. 11 PATENTEIYII Eva 378 FASENACIONALI
Act. 400 OPOSIOBSERVIER Folios: 64

FORMULARIO ÚNICO DE OPOSICIÓN

①

OPOSICION A

- ☒ Patente de Invención
☐ Patente de Modelo de Utilidad
☐ Diseño Industrial
☐ Esquema de Trazado para Circuitos Integrados
☐ Marcas de Productos o Servicios

- ☐ Marca Colectiva
☐ Marca de Certificación
☐ Lema Comercial

②

SOLICITUD
PUBLICADA

Numero del expediente: 08-35079

Solicitante: WORLD-TRADE IMPORT-EXPORT WTIE, A.G.

Apoderado: DILIA MARIA RODRIGUEZ D. ALEMAN

Título de la nueva creación o denominación del signo: *COMPOSICIONES FARMACÉUTICAS QUE COMPRENDEN SUSTANCIAS ANTIDIABÉTICAS COMBINADAS PARA SU USO EN DIABETES MELLITUS

Gaceta: 595

③ OPOSICION PRESENTADA POR:

SOLICITANTE	Nombre: PROCAPS S.A.	IDENTIFICACION	
	Dirección: CALLE 80 No. 78B -201	C.C. ☐	NIT. ☒
	Nacionalidad o Domicilio: COLOMBIA	C.E. ☐	Otro ☐
	Lugar de Constitución: BARRANQUILLA		Cual
	Telefono: (571)3719900 Fax: (571)3730818	Numero	890.106.527-5
	E-mail:		
REPRESENTANTE O APODERADO	Nombre: ELIANA ISAURA MORENO BOHORQUEZ	IDENTIFICACION	
	Dirección: CARRERA 13 No. 119-95 OF 104	C.C. ☒	NIT. ☐
	Telefono: Fax:	C.E. ☐	Otro ☐
	E-mail: (571)2131213 (571)6121979		Cual
	negocios@optimum-co.com	Numero	51.975.664 TP.83823

④ FUNDAMENTOS DE LA OPOSICION

Art. 14, 16, 18, 20 y 30 de la Decisión 486 de la CAN

Causal:

No cumple con los requisitos de patentabilidad.

Signo opositor:

Justificación:

La presente solicitud no cumple con los requisitos de patentabilidad dado que lo revelado, ya se encontraba en el estado de la técnica o es posible derivarlo de la misma tal y como se demostrará en el capítulo "Fundamento de Hechos"

⑤ Comprobante de pago No. _____

Fecha _____

⑥ ANEXOS

- ☒ Comprobante de pago de la tasa.
- ☒ Poderes, si fuere el caso.
- ☒ Pruebas de los fundamentos de la oposición.
- ☐ Documentos que acrediten el legítimo interés, si fuere el caso.
- ☒ Documento que acredita la existencia y representación legal de las partes, cuando sean personas jurídicas.

⑦

NOMBRE: ELIANA ISaura MORENO BOHORQUEZ

FIRMA:

Eliana Isaura Moreno Bohorquez

C.C. 51.975.664

TP. 83823

Señora Jefe,

DIVISIÓN DE NUEVAS CREACIONES

Superintendencia de Industria y Comercio

E. S. D.

Referencia : Expediente N° 0835079

Asunto : Oposición a la solicitud de patente de Invención titulada
"COMPOSICIONES FARMACÉUTICAS QUE
COMPRENDEN SUSTANCIAS ANTIDIABÉTICAS
COMBINADAS PARA SU USO EN DIABETES
MELLITUS"

Solicitante : WORLD-TRADE IMPORT-EXPORT WTIE, A.G.

Opositora : PROCAPS S.A.

Publicada en la Gaceta de la Propiedad Industrial

N° 595 del 29 de agosto de 2008

Yo, **ELIANA ISaura MORENO BOHORQUEZ**, abogada en ejercicio, identificada como aparece al pie de su firma, con tarjeta profesional No. 83823 del Consejo Superior de la Judicatura, en mi condición de apoderada de la sociedad **PROCAPS S.A.** conformada bajo las leyes de la República de Colombia y domiciliada en la ciudad de Barranquilla, Colombia, atentamente manifiesto que estando dentro del término de ley y por orden expresa de mi representada, presento oposición a la concesión del registro de la Patente de Invención titulada "COMPOSICIONES FARMACEUTICAS QUE COMPRENDEN SUSTANCIAS ANTIDIABETICAS COMBINADAS PARA SU USO EN DIABETES MELLITUS", cuyo titular es WORLD-TRADE IMPORT.

EXPORT WTIE, A.G, y pido a Usted declarar fundada esta oposición y en consecuencia negar el registro de la patente solicitada.

1. INTERÉS PARA ACTUAR

Conforme a lo dispuesto en el artículo 42 de la Decisión 486 de 2000 de la CAN, estando dentro del término estipulado por la ley, manifiesto el legítimo interés de nuestra representada para oponerse al registro de la patente de la referencia, atendiendo a que la solicitud pretendida no cumple con los requisitos dispuestos en la ley como se analizará más adelante y de ser concedida afectaría directamente la comercialización de algunos productos de mi representada, que contienen en particular biguanidas. Por lo tanto, solicito respetuosamente a ese Despacho se sirva tener en cuenta la presente oposición dentro del trámite administrativo que se surte en esta Superintendencia.

2. FUNDAMENTOS DE HECHOS

- 2.1. La solicitud objeto de la presente fue presentada el 8 de abril de 2008, reivindicando prioridad bajo la solicitud MX2005PA10977 del 2005-10-12; y fue publicada en Colombia, en la Gaceta de la Propiedad Industrial N° 595 del 29 de agosto de 2008, cuya publicación internacional corresponde a la WO2007043853 del 2007-04-19.
- 2.2. La solicitud colombiana 0835079 objeto de la presente oposición, se refiere a una composición farmacéutica que comprende sustancias antidiabéticas combinadas para su uso en diabetes mellitus, caracterizadas porque dicha combinación o

asociación consisten en dos o tres sustancias antidiabéticas seleccionadas del conjunto formado por: sulfonilureas, meglitinidas, biguanidas ó inhibidores de alfa-glucosidasa con tiazolidinedionas para el tratamiento de la diabetes mellitus tipo 2 en nuevas formulaciones; donde las sulfonilureas son seleccionadas del conjunto formado por glipizida, gliburida, glimepirida; meglitinidas, repaglinida, nateglinida, tiazolidinedionas o una combinación de estas; biguanidas como metformina; inhibidores de la alfa-glucosidasa conocidos como acarbosa, miglitol en asociación o combinación con tiazolidinedionas conocidas como pioglitazona, rosiglitazona, troglitazona, como base o una sal fisiológicamente aceptada.

2.3. Ahora bien, con base en el artículo 14 de la Decisión 486 de la CAN consagra lo siguiente: "Los países miembros otorgarán patentes para las invenciones, sean de producto o procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial". Así las cosas, las invenciones objeto de patente deben ser nuevas y tener nivel inventivo. Bien, pues antes de la fecha de prioridad de esta solicitud se encuentran los siguientes documentos que afecta la patentabilidad de la presente solicitud:

- D1: WO0027401 publicada el 18 de mayo de 2000.

2.4. Ahora bien, el documento D1, particularmente en la descripción revela combinaciones entre glitazonas antidiabéticas, un agente biguanida antidiabético y opcionalmente un agente sulfonilurea útil en el tratamiento de la diabetes mellitus y para mejorar el control glicémico. Como tal precisamente esta anterioridad D1 revela composiciones antidiabéticas que contienen glitazona (tiazolidinediona) y una biguanida que puede ser metformina, según se indica en la reivindicación 8 particularmente. Opcionalmente, esta anterioridad D1 define que puede incluir

una sulfonilurea tal como se evidencia desde el resumen y se define en la descripción. Por lo tanto, visto dicho documento D1, es evidente la pre-existencia de combinaciones o asociaciones que consisten en dos o tres sustancias antidiabéticas, tal y como se revela en el capítulo reivindicatorio de la presente solicitud.

2.5. Por lo tanto, este documento objeto de oposición a la luz del documento D1 carece evidentemente de NOVEDAD.

2.6. En consecuencia y de acuerdo a lo descrito anteriormente, se deriva que la solicitud colombiana 0835079 no puede pretender un monopolio por patente toda vez que lo que pretende no cumple con uno de los tres requisitos necesarios para su protección.

2.7. Que por consiguiente, respecto a la solicitud pretendida se tiene que:

2.7.1. **CARECE DE NOVEDAD:** Según la decisión 486 de la Comunidad Andina de Naciones, Artículo 16.- *"Una invención se considerará nueva cuando no está comprendida en el estado de la técnica. El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente o, en su caso, de la prioridad reconocida."* A la fecha de prioridad, 12 de octubre de 2005 ya era conocido, pues como se demostró, era parte del arte anterior desde el año 2000 con base en el documento D1, la pre-existencia de combinaciones o asociaciones que consisten en dos o tres sustancias antidiabéticas seleccionadas del conjunto formado por sulfonilureas, meglitinidas y biguanidas para el tratamiento de la diabetes mellitus, sobre el cual busca protección en el capítulo reivindicatorio.

2.8. Dado lo anterior, es posible deducir que la solicitud y lo reivindicado no es objeto de patentabilidad pues es contrario a lo que dicta la Decisión 486 de la Comunidad Andina de Naciones, Artículo 14.- *"Los Países Miembros otorgarán patentes para las invenciones, sean de producto o de procedimiento, en todos los campos de la tecnología, siempre que sean nuevas, tengan nivel inventivo y sean susceptibles de aplicación industrial"*. La solicitud pretendida no cumple con uno de los tres requisitos de patentabilidad.

2.9. Por todo lo anterior, atentamente solicito a usted que se sirva declarar fundada **"COMPOSICIONES FARMACEUTICAS QUE COMPRENDEN SUSTANCIAS ANTIDIABETICAS COMBINADAS PARA SU USO EN DIABETES MELLITUS"**, cuyo titular es **WORLD-TRADE IMPORT-EXPORT WTIE, A.G.**, solicitud Colombiana que apareció publicada en la Gaceta de la Propiedad Industrial N° 595 del 29 de agosto de 2008.

3. PRUEBAS

De conformidad con lo dispuesto por las normas vigentes, solicito a usted tener como prueba en este asunto los siguientes:

- D1: WO0027401 publicada el 18 de mayo de 2000.

4. FUNDAMENTO DE DERECHO

Fundamento esta observación en las normas legales siguientes:

- 4.1. Numeral 1 del artículo 586 del Código de Comercio.
- 4.2. Artículo 42 de la Decisión 486 de la Comisión del Acuerdo de Cartagena.
- 4.3. En las demás normas concordantes.

5. ANEXOS

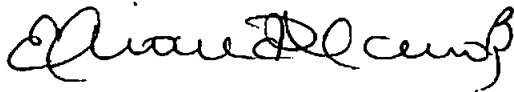
Para los efectos correspondientes anexo al presente escrito los siguientes documentos:

- 1. Poder para actuar en el presente.
- 2. Documento que acredita al representante legal de **PROCAPS S.A.**
- 3. Recibo de caja del respectivo pago de tasa.
- 4. Copias de los documentos:
 - DI: WO0027401 publicada el 18 de mayo de 2000.

6. NOTIFICACIONES

Para efectos de notificaciones que por disposición del artículo 50 del Decrero 01 de 1984 debe hacer su Despacho, informo que mi representada y la suscrita recibiremos notificaciones en la Secretaria de su Despacho o en mis oficinas situadas en la Carrera 13 N° 119-95, Of. 104 de esta ciudad de Bogotá.

Señor Superintendente,



ELIANA ISAURA MORENO BOHORQUEZ

C.C. 51'975.664 de Bogotá

T.P.A. 83823 del C.S. de la J.



PODER ESPECIAL

Yo, **WALTER TANAKA TATEKAWA**, mayor de edad y vecino de la ciudad de Barranquilla (Colombia), identificado como aparece al pie de mi firma, quien en el presente documento actúa en calidad de Representante Legal de la sociedad **PROCAPS S.A.** sociedad legalmente constituida y domiciliada en la ciudad de Barranquilla (Colombia), por el presente documento otorgo a la doctora **ELIANA ISAURA MORENO BOHORQUEZ**, abogada en ejercicio, identificada como aparece al pie de su firma, con tarjeta profesional No. 83823 del C.S. de la J., poder especial amplio y suficiente, para formular oposiciones u observaciones a la solicitud de patente No. 08 035.079, titulada "**COMPOSICIONES FARMACÉUTICAS QUE COMPRENDEN SUSTANCIAS ANTIDIABÉTICAS COMBINADAS PARA SU USO EN DIABETES MELLITUS**", cuyo titular es **WORLD-TRADE IMPORT-EXPORT WTIE, AG**, publicada en la gaceta No. 595 del 29 de Agosto de 2008.

Nuestro apoderado queda facultado, de manera expresa, para realizar todo tipo de actos necesarios para llevar a cabo el trámite de la oposición, incluyendo, sin limitación, preparar y presentar solicitudes, hacer declaraciones, pagar tasas, contribuciones e impuestos, recabar los títulos o certificados. Asimismo quedan autorizados para impugnar administrativa y judicialmente todo lo que fuere resuelto en el expediente a que se hace expresa referencia en el presente poder, con todas las facultades generales y específicas que fuera requerido para ella.

De la misma manera, además de las facultades que le confiere la naturaleza del presente mandato, se encuentran facultados para recibir, desistir, transigir, sustituir, y reasumir el presente poder, incoar acciones, interponer recursos y demás facultades conferidas por la ley.

Dado y Firmado en Barranquilla (Colombia) a los 24 días del mes de Octubre de 2008.

PROCAPS S.A.

C.C. N° 16'251.923

NIT: 890.106.527-5

Representante Legal

Acepto:

Eliana Isaura Moreno Bohorquez

ELIANA ISAURA MORENO BOHORQUEZ

C.C. 51'975.664 de Bogotá

T.P.A. 83823 del C.S. de la J.

LA PRESENTE
SE PRACTICA A PETICION
DE PARTE INTERESADA

DILIGENCIA DE RECONOCIMIENTO ANTE EL
SUSCRITO NOTARIO SEXTO DE BARRANQUILLA
COMPARECIO Walter Tadeo Patekawa
IDENTIFICADO CON ccf 16251923 Peluero (malla)
y declaró que es cierto el contenido del documento
anterior y suya la firma
Barranquilla **24 OCT. 2008**

[Handwritten signature]



LA HUELLA DE ESTA
DILIGENCIA CORRESPONDE
NOTARIO SEXTO

**DILIGENCIA DE PRESENTACION PERSONAL
Y RECONOCIMIENTO**
NOTARIA 2ª DE CHIA CUNDINAMARCA
LA SUSCRITA NOTARIA
CERTIFICA

NOTARIA 6A DE BARRANQUILLA
JORGE DEL GORDO FDEZ DE CASTRO
NOTARIO ENCARGADO

Que el escrito dirigido Sra. Intendesa de
Ind. y Comercio
fue presentado personalmente por: Eliaza Izaver
Maestro Boharquez T.P. 83823 C.S.S
Identificado(s) con: C.C. 51935664 de Chia
quien(es) declaro(arón) que su contenido es cierto y que la(s)
firma(s) puesta(s) en el es (son) suya(s)
Firma [Handwritten signature]

Chia Cundinamarca **24 NOV 2008**

La Notaria



1

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 08-035079 - 00003-0000

Fecha: 2008-11-25 14:38:26 Dep: 2020 NULCREACION
Tra: 11 PATENT/II Evt: 378 FASENACIONAL
Act: 400 OPOS/OBSERVIER Folios: 64

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 08 - 91,933
FECHA : NOVIEMBRE 25 DE 2008

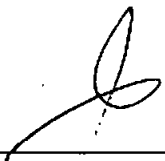
***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
LAB. PROCAPS	CONSIGNACION	BANCO DE BOGOTA	062754387	4928873	09/10/2008	1,862,000.00
GYROPHARM S.A.	CONSIGNACION	BANCO DE BOGOTA	062754387	14672361	18/11/2008	1,330,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-04	PRESENTACION DE OBSERVACIONES	
		12 MARCAS Y LEMAS COMERCIALES	266,000.00
		TOTAL :	266,000.00

SON: DOSCIENTOS SESENTA Y SEIS MIL PESOS

RESPONSABLE : 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____



***** Pag. 1
 CAMARA DE COMERCIO
 DE BARRANQUILLA
 11*****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----

NIT: 890.106.527-5.

EL SUSCRITO SECRETARIO DE LA CAMARA DE COMERCIO DE BARRANQUILLA, CON FUNDAMENTO EN LAS INSCRIPCIONES DEL REGISTRO MERCANTIL:

C E R T I F I C A

Que por Escritura Pública No. 1,190 del 22 de Julio de 1976, otorgada en la Notaria Tercera de Barranquilla, inscrito(as) en esta Cámara de Comercio, el 28 de Julio de 1976 bajo el No. 6,070 del libro respectivo, fue constituida la sociedad----- limitada denominada "PRODUCTORA DE CAPSULAS DE GELATINAS LIMITADA "PROCAPS LIMITADA".-----

C E R T I F I C A

Que por Escritura Pública No. 1,307 del 28 de Junio de 1979, otorgada en la Notaria Tercera de Barranquilla, inscrito(as) en esta Cámara de Comercio, el 23 de Julio de 1979 bajo el No. 10,039 del libro respectivo, la sociedad antes mencionada----- se transformo en sociedad anonima bajo la denominacion social de "PRODUCTORA DE CAPSULAS DE GELATINA S.A." PROCAPS S.A."-----

C E R T I F I C A

Que por Escritura Pública No. 3,810 del 31 de Dic/bre de 1980, otorgada en la Notaria Primera de Barranquilla, inscrito(as) en esta Cámara de Comercio, el 30 de Enero de 1981 bajo el No. 12,705 del libro respectivo, la sociedad antes mencionada----- se transformo en sociedad de responsabilidad limitada bajo al razon social de "PRODUCTORA DE CAPSULAS DE GELATINA LIMITADA "PROCAPS LI - MITADA".-----

C E R T I F I C A

Que por Escritura Pública No. 3,755 del 10 de Nov/bre de 1983, otorgada en la Notaria Unica de Soledad, inscrito(as) en esta Cámara de Comercio, el 22 de Nov/bre de 1983 bajo el No. 17,922 del libro respectivo, la sociedad antes mencionada----- se transformo en sociedad anonima bajo la denominacion social de "PRODUCTORA DE CAPSULAS DE GELATINA S.A." PROCAPS S.A."-----

C E R T I F I C A

Que por Escritura Pública No. 3,615 del 06 de Dic/bre de 1996, otorgada en la Notaria 2a. de Barranquilla, inscrito(as) en esta Cámara de Comercio, el 20 de Dic/bre de 1996 bajo el No. 67,218 del

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----
NIT: 890.106.527-5.

libro respectivo, la sociedad antes mencionada-----
cambio de razon social, por la denominacion LABORATORIOS PROCAPS S.A

C E R T I F I C A

Que por Escritura Pública No. 3,775 del 18 de Dic/bre de 1996, otorgada en la Notaria 2a. de Barranquilla, inscrito(as) en esta Cámara de Comercio, el 23 de Enero de 1997 bajo el No. 67,704 del libro respectivo, la sociedad antes mencionada-----
cambio de razon social, por la denominacion PROCAPS S.A.-----

C E R T I F I C A

Que dicha sociedad ha sido reformada por las siguientes escrituras y/o documentos privados:

Numero	aaaa/mm/dd	Notaria	No. Insc o Reg	aaaa/mm/dd
39	1979/01/18	Notaria 3a. de Barranquilla.	9,452	1979/01/24
992	1981/04/30	Notaria 1a. de Barranquilla.	13,112	1981/05/06
1,464	1982/08/27	Notaria Unica de Soledad	15,533	1982/09/08
2,744	1983/08/18	Notaria Unica de Soledad	17,416	1983/08/26
3,826	1984/07/16	Notaria Unica de Soledad	19,554	1984/07/27
3,835	1985/08/26	Notaria Unica de Soledad	22,230	1985/09/04
2,260	1986/09/10	Notaria Unica de Soledad.	24,995	1986/09/15
1,849	1989/07/11	Notaria 2a. de Barranquilla.	33,909	1989/07/13
444	1990/02/21	Notaria 2a. de Barranquilla.	36,101	1990/03/16
3,090	1991/12/17	Notaria 2a. de Barranquilla	43,993	1992/01/28
269	1993/02/01	Notaria 2a. de Barranquilla	48,428	1993/02/16
2,342	1993/07/28	Notaria 2a. de Barranquilla	50,582	1993/08/10
3,652	1993/11/09	Notaria 2a. de Barranquilla	51,798	1993/11/22
3,615	1996/12/06	Notaria 2a. de Barranquilla	67,218	1996/12/20
89	1997/01/16	Notaria 2a. de Barranquilla	67,704	1997/01/23
2,070	1997/07/17	Notaria 2a. de Barranquilla	70,627	1997/07/31
2,281	1997/08/04	Notaria 2a. de Barranquilla	70,813	1997/08/14
765	1999/04/22	Notaria 3a. de Barranquilla	80,628	1999/04/23
459	2001/02/21	Notaria 2a. de Barranquilla	91,502	2001/02/23
2,608	2001/10/05	Notaria 2a. de Barranquilla	95,771	2001/11/08
1,730	2004/07/29	Notaria 2. de Barranquilla	112,999	2004/08/26
416	2005/03/03	Notaria 2. de Barranquilla	116,364	2005/03/10
1,613	2005/07/28	Notaria 2. de Barranquilla	119,322	2005/08/18

C E R T I F I C A

Que de acuerdo con la(s) escritura(s) arriba citada(s), la sociedad se rige por las siguientes disposiciones:

DENOMINACION O RAZON SOCIAL:

PROCAPS S.A.-----

SIGLA: PROCAPS.

DOMICILIO PRINCIPAL: Barranquilla.

NIT No: 890.106.527-5.

MATRICULA MERCANTIL: 24,802.

C E R T I F I C A

***** C O N T I N U A *****



***** Pag. 2
CAMARA DE COMERCIO
DE BARRANQUILLA
11*****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----

NIT: 890.106.527-5.

Direccion para notificaciones judiciales:

CL 80 No 78 B - 201.

De la ciudad de Barranquilla.

C E R T I F I C A

DURACION: El término de duración de la sociedad se fijó hasta el 18 de Agosto de 2073.

C E R T I F I C A

OBJETO SOCIAL: El objeto principal de la sociedad sera: a)-La fabricacion de capsulas y otros productos similares a partir de materiales tales como gelatinas u otros de distinta naturaleza, que puedan ser utilizados como envases o recipientes de productos y sustancias quimicas, farmaceuticas y cosméticas, para uso y consumo humano y veterinario; b)-La investigación, desarrollo y fabricacion de toda clase de productos y sustancias quimicas, farmaceuticas y cosméticas para uso y consumo humano, animal y vegetal; c)-La compra y venta de materias primas, insumos y productos intermedios necesarios para los procesos de fabricacion de sustancias quimicas, farmaceuticas, alimenticias y cosméticas, así como la comercializacion interna y externa de los productos terminados, d) La compra, venta, importacion, exportacion y distribucion de toda clase de elementos instrumentales y equipos medicos, quirurgicos, odontologicos, y hospitalarios para la salud humana y animal. e)La compra, venta, exportacion y distribucion de dulces, confites, galletas y todo tipo de golosinas o alimentos para el consumo humano. f) Actuar como representante o agente de personas naturales y juridicas, nacionales y extranjeras en la realizacion de operaciones o transacciones relacionadas con la industria farmaceutica y en especial con cualquiera de las actividades descritas en los literales a), b), c), d) y e) antes descritos; g) Prestar los servicios de asesoria y consultoria en las areas administrativas, de mercadeo, analisis clinico, asistencia tecnica, investigacion, costos y produccion, exportaciones, importaciones, ventas, relacionadas con iguales o similares actividades a las que constituyen el objeto de PROCAPS S.A., así como los de publicidad y promocion de productos quimicos, cosméticos y farmaceuticos para uso humano, animal o industrial; h)-Adquirir, operar, administrar y explotar, a cualquier titulo, empresa o establecimientos dedicados a la investigacion, desarrollo, fabricacion o comercializacion de productos quimicos, farmaceuticos, hospitalarios o cosméticos. En desarrollo de su objeto principal, la sociedad podra tomar interes social como accionista,

***** C O N T I N U A *****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----
NIT: 890.106.527-5.

socio o fundador de empresas que tengan igual o similar objeto, comprar, vender, importar y exportar maquinarias, insumos y repuestos requeridos para el desarrollo de sus actividades; tomar dinero en prestamo, financiar y garantizar las operaciones comerciales que celebre con terceros relativas a su objeto; celebrar y ejecutar todo tipo de actos y contratos necesarios para desarrollar sus operaciones; girar, aceptar, otorgar y protestar todo tipo de titulos valores e instrumentos negociables; comprar, vender y constituir gravámenes sobre bienes muebles e inmuebles; designar representantes o apoderados en el pais y en el exterior y, en general, realizar cualquier acto o negocio que sea necesario o conveniente para el desarrollo de su objeto social y para la mejor proteccion de sus intereses corporativos o la de sus socios. La sociedad podra garantizar el cumplimiento de obligaciones adquiridas por terceros o por sus socios, para lo cual podra inclusive constituir gravámenes reales sobre sus bienes de cualquier naturaleza.-----

C E R T I F I C A

CAPITAL	Nro Acciones	Valor Acción
Autorizado		
\$*****2,000,000,000	*****2,000,000	*****1,000
Suscrito		
\$*****1,229,071,000	*****1,229,071	*****1,000
Pagado		
\$*****1,229,071,000	*****1,229,071	*****1,000

C E R T I F I C A

ADMINISTRACION: La direccion y administracion de la sociedad correspondera a la Asamblea General de Accionistas, a la Junta Directiva, al Presidente, al Vicepresidente y a un Gerente General. Corresponde a la Junta Directiva las siguientes funciones y atribuciones entre otras: Autorizar cualquier acto o contrato cuya cuantia sea superior al equivalente en pesos Colombianos a doscientos cincuenta mil dolares de los Estados Unidos de America (US\$250.000), liquidados a la tasa de cambio representativa del mercado vigente el dia en que se surta la transacion. Cuando se trate de operaciones en virtud de las cuales la sociedad garantice obligaciones de terceros o de los socios, se requerira que la operacion sea aprobada con el voto de por lo menos 2/3 partes de los integrantes de la Junta Directiva. La sociedad tendra un Presidente, quien ejercera la representacion legal de la sociedad y tendra las siguientes atribuciones entre otras: Ejecutar las decisiones de la Asamblea General de Accionistas y de la Junta Directiva. Ejercer la Representacion Legal de la sociedad en todos los actos y contratos que se requieran para el desarrollo del objeto social, de conformidad con lo previsto en las leyes y en los presentes estatutos. Constituir apoderados judiciales y extrajudiciales, recibir notificaciones, absolver interrogatorios de parte, confesar obligaciones de la sociedad, transigir, disistir y allanar a la sociedad en cualquier asunto judicial. Aprobar y celebrar en nombre de la sociedad todo acto o contrato cuya cuantia sea igual o inferior al equivalente

***** C O N T I N U A *****



***** Pag. 3
 CAMARA DE COMERCIO
 DE BARRANQUILLA
 11*****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----

NIT: 890.106.527-5.

en pesos colombianos a doscientos cincuenta mil dolares de los Estados Unidos de America (US\$250.000), liquidados a la tasa de cambio representativa del mercado vigente el dia en que se surta la transacion o celebracion del acto. Las demas funciones que le correspondan como Representante Legal por disposicion de la ley, de estos estatutos o de la Junta Directiva. El Presidente tendra un suplente, designado por la Junta Directiva, quien reemplazara al Presidente en sus faltas temporales, absolutas o meramente accidentales, con entidades facultades y sin que sea necesario para ello acreditar la ausencia del principal. La sociedad tendra un Vicepresidente designado por la Junta Directiva, quien tambien ejercera la representacion legal de la sociedad, pudiendo ejercerla conjunta o separadamente con el Presidente. El vicepresidente tendra las siguientes facultades entre otras: Ejecutar dentro de su competencia las decisiones de la Asamblea General de Accionistas, de la Junta Directiva y del Presidente. Ejercer la representacion legal de la sociedad en todos los actos y contratos que se requieran para el desarrollo del objeto social, de conformidad con lo previsto en las leyes y en los presentes estatutos. Constituir apoderados judiciales y extrajudiciales, recibir notificaciones, absolver interrogatorios de parte, confesar obligaciones de la sociedad, transigir, desistir y allanar a la sociedad en cualquier asunto judicial. Aprobar y celebrar en nombre de la sociedad todo acto o contrato cuya cuantia sea igual o inferior al equivalente en pesos colombianos a ciento cincuenta mil dolares de los Estados Unidos de America (US\$150.000), liquidados a la tasa de cambio representativa del mercado vigente el dia en que se surta la aprobacion o celebracion del acto, siempre que no se trate de enajenar bienes inmuebles o cualquier otro activo fijo de la sociedad, inclusive de naturaleza muebles, acciones, cuotas o partes de interes inversiones y todo tipo de derechos de la sociedad, o de constituir gravámenes sobre cualquiera de los anteriores, facultades que radican exclusiva y privativamente en cabeza del Presidente. Las demas funciones que le corresponda como Representante legal por disposicion de la ley, de estos estatutos o de la Junta Directiva. El Vicepresidente tendra (1) suplente, designado por la Junta Directiva, quien lo reemplazara conjunta o separadamente en sus faltas temporales, absolutas o meramente accidentales, con identicas facultades y sin que sea necesario para ello acreditar la ausencia del principal. La sociedad tendra (1) Gerente General, con su respectivo Suplente, designados por la Junta Directiva. El Suplente reemplazara al Gerente General, en sus faltas temporales, absolutas o meramente accidentales, quien junto con el gerente general, llevaran la representacion legal de la sociedad, con identicas facultades, pudiendolas ejercer conjunta o separadamente con el Presidente y Vicepresidente, con identicas facultades

***** CONTINUA *****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----
NIT: 890.106.527-5.

que el Gerente General y sin que sea necesario para ello acreditar la ausencia del titular. El Gerente General tendra las siguientes facultades entre otras: Ejercer la representacion legal de la sociedad, en todos los actos y contratos que se requieran para el desarrollo del objeto social, de conformidad con lo previsto en las leyes y en los presentes estatutos. Aprobar y celebrar en nombre de la sociedad todo acto o contrato cuya cuantia sea igual o inferior al equivalente en pesos Colombianos a Cincuenta Mil dolares de los Estados Unidos de America (US\$50.000), liquidados a la tasa de cambio representativa del mercado vigente el dia en que se surta la aprobacion o celebracion del acto, siempre que no se trate de enajenar a cualquier titulo bienes inmuebles o cualquier otro activo fijo de la sociedad, inclusive de naturaleza mueble, acciones, cuotas o partes de interes, inversiones y todo tipo de derechos de la sociedad o de constituir gravámenes sobre cualquiera de las anteriores facultades que radican exclusiva y privativamente en cabeza del Presidente.

C E R T I F I C A

Que según Acta No. 116 del 27 de Junio de 1997 correspondiente a la Asamblea de Accionistas en Barranquilla, de la sociedad:

PROCAPS S.A.-----
cuya parte pertinente se inscribió en esta Cámara de Comercio, el 15 de Agosto de 1997 bajo el No. 70,838 del libro respectivo, y según Acta No. 127 del 22 de Marzo de 2000 correspondiente a la Asamblea de Accionistas en Barranquilla, de la sociedad:

PROCAPS S.A.-----
cuya parte pertinente se inscribió en esta Cámara de Comercio, el 29 de Mayo de 2000 bajo el No. 87,250 del libro respectivo, fueron hechos los siguientes nombramientos:

CLASE: JUNTA DIRECTIVA

Principales

1. Minski Gontovnik Ruben	CC.*****7,463,982
2. Minski Gontovnik Meyer	CC.*****7,461,324
3. Minski Gontovnik Jose	CC.*****8,671,834

Suplentes

1. Minski Zilberblum Elliot	CC.*****72,219,541
2. Minski Deitel Daniel	*****
3. Minski Sharon	PA.*990,212,082,805

C E R T I F I C A

Que según Acta No. 116 del 27 de Junio de 1997 correspondiente a la Asamblea de Accionistas en Barranquilla, de la sociedad: PROCAPS S.A. cuya parte pertinente se inscribió en esta Cámara de Comercio, el 15 de Agosto de 1997 bajo el No. 70,838 del libro respectivo, fueron hechos los siguientes nombramientos:

Cargo/Nombre	Identificación
Presidente.	

***** C O N T I N U A *****



***** Pag. 4
C A M A R A D E C O M E R C I O
D E B A R R A N Q U I L L A
11*****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----

NIT: 890.106.527-5.

Minski Gontovnik Ruben	CC.*****7,463,982
Suplente del Presidente	
Minski Minski Abraham	CC.*****802,575
Vicepresidente	
Minski Gontovnik Meyer	CC.*****7,461,324
Suplente del vicepresidente	
Minski Gontovnik Jose	CC.*****8,671,834

C E R T I F I C A

Que según Acta No. 11 del 01 de Febrero de 2001 correspondiente a la Junta Directiva en Barranquilla, de la sociedad: PROCAPS S.A. cuya parte pertinente se inscribió en esta Cámara de Comercio, el 12 de Febrero de 2001 bajo el No. 91,273 del libro respectivo, fueron hechos los siguientes nombramientos:

Cargo/Nombre	Identificación
Gerente General.	
Uribe Ochoa Guillermo Luis	CC.*****70,073,754

C E R T I F I C A

Que según Acta No. 406 del 02 de Sep/bre de 2004 correspondiente a la Junta Directiva en Barranquilla, de la sociedad: PROCAPS S.A. cuya parte pertinente se inscribió en esta Cámara de Comercio, el 09 de Sep/bre de 2004 bajo el No. 113,263 del libro respectivo, fueron hechos los siguientes nombramientos:

Cargo/Nombre	Identificación
Suplente del Gerente.	
Tanaka Tatekawa Walter	CC.*****16,251,923

C E R T I F I C A

Que según Acta No. 124 del 29 de Marzo de 1999 correspondiente a la Asamblea de Accionistas en Barranquilla, de la sociedad: PROCAPS S.A. cuya parte pertinente se inscribió en esta Cámara de Comercio, el 04 de Agosto de 1999 bajo el No. 82,226 del libro respectivo, fueron hechos los siguientes nombramientos:

Cargo/Nombre	Identificación
Revisor Fiscal Ppal.	
Vargas Pertuz Ana Isabel	CC.*****32,696,645

C E R T I F I C A

Que según Acta No. 127 del 22 de Marzo de 2000 correspondiente a la Asamblea de Accionistas en Barranquilla, de la sociedad: PROCAPS

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----
NIT: 890.106.527-5.

S.A. cuya parte pertinente se inscribió en esta Cámara de Comercio, el 29 de Mayo de 2000 bajo el No. 87,250 del libro respectivo, fueron hechos los siguientes nombramientos:

Cargo/Nombre	Identificación
Suplente del Revisor Fiscal. Lozada Villareal Milena	CC.*****32,748,111

C E R T I F I C A

Que por Escritura Pública No. 2,784 del 07 de Dic/bre de 2007, otorgada en la Notaria 2 a. de Barranquilla cuya parte pertinente se inscribió en esta Cámara de Comercio, el 20 de Dic/bre de 2007 bajo el No. 3,492 del libro respectivo,-----
y las inscripciones 3.492-1, 3.493, 3.494, 3.495, 3.496, 3.497, ----
3.498, 3.499, 3.500, 3.501, 3.502, 3.503, 3.504, 3.505, 3.506, ----
3.507, Consta que RUBEN MINSKI GONTOVNIK, C.C. No. 7.463.982, -----
obrando como Presidente y Representante Legal de la sociedad C.I. NATURMEGA S.A., que obrando en su condicion de Presidente y -----
Representante Legaql de la sociedad PROCAPS S.A., el presidente ----
debidamente facultado por los Estatutos Sociales y por el Maximo Organó Social, otorga los siguientes poderes: Otorgar poder -----
general, amplio y suficiente a los doctores JOSEFINA DEL CARMEN ----
MIELES BUELVAS CC.No.33.138.497; a MARCELA CARVAJALINO PAGANO -----
CC.No.22.579.748; CRISTINA VIOLI FRANCESCHINI CC.No.22.463.716, con las facultades que se transcriben a continuacion: a.- Para que ----
representen a la sociedad PROCAPS S.A, ante todo tipo de -----
autoridades administrativas y jurisdiccionales, en asuntos de ----
naturaleza civil, laboral, comercial, penal, aduanera, cambiaria, tributaria, policiva, administrativa y fiscal. b.- Contestar y ----
presentar demandas, requerimientos, recursos, pedir y aportar ----
pruebas, recibir, notificarse, ejercer la accion de tutela, -----
tramitar incidente de desacato, comparecer en los procesos que ----
cursen contra la sociedad, allanarse en nombre de la sociedad en los asuntos que sean necesarios, transigir, desistir, sustituir, renunciar y reasumir el poder. c.- La facultad expresa de -----
conciliar, por tanto pueden llegar a acuerdos conciliatorios, ----
transaccionales, judiciales o extrajudiciales o extrajudiciales, cualquiera que sea su cuantia, para lo cual las apoderadas deben aportar la autorizacion simple y escrita del Representante legal de la sociedad. d.- Podran presentar solicitudes de devolucion y/o compensacion de impuestos, ventas y rentas, recibir los pagos por las devoluciones y adelantar todo tramite o proceso administrativo ante la DIAN, de tal forma que en ningun momento quede sin -----
representacion legal de la sociedad. PODERES ESPECIALES: a.- Se ----
confiere poder especial amplio y suficiente a las personas que se determinan seguidamente, que conforman el grupo A y B, para, para que conjuntamente suscriban contratos de suministros de mercancías y servicios con entidades oficiales, hasta la suma de OCHOCIENTOS MIL DOLARES DE LOS ESTADOS UNIDOS DE AMERICA (US800.000.00), -----
liquidados a la tasa representativa del mercado vigente en el dia que se realice la respectiva transaccion. Grupo A. WALTER NANAKA TATEKAWA CC.No.16.251.923, CLAUDIA TANGARIFE CASTILLO -----
CC.No.41.660.293, CARMEN ALICIA FLOREZ CC.No.22.434.044, IVAN -----

***** C O N T I N U A *****



***** Pag. 5
C A M A R A D E C O M E R C I O
D E B A R R A N Q U I L L A
11*****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----
NIT: 890.106.527-5.

VILLAREAL CAMACHO CC.No.91.201.749, CARMEN ALICIA HERRERA -----
DIAZGRANADOS CC.No.22.377.540, DAVID ANTONIO CHARRIS GIRALDO -----
CC.No.19.341.274, RICARDO DORADO HURTADO CC.No.79.715.772, JAIME
FORERO LLINAS CC.No.19.300.593. b.- Se confiere poder especial ----
amplio y suficiente al señor WILLIAM ALBERTO BARROS CERRA -----
CC.No.8.715.941, para que en nombre y representacion de PROCAPS ----
S.A., suscriban declaraciones cambiarias, aduaneras y tributarias a
que este obligada la sociedad, en el giro normal de sus negocios y
operaciones sociales, por tanto quedan facultados para firmarlas,
como tambien los demas documentos relacionados con ellas, -----
notificarse, aportar y solicitar las pruebas que sean necesarias.
c.-Otorgar poder especial amplio y suficiente al señor MARLON ----
TATIS PAREDES CC.No.72.176.874 y al señor WILLIAM ALBERTO BARROS
CERRA CC.No.8.715.941, para que en nombre y representacion de ----
PROCANPS S.A., suscriban las declaraciones, reportes y cualquier
documento relacionado con los tramites o registros de Comercio ----
Exterior y o cualquier entidad del Estado que haga sus veces: d)
Otorgar poder especial amplio y suficiente a la doctora CARMEN ----
ALICIA HERRERA DIAZGRANADOS, CC.No.22.377.540 y al doctor WALTER
TANAKA TATEKAWA, CC.No.16.251.923, para que en nombre y -----
representacion de PROCAPS S.A.; endosen los titulos valores de la
sociedad hasta por la suma de UN MIL MILLONES DE PESOS -----
(1.000.000.000.00) M.L. CUARTO: EI representante legal de la ----
sociedad PROCAPS S.A.; doctor RUBEN MINSKI GONTOVNIK, manifiesta
que la presente reforma fue aprobada por la Asamblea General -----
Extraordinaria de Accionista de PROCAPS S.A., con observancia de
las disposiciones legales y estatutarias.-----

C E R T I F I C A

Que por Escritura Pública No. 1,933 del 16 de Sep/bre de 2008,
otorgada en la Notaria 2 a. de Barranquilla cuya parte pertinente
se inscribió en esta Cámara de Comercio, el 06 de Octubre de 2008
bajo el No. 3,748 del libro respectivo,-----
Consta que el señor RUBEN MINSKI GONTOVNIK, C.C. No. 7.463.982, que
comparece en su condicion de Presidente y Representante Legal de la
Sociedad PROCAPS S.A., confiere por medio de este instrumento ----
publico Poder especial Amplio y Suficiente a la doctora MILENA ----
ESCAFFI PARDO, C.C. No. 32.758.420, para que en nombre y -----
representacion de PROCAPS S.A., suscriba declaraciones cambiarias,
aduaneras y tributarias a que este obligada la sociedad en el giro
normal de sus negocios y operaciones sociales, por tanto queda ----
facultada para firmar, como tambien los demas documentos -----
relacionados con ellas, notificarse, aportar y solicitar las ----
pruebas que sean necesarias.-----

***** C O N T I N U A *****

CERTIFICADO DE EXISTENCIA Y REPRESENTACION LEGAL O DE INSCRIPCION DE DOCUMENTOS.

PROCAPS S.A.-----
NIT: 890.106.527-5.

C E R T I F I C A

Que en esta Cámara de Comercio no aparecen inscripciones posteriores de documentos referentes a reforma, disolución, liquidación o nombramientos de representantes legales de la expresada sociedad.

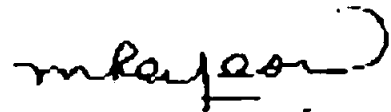
C E R T I F I C A

Que su última Renovación fue el: 19 de Marzo de 2008.

La información sobre embargos de establecimiento se suministra en Certificados de Matrícula, la de contratos sujetos a registro, en Certificados Especiales.

C E R T I F I C A

Que los actos de registro aquí certificados quedan en firme cinco días hábiles despues de la correspondiente inscripción, siempre que, dentro de dicho término, no sean objeto de los recursos de reposición ante esta entidad, y/o de apelación para ante la Superintendencia de Industria y Comercio.

A handwritten signature in black ink, appearing to read 'm. Rojas', is located in the lower right quadrant of the document.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

-1-

COMBINATIONS FOR DIABETES WHICH CONTAIN A SULFONYLUREA, A GLITAZONE AND A BIGUANIDE

5

FIELD OF THE INVENTION

This invention relates to combinations of antidiabetic compounds, and to a method for treating diabetes employing such combinations.

BACKGROUND OF THE INVENTION

10 Diabetes mellitus is a metabolic disorder characterized by hyperglycemia, insulin resistance, and is often associated with other disorders such as obesity, hypertension, hyperlipidemia, as well as complications such as cardiovascular disease, retinopathy, neuropathy, and nephropathy. The disease is progressive in nature, and can often be controlled initially by diet alone, but generally requires
15 treatment with drugs such as sulfonylureas and injections of exogenous insulin. A new class of compounds known as the glitazones has recently received a great deal of attention for their ability to treat diabetes. These compounds operate by increasing the sensitivity of insulin receptors throughout the body, thereby diminishing or eliminating the need for exogenous insulin. Another agent known
20 as a biguanide also is used to decrease hepatic glucose production as well as intestinal absorption of glucose.

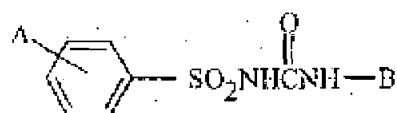
It has now been discovered that combination therapy with a biguanide and a glitazone results in dramatic improvement in glycemic control, and that even better control can be achieved by using a combination comprised of a biguanide, a
25 glitazone, and a sulfonylurea. Accordingly, such combinations are especially useful in treating diabetes and associated complications.

-2-

SUMMARY OF THE INVENTION

This invention provides a method of treating diabetes by administering to a subject in need of treatment a combination of a sulfonylurea antidiabetic agent and an antidiabetic glitazone, together with a biguanide antidiabetic agent such as metformin, or simply a glitazone together with a biguanide. The clinical data presented herein establishes the unexpected biological benefits achievable with these combinations.

The sulfonylureas are a class of compounds that have been widely employed to treat diabetes. Such compounds are well known, for example as described in United States Patent No. 3,454,635, 3,669,966, 2,968,158, 3,501,495, 3,708,486, 3,668,215, 3,654,357, and 3,097,242. Most of the sulfonylurea antidiabetics are defined by the formula

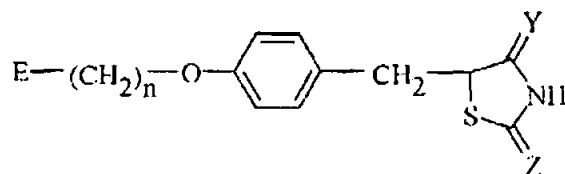


where A is hydrogen, halo, or an organic radical such as alkyl, alkanoyl, aryl, aralkyl, heteroaryl, and cycloalkyl, and B is alkyl, cycloalkyl, and a heterocyclic group such as hexahydroazepine. Preferred sulfonylureas to be employed are those wherein A is chloro, alkyl such as methyl, or alkyl substituted with aryl carbonyl or aryl carboxamido, for instance 3-chloro-5-methoxybenzoyl ethyl or 5-methyl-2-pyrazinylcarbonylaminoethyl.

Especially preferred sulfonylureas to be employed in the combinations of this invention are glyburide, gliquidone, glipizide, tolbutamide, tolazamide, glisoxepid, chlorpropamide, glibornuride, gliclazide, glimepiride, phenbutamide, and tolcyclamide.

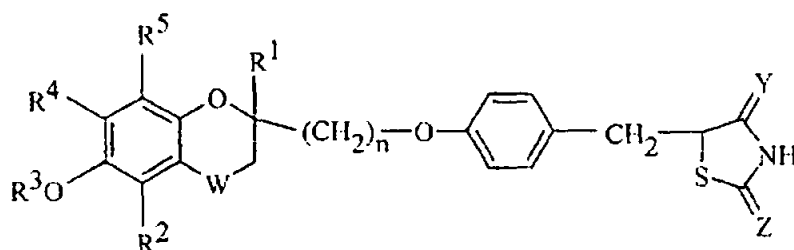
According to this invention, the foregoing sulfonylureas are used in combination with a glitazone to treat diabetes and to improve glycemic control. The glitazones are a family of antidiabetic agents characterized as being thiazolidinediones or related analogs. They are described in *Current Pharmaceutical Design*, 1996;2:85-101. Typical glitazones have the formula

-3-



where n is 1, 2, or 3, Y and Z independently are O or NH; and E is a cyclic or bicyclic aromatic or non-aromatic ring, optionally containing a heteroatom selected from oxygen or nitrogen.

5 Preferred glitazones have the formula



wherein:

R¹ and R² independently are hydrogen or C₁-C₅ alkyl;

10 R³ is hydrogen, a C₁-C₆ aliphatic acyl group, an alicyclic acyl group, an aromatic acyl group, a heterocyclic acyl group, an araliphatic acyl group, a (C₁-C₆ alkoxy) carbonyl group, or an aralkyloxycarbonyl group;

R⁴ and R⁵ independently are hydrogen, C₁-C₅ alkyl, C₁-C₅ alkoxy, or R⁴ and R⁵ together are C₁-C₄ alkylenedioxy;

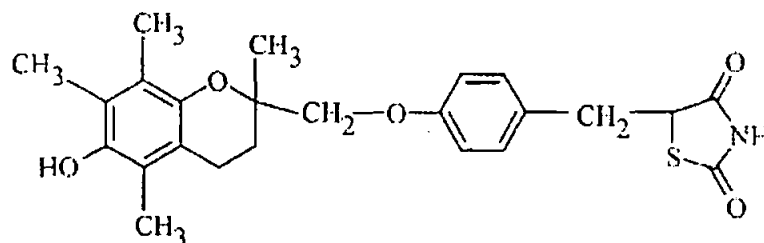
W is -CH₂-, >CO-, or CHOR⁶, where R⁶ is any one of the atoms or groups

15 defined for R³ and may be the same as or different from R³;

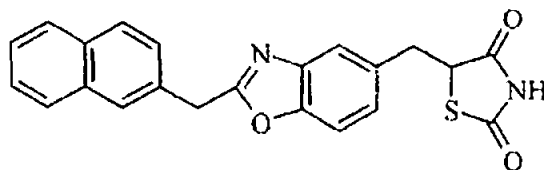
n, Y, and Z are as defined above, and pharmaceutically acceptable salts thereof.

An especially preferred glitazone is troglitazone having the formula

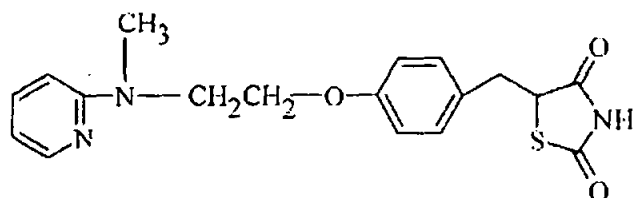
-4-



Other glitazones that can be employed in this invention are described in United States Patent No. 5,457,109, which is incorporated herein by reference. Other specific glitazones which are preferred include ciglitazone, pioglitazone, englitazone, TA 174, which has the formula



and BRL 49653, which has the formula



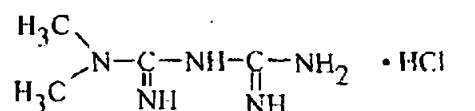
Additionally preferred glitazones include:

- 10 5-(4-[2-[1-(4-2'-Pyridylphenyl)ethylideneaminoxy]ethoxy]benzyl)-thiazolidine-2,4-dione;
- 5-(4-[5-Methoxy-3-methylimidazo[5,4-b]pyridin-2-yl-methoxy]benzyl)-thiazolidine-2,4-dione, or its hydrochloride;
- 5-[4-(6-Methoxy-1-methylbenzimidazol-2-yl-methoxy)benzyl]-
- 15 thiazolidine-2,4-dione;
- 5-[4-(1-Methylbenzimidazol-2-ylmethoxy)benzyl]thiazolidine-2,4-dione;
- and

-5-

5-[4-(5-Hydroxy-1,4,6,7-tetramethylbenzimidazol-2-ylmethoxy)benzyl]-thiazolidine-2,4-dione.

A typical biguanide is metformin. It typically is used clinically as a pharmaceutically acceptable salt, preferably the hydrochloride salt. A commercial form of metformin hydrochloride is available, and its chemical name is N,N-dimethylimidodicarbonimidic diamide hydrochloride. Metformin hydrochloride has the structural formula



As used herein, "metformin" means the base compound as well as its pharmaceutically acceptable salts. Metformin is used clinically to manage NIDDM, particularly in patients who are not effectively treated with a sulfonylurea. While it is not chemically related to the sulfonylureas, it routinely is utilized in combination with a sulfonylurea, and has been shown to be synergistic in some cases. Other biguanides can also be used.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 - Dose response of CS-045 (troglitazone), pioglitazone, and BRL-49653 (rosiglitazone) in causing reduction in red blood cell counts in female rats.

Figure 2 - Dose response of troglitazone, pioglitazone, and rosiglitazone in increases in brown adipose tissue in rats.

Figure 3 - Dose response of troglitazone, pioglitazone, and rosiglitazone in increasing heart weight (mass) in rats.

Figure 4 - Dose response (ED₂₅) of troglitazone, pioglitazone, and rosiglitazone in causing a decrease in plasma glucose in KK mice.

Figure 5 - Dose response(ED₂₅) of troglitazone, pioglitazone, and rosiglitazone in decreasing plasma glucose (%) in ZDF rats.

Figure 7 - Dose response of troglitazone, pioglitazone, and rosiglitazone in decreasing plasma glucose (%) in db/db mice.

Figure 9 - Changes in FPG and post-prandial glucose (PPG ($\pm$ SEM) at 3 months of monotherapy of metformin and of troglitazone.

Figure 11 – Changes in FPG and PPG after 3 months monotherapy of metformin and of troglitazone, and after an additional 3 months of combination therapy (metformin and troglitazone).

DETAILED DESCRIPTION OF THE INVENTION

30 The dosage of each agent will vary depending upon the severity of the disease, the frequency of administration, the particular agents and combinations

-7-

utilized, and other factors routinely considered by an attending medical practitioner. The sulfonylurea normally will be administered at a daily dose of from about 0.25 mg to about 500 mg, typically about 3 mg to about 250 mg. A typical dosage for glyburide, for example, will be about 10 to about 20 mg per day. The glitazones will normally be administered at doses from about 5 mg to about 2500 mg per day, and more typically from about 50 mg to about 1500 mg per day. A preferred glitazone is troglitazone, and it will be employed at doses from about 100 mg to about 1000 mg per day. A further preferred glitazone is rosiglitazone (BRI. 49653), and it will be employed at doses of about 5 mg to about 10 mg per day. Another preferred glitazone is pioglitazone, and it will be employed at doses of about 50 mg to about 200 mg per day. Metformin hydrochloride will be administered at doses of about 300 mg to about 2000 mg per day. It is available commercially in tablets which contain 500 mg and 850 mg of active agent. These can be given up to two times a day or more.

Typical combinations to be employed according to this invention thus include troglitazone plus metformin, and troglitazone plus metformin plus a sulfonylurea such as glyburide. Another typical and preferred combination is rosiglitazone plus metformin, and rosiglitazone plus metformin plus a sulfonylurea such as glyburide. Still another preferred combination is pioglitazone plus metformin, and pioglitazone plus metformin plus a sulfonylurea such as glyburide. These combinations produce better than expected control of NIDDM.

The invention provides compositions of antidiabetic agents, for example, metformin and a glitazone, as well as metformin, a sulfonylurea and a glitazone, and a method of treating diabetes and controlling glycemic conditions comprising administering to a patient in need of treatment an effective amount of metformin and a glitazone, or metformin, a sulfonylurea and an effective amount of a glitazone. When the sulfonylurea and glitazone are formulated together, the compositions will contain about one to about 1000 parts by weight of sulfonylurea, and about 1000 to about one part by weight glitazone. For example, a typical composition of glyburide and troglitazone will contain about 12 mg of glyburide and about 500 mg of troglitazone. Such combination will be administered to an adult patient about once each day to achieve a desired glycemic control. Metformin can be combined directly with a glitazone such as troglitazone.

26

-8-

Typical doses will be about 500 mg of metformin and about 300 to 600 mg of troglitazone. A typical three-way composition includes 12 mg of glyburide, 400 mg of troglitazone, and 500 mg of metformin.

5 The compositions may contain common excipients and carriers such as starch, sucrose, talc, gelatin, methylcellulose, and magnesium stearate. The compositions will normally be made for oral administration, for instance as tablets or capsules, but also may be in the form of aqueous suspensions or solutions, suppositories, slow release forms, for example employing an osmotic pump, skin patch, or the like.

10 The method of treating diabetes employing a combination provided by this invention has been established in a long-term controlled clinical evaluation. A typical study determined the efficacy and safety of troglitazone alone and in combination with the sulfonylurea glyburide for the treatment of non-insulin dependent diabetes mellitus (NIDDM). This study targeted the segment of the
15 NIDDM population in which the disease state has progressed to a point where maximum doses of sulfonylureas no longer produce adequate glycemic control. These patients are at a stage where the maximally stimulated pancreatic insulin secretion does not keep up with the increasing demand. Since the unstimulated (absence of sulfonylurea) insulin secretory capacity of the beta cells is very low in
20 this population, reversing insulin resistance alone would be of partial benefit. Therefore, maintaining a level of stimulated insulin secretion with a sulfonylurea while adding troglitazone to improve insulin sensitivity could provide a level of glycemic control unattainable by either medication alone.

25 A primary objective of the study was to assess the efficacy of troglitazone alone or in combination with micronized glyburide in patients with NIDDM by comparing changes in markers of glycemic and lipid homeostasis over 1 year of treatment. Long-term safety was also an objective of this study, assessed by adverse events and clinical laboratory data.

30 The effect of treatment on the pattern of post-prandial glucose tolerance (standard 2-hour meal tolerance test) was determined in a subset of patients. In addition, heart mass and function (echocardiographic procedure) were monitored in a subset of patients.

Based upon this study, the U.S. Food and Drug Administration has now approved the use of troglitazone in combination with sulfonylureas in the treatment of type II diabetes. Troglitazone is now routinely used clinically in combination with sulfonylureas, especially glyburide. A brief summary of the results of the 12-month, 30-center clinical trial study in 552 patients is presented below.

Overview

Troglitazone monotherapy and troglitazone/glyburide combination therapy were well-tolerated throughout the study. Overall, 70% of patients treated with troglitazone monotherapy had adverse events compared with 90% of patients treated with glyburide (control) therapy. Patients treated with combination therapy had an incidence of adverse events similar to glyburide therapy, 91%. To what extent the high dropout rate for troglitazone monotherapy affected the incidence of adverse events is not known.

In general, the incidence of adverse events was not influenced by age or menopausal status. Overall, patients treated with combination therapy had a higher incidence of associated adverse events (26%) compared with those treated with glyburide (10%).

The incidence of serious adverse events was similar across all treatments; the percent of patients withdrawn for adverse events was 8% across treatments.

Clinical Laboratory Measurements

Changes From Baseline to Outside Normal Range

Baseline clinical laboratory parameters were compared with values at the end of the study (last visit) to identify any abnormal trends. The percent of patients with increases or decreases in laboratory values were calculated based on the number of patients at risk for changes outside of the reference range; i.e., patients with low or high values at baseline were not considered at risk for a decrease or increase, respectively.

No clinically adverse trends were noted in any laboratory parameter. However, dramatic improvement (i.e., decreases) in urine glucose for all combination therapy groups was evident.

Clinically Important Changes

The Guidelines for Evaluation of Clinical Laboratory Values were used to identify those patients that may have had a clinically important change in one or more laboratory values at any point during the study. Laboratory results were then reviewed for these particular patients to determine which patients actually had clinically important changes in a given laboratory parameter. Minimal changes occurred within any laboratory parameter across all treatments.

Patients meeting criteria for clinically important changes are discussed below. A greater number of patients treated with troglitazone combination therapy than troglitazone monotherapy had laboratory changes meeting clinically meaningful change criteria. One patient had significantly elevated ALT and AST which was considered attributable to study drug by the investigator and which causality cannot be confidently ruled out: Patient 4, Center 16, experienced significantly elevated ALT (1155 U/L) and AST (458 U/L) following 57 days of troglitazone 600 mg combination therapy and receiving a flu vaccine. ALT and AST returned to baseline levels 49 days after therapy was withdrawn.

Specific Laboratory Parameters

Hematology: Minimal changes occurred with any of the hematological parameters. Changes that met criteria for possible clinical importance were increases or decreases within the normal range or transient changes that subsequently resolved. Patients meeting clinically important changes in hematology parameters are noted here. Thirty-four patients had changes in hemoglobin or hematocrit or both meeting criteria for clinically meaningful change. Seven patients had mildly transient decreases which returned to baseline levels while remaining on troglitazone (3 patients; two on 400 mg, one on 600 mg) or troglitazone combination (4 patients; three on 400 mg/12 mg, one on 600 mg/12 mg). Eight patients had slight decreases within the normal range or were near the lower normal limit at baseline and dropped below normal limits during the study, and hemoglobin or hematocrit levels remained stable throughout the study. Eight patients had levels below normal reference limits for hemoglobin or hematocrit at baseline and remained below normal limits throughout the study,

-11-

none were withdrawn for this reason. Fourteen patients had decreases in hemoglobin and hematocrit secondary to blood loss for several reasons, e.g., acute bleeding due to automobile accident, rectal bleeding due to hemorrhoids, donated blood, bleeding ulcer (2 patients), CABG surgery (4 patients). Two of these patients were consuming up to 50 concurrent medications and two additional patients had severe infections associated temporally with decreased hemoglobin and hematocrit. After thorough review of patient laboratory data, no patient experienced clinically important decreases in any hematological parameter that can be directly attributable to troglitazone.

Liver Enzymes: Thirteen patients had clinically meaningful elevations in ALT, AST, or both. Three of these patients were terminated due to enzymes elevations; all were followed and enzymes returned to either baseline or within normal limits. Four additional patients had transient elevations which resolved while remaining on troglitazone or troglitazone combination. Two patients on troglitazone 600 mg combination, three on troglitazone 300 mg combination, and one patient on troglitazone 200 mg monotherapy had mildly elevated ($<3 \times$ upper normal limit) at the end of the study. Three of these patients were concomitantly using many additional medications for concurrent illness which cannot be ruled out as causal or contributory to their elevated enzymes.

DISCUSSION

Although troglitazone enhances insulin action at the cellular level, it does not stimulate insulin release nor does it mimic its action. The therapeutic benefits of troglitazone treatment depend on the availability of adequate amounts of insulin. The addition of troglitazone to concurrent sulfonylurea treatment provides a balance of stimulated release of insulin while ameliorating insulin resistance. The results obtained in this study support this hypothesis and provide evidence of significant improvement in glycemic control of patients with very few remaining therapeutic options.

Glycemic Parameters

The mean change from baseline in FSG for the 600T/12G arm was -56 mg/dL, representing a difference of -79 mg/dL from the control arm. The improvement in FSG is confirmed by a mean change from baseline in HbA_{1c} of -1.75% in the same treatment arm, a difference of -2.65% from the active control arm. Approximately 60% of patients in the 600T/12g arm reached an HbA_{1c} level ≤8%. The magnitude of these changes represent an impressive improvement in glycemic control without the use of exogenous insulin. Although the glycemic improvements observed in the 400T/12G and the 200T/12G arms were less pronounced, these data provide the rationale for titration based on the level of glycemic control.

The results of the troglitazone monotherapy treatment arms, on the other hand, should be interpreted carefully. Considering the slow acting properties of troglitazone, an immediate switch from sulfonylurea to troglitazone would cause a deterioration in glycemic control before any improvement is observed. Moreover, the immediate switch in patients who are already in poor control would worsen the degree of glucose toxicity and make adequate glycemic control even harder to achieve. This situation was observed in the monotherapy arms. Those patients were switched from the maximum dose of glyburide to troglitazone monotherapy at the time of randomization. Consequently, glycemic control in the majority of patients worsened, and patients with excessive hyperglycemia were withdrawn from the study for safety purposes. Due to the nature of the ITT analysis with LOCF, the average change in FSG and HbA_{1c} is reflective of the high glycemic values of patients who discontinued early. In other words, the higher the early dropout rate, the worse the end of study results would appear. This is especially the case in the T200 arm since the dropout rate due to lack of efficacy reached almost 60%. Therefore, the results of the ITT analysis in this case are not a good reflection of the true response of all patients. On the other hand, the results of the completers analysis represent a bias in favor of troglitazone. The completers analysis would effectively select the sub-population who are more likely to respond to study medication. The true response of these treatment arms is more likely to lie somewhere between the results of the ITT and completers

-13-

populations. Nevertheless, the clinical interpretation of these data indicates that switching patients from sulfonylurea use, particularly those on high doses, to troglitazone monotherapy is not an appropriate therapeutic approach.

5 Troglitazone should be added to current treatment regimens of a sulfonylurea beginning at 200 mg and increasing up to 600 mg as needed to optimize glycemic control. As patients reach target goals of glycemic control, the dose of sulfonylurea may be reduced or even eliminated based on the level of glycemic control. Hence, in these patients (sulfonylurea failures), troglitazone as monotherapy is achieved only if warranted based upon glycemic control
10 parameters. Faced with the alternative of reducing the dosage of one of the agents, the pathophysiology of the disease should be considered. Treating the basic defect of type II diabetes, i.e., insulin resistance, should take precedence over exhausting pancreatic insulin secretion by sulfonylurea stimulation. Therefore, as glycemic control improves the sulfonylurea should be considered for dose reduction or even
15 discontinuation if indicated. Troglitazone alone can be effective in naive patients who are not well-controlled on diet and exercise but have not been managed on oral agents. The deficit in the insulin secretory capacity of naive patients is generally relative, and the improvement in insulin sensitivity may be sufficient to restore normoglycemia.

20 **Insulin, C-peptide, and Meal Tolerance Test**

The insulin reduction observed in the combination treatment arms reflects an improvement in insulin sensitivity since the lower insulin level is associated with significant decreases in FSG and HbA_{1c} rather than increases. The direction of the change in the fasting levels of insulin and serum glucose is mirrored by
25 similar changes in the AUC of the insulin and serum glucose during the meal tolerance test for the combination arms. The improved insulin sensitivity leads to a reduced demand on pancreatic secretion of insulin, a desirable outcome given the natural progression of the disease.

The magnitude of the reduction in insulin in the monotherapy arms is
30 greater than that observed in the various combination arms. While a similar reduction between the monotherapy and the combination treatment arms would have been expected based upon enhanced insulin activity, the additional decrease

-14-

in insulin levels may be attributed to the removal of sulfonylurea-stimulated insulin secretion. Finally, the reduction observed in the control arm (micronized glyburide) may be attributed to gradual degradation of the pancreatic secretory function or secondary failure typically observed with sulfonylurea treatment over time. This change cannot be attributed to improvements in insulin sensitivity, since FSG levels increased and did not decrease. The observed changes in insulin levels were confirmed by similar changes in direction and magnitude in C-peptide levels for all treatment arms.

Lipid Parameters

The classical manifestations of insulin resistance in a diabetic population are elevated triglycerides and low levels of HDL. Therefore, the reversal of insulin resistance should be expected to elicit favorable changes in these lipid parameters, as observed in this study. Although statistical significance was reached in some (but not all) treatment arms, the general trend of the changes is consistent with the reversal of insulin resistance, i.e., a reduction in triglycerides and an increase in HDL. The reduction in insulin levels and resultant increase in lipoprotein lipase (LPL) activity could be responsible for the triglyceride and HDL changes. Modest increases of minimal clinical significance in total cholesterol and LDL were observed in the monotherapy arms. Similar, but less pronounced changes were observed in the combination arms. It is important to note that LDL levels were measured directly and not calculated indirectly from triglycerides and cholesterol levels using the Friedwald formula. Both LDL and cholesterol are relatively constant parameters and are not affected by the fasting state of the patient. Triglycerides, however, are extremely variable, and affected by the fasting state of the patient. This variability could explain the fact that a clinically desirable mean reduction in excess of 50 mg/dL observed in the T600/G12 group did not reach statistical significance. In contrast, the magnitude of change in both cholesterol and LDL was of little clinical significance (only 4%-7% in the combination treatment arms) but was statistically significant.

Lipid changes observed in this study are consistent with results from prior studies. The favorable change in triglycerides, HDL, and FFA are contrasted by minimal increases in total cholesterol, LDL, Lp(a), and no changes in Apo (A1)

and Apo (B). Collectively, these changes may be interpreted as having a potentially beneficial impact on atherogenic risk. It should be noted that patients with elevated triglycerides levels could potentially benefit from troglitazone treatment and provide synergism to the management of their dyslipidemia since
5 elevated triglyceride levels are recognized as an independent risk factor for cardiovascular disease.

Blood Pressure

No statistically or clinically significant changes were observed in systolic blood pressure at the end of the study. Mean diastolic blood pressure, however,
10 decreased significantly ($p < 0.05$) for patients treated with 600 mg/12 mg combination therapy. A reduction in diastolic BP is consistent with similar observation in other troglitazone studies. The direction and magnitude of the DBP change offers a clinically desirable endpoint in this population. Given the fact that hypertensive patients were excluded from this study, only minor changes would
15 be expected. Since this study was not powered to detect small changes in blood pressure, the direction of the observed change still represents a desirable change in this population. The reduction in diastolic BP is corroborated by a decrease in the calculated peripheral resistance in the subgroup of patients that underwent cardiac output measurements in this study. This change in BP could result indirectly from
20 reversing insulin resistance and amelioration of hyperinsulinemia, or alternatively, from a direct action of troglitazone on peripheral vasculature.

Weight

A statistically significant increase in weight was observed in the combination arms in contrast to the troglitazone monotherapy arms in which
25 modest weight losses of 1 to 7 lbs were seen. While the magnitude of the change is relatively small (approximately 6%), minor increases in weight in this population should be carefully monitored. The fact that weight increases were observed in the combination therapy arms only and not the monotherapy arms is suggestive of factors other than troglitazone therapy being responsible for weight
30 increases. Several factors may have contributed to weight gain in this study. The fact that weight gain was mainly observed in treatment arms associated with

improved glycemic control suggests that diminished glycosuria may be contributing to weight gain. The weight increase may possibly be a result of potentiation of the known affect of sulfonylurea therapy on weight gain. In addition, patients in this study were instructed on a weight maintenance diet for the duration of the study. Appropriate diabetic diet instructions targeting ideal body weight was not implemented in this study. Finally, improving hyperglycemia and achieving target glycemic control in this population is a disincentive to maintain strict caloric and sugar intake. In clinical practice, diet and exercise should be strongly emphasized to avoid potential weight gain.

10 **Safety**

Troglitazone, both as mono- and combination therapy, was well-tolerated during the study. The overall adverse event profile of troglitazone/glyburide combination therapy was similar to the adverse event profile of glyburide monotherapy. Most adverse events occurred at the lower incidence in patients treated with troglitazone monotherapy compared with the patients treated with glyburide monotherapy. This may be attributed to a better adverse event profile for troglitazone and may in part be due to the high dropout rate for patients treated with troglitazone monotherapy. Tolerance was also evident by the rare occurrence of unacceptable levels of clinical laboratory parameters; most of these occurrences resolved while study treatment continued.

Summary

In summary, patients with type II diabetes receiving maximum doses of sulfonylurea have very few oral therapeutic options remaining. Aside from insulin resistance, the hallmark of the disease at this stage is mainly a diminished pancreatic response to glucose stimulus. Improving insulin resistance is of great benefit when added to a current regimen capable of stimulating insulin release (e.g., sulfonylurea). Combination therapy of troglitazone and sulfonylurea appears to be safe and well-tolerated and can result in significant improvement in glycemic control. It should be noted that patients on maximum doses of a sulfonylurea should not be switched to troglitazone monotherapy. Monotherapy should only be achieved if indicated by downward titration of the sulfonylurea

-17-

dose. Finally, application of the results of this study should not be limited to patients who fail on maximum doses of sulfonylurea therapy but also extended to patients on lower doses of a sulfonylurea.

CONCLUSIONS

- 5 Troglitazone/glyburide combination therapy is well-tolerated and significantly ($p < 0.0001$) improves glycemic control over a 52-week period at doses of 200 mg/12 mg to 600 mg/12 mg compared with glyburide monotherapy in patients with NIDDM who are not adequately controlled on sulfonylurea therapy.
- 10 Another glitazone, namely BRL 49653 (now known as rosiglitazone, "RSG"), has undergone clinical evaluation and has demonstrated good efficacy in controlling glycemia in patients with type II diabetes. Rosiglitazone was evaluated in a multi-center, placebo-controlled trial. In this study, 493 patients with a fasting glucose between 7.8 mmol/L and 16.7 mmol/L were randomly assigned to
- 15 treatment with placebo or rosiglitazone given at 4 mg or 8 mg per day. The rosiglitazone was administered as a twice-daily regimen for 26 weeks, following a 4-week placebo run-in period. The baseline demographic and metabolic characteristics of the patient population is given in Table 1.

TABLE 1. Baseline Demographic and Metabolic Characteristics

Baseline Characteristics, n(%)	Treatment Group		
	Placebo (n = 158)	RSG 4 mg/day (n = 166)	RSG 8 mg/day (n = 169)
Age (years)			
Mean $\pm$ SD	58.8 $\pm$ 10.9	59.6 $\pm$ 9.8	60.7 $\pm$ 9.5
Range	36-81	39-79	38-80
Sex			
Males	104	107	113
Females	54	59	56
Duration of Diabetes (years)			
Mean	4.6	4.8	5.4
Previous Therapy			
Diet only	45	44	45
Previous oral agents	113	122	124
FPG ^a (mmol/L)			
Mean $\pm$ SD	12.7 $\pm$ 3.3	12.6 $\pm$ 3.4	12.2 $\pm$ 3.5
Range	6.44-20.76	5.61-23.59	5.61-21.54
HbA _{1c} ^b (%)			
Mean $\pm$ SD	9.0 $\pm$ 1.66	9.0 $\pm$ 1.52	8.8 $\pm$ 1.56
Range	5.2-13.3	5.9-13.9	5.9-13.0
C-Peptide ^c (mmol/L)			
Mean $\pm$ SD	1.00 $\pm$ 0.42	1.02 $\pm$ 0.43	0.99 $\pm$ 0.47
Range	0.26-2.71	0.23-2.34	0.3-2.90
BMI (kg/m ²)			
Mean $\pm$ SD	29.9 $\pm$ 4.13	30.2 $\pm$ 4.10	29.1 $\pm$ 3.85
Range	21.2-38.2	19.2-39.5	21.5-37.9

^a Normal range, for Ages 13-49, 3.89-6.38 mmol/L; for Ages $\geq$ 50 years, 3.89-6.94 mmol/L.

^b Normal range, <6.5% of total hemoglobin.

^c Normal range, 0.26-1.32 nmol/L.

The patients were monitored throughout the study for fasting plasma glucose levels in their blood (FPG in mmol/L), and for their blood levels of Hemoglobin A_{1c} (HbA_{1c}) relative to baseline characteristics. The results of the 26-week trial are presented in Table 2.

TABLE 2. Glucose-Lowering Effect of Rosiglitazone

	Placebo (n = 158)	RSG 4 mg/day (n = 166)	RSG 8 mg/day (n = 169)
FPG (mmol/L)-Baseline	12.7	12.6	12.2
Mean Δ From Baseline (SD)	+1.05 (3.58)	-2.13 (2.91)	-3.00 (2.85)
Comparison With Placebo ^a	--	-3.20*	-4.22*
95% CI	--	(-3.94, -2.48)	(-4.95, -3.49)
FPG (mg/dL)-Baseline	228.8	226.9	219.7
Mean Δ From Baseline (SE)	18.9 (5.1)	-38.4 (4.1)	-54.0 (3.9)
Comparison With Placebo ^a	--	-57.7*	-76*
95% CI	--	(-70.9, -44.6)	(-89.2, -62.9)
HbA _{1c} (%) -Baseline	9.04	9.02	8.75
Mean Δ From Baseline (SD)	+0.92 (1.21)	-0.28 (1.27)	-0.56 (1.38)
Comparison With Placebo ^a	--	-1.21*	-1.54*
95% CI	--	(-1.52, -0.89)	(-1.85, -1.22)

^a Adjusted mean difference

* p < 0.0001.

5

The data presented in Table 2 demonstrate that rosiglitazone at 4 and 8 mg/day has a glucose-lowering effect compared to placebo-treated patients and to baseline. In a further analysis, the change from baseline in HbA_{1c} in a subset of patients who had previously failed to be controlled on dietary therapy alone demonstrated a greater change from baseline in the patients treated with rosiglitazone. These results are shown in Table 3.

TABLE 3. Effect of Rosiglitazone in Diet-Failure Subset

	Placebo	4 mg/day	8 mg/day
HbA _{1c} (%) (Diet-Failure Subset)			
n =	45	44	45
Baseline	8.5	8.75	8.51
Mean Δ From Baseline (SD)	0.47 (1.14)	-0.85 (0.93)	-0.91 (1.04)

-20-

The data in Table 3 establish that rosiglitazone at 4 mg/day caused a 1.3% reduction in HbA_{1c} relative to placebo-treated controls, and at 8 mg/day, caused a 1.38% reduction compared to placebo.

As noted above, rosiglitazone is a preferred glitazone to be combined with a sulfonylurea according to this invention. The sulfonylurea will be employed at a dose of about 0.25 mg to about 500 mg, typically from about 3 mg to about 250 mg. The rosiglitazone will be administered at a dose of about 5 to about 2500 mg per day, and more typically at a dose of about 5 mg to about 50 mg.

Additional examples of combination therapy according to this invention will employ the glitazone BRL 49653 together with a sulfonylurea selected from glyburide, chlorpropamide, tolbutamide, and glipizide. Another combination will be the glitazone TA 174 in combination with a sulfonylurea selected from glisoxepid, acetohexamide, glibornuride, and tolazamide. Still another combination provided by this invention is englitazone together with glibornuride, glyburide, or glisoxepid. Further preferred combinations include pioglitazone with tolbutamide, glipizide, glyburide, or glibornuride.

Several studies have been conducted showing the beneficial effects of pioglitazone, "Pi," ((±)-5-[p-[2-(5-ethyl-2-pyridyl)ethoxy]benzyl]-2,4-thiazolidinedione hydrochloride), both alone and in combination with sulfonylureas, in controlling and promoting hepatic glucose uptake in patients having NIDDM. One such clinical trial used 20 patients having a mean age of 58.2 ± 9.4 (13 males, 7 females). All patients were controlling their blood glucose by diet alone or by taking a sulfonylurea. After establishing each patient's baseline insulin sensitivity, pioglitazone was administered orally at a dose of 30 mg/day, every morning for 3 months. At the end of the 3-month treatment period, fasting plasma glucose (FPG) level significantly ($p < 0.01$) decreased from 11.0 ± 1.5 mmol/liter to 8.9 ± 1.1 mmol/liter. Hemoglobin A_{1c} level significantly fell from $9.2 \pm 1.8\%$ to $8.3 \pm 1.5\%$ ($p < 0.01$). Fasting serum insulin and C peptide levels decreased from 83 ± 36 pmol/liter and 0.62 ± 0.21 nmol/liter to 66 ± 29 pmol/liter and 0.58 ± 0.25 nmol/liter, respectively. These results demonstrate that pioglitazone enhances the insulin action in NIDDM patients on diet alone or

-21-

on concomitant sulfonylurca use, and thereby improves both plasma glucose level and lipid profiles.

In another study, pioglitazone was administered in combination with glipizide (GI). In a two period cross-over study in 16 normal volunteers, patients received placebo (Pb) plus 5 mg of glipizide, or pioglitazone (45 mg/day) plus 5 mg/day of glipizide. The patients were dosed for 7 days on one treatment, and then for the following 7 days on the alternate treatment. The pharmacokinetic (PK) effects of multiple doses of pioglitazone on steady state glipizide levels was determined. The plasma glipizide PK parameters are shown in Table 4.

TABLE 4
Steady State Glipizine PK Parameters

PK Parameter	Pb + GI Mean (SD)		Pi + GI Mean (SD)	
AUC(0-inf)	1884	(685)	1833	(684)
Cmax (ng/mL)	367	(68.4)	332	(42.0)
Tmax (hr)	2.3	(1.2)	2.7	(1.2)
Kel (1/hr)	0.214	(0.0524)	0.222	(0.0516)
T1/2 el (hr)	3.51	(1.33)	3.39	(1.31)
Cl/F (L/hr)	2.85	(0.624)	2.94	(0.679)
Vd/F (L)	13.5	(1.60)	13.4	(1.55)

The PK and statistical analyses of the data indicate that the coadministration of Pi did not alter the disposition or steady-state PK characteristics of GI. No serious adverse events and no clinically significant trends in vital signs, physical findings, or clinical laboratory tests were observed.

In another study in patients, pioglitazone alone, and together with sulfonylurcas, significantly increased hepatic glucose uptake (HGU). Thirty patients were selected for the trial. Four controlled their blood glucose on diet alone; the remaining 26 were taking a sulfonylurea. Twenty-one patients were given 30 mg of pioglitazone daily for 12 weeks. Nine patients (one on diet alone, 8 on sulfonylurca drugs), were given placebo. The group receiving pioglitazone showed an increase in HGU from 28.5 ± 19.4 to 59.4 ± 27.1 , a 12% increase in

-22-

hepatic glucose uptake. The group receiving placebo showed no significant change in hepatic glucose uptake.

As noted above, the glitazones are a class of thiazolidinediones which have been shown to enhance hepatic and peripheral glucose uptake in animals, including humans, and are thus useful for treating diabetes mellitus. All of the glitazone compounds operate by the same mechanism within an animal system. Several studies have established the close similarity in biological activity of various glitazones from within the thiazolidinedione class. For example, troglitazone, pioglitazone, and rosiglitazone all cause a slight reduction in red blood cell counts when administered at various dosages to female rats (Figure 1). Similarly, all three glitazones have about the same negligible effect on brown adipose tissue weight changes in rats (Figure 2). Pioglitazone causes a slight increase in heart weight, whereas troglitazone has essentially no effect, and rosiglitazone causes an increase only at higher dose levels (Figure 3). When tested in various mouse models, all three glitazones caused a substantial decrease in plasma glucose levels in a dose dependent fashion (Figures 4, 5, 6, and 7).

The foregoing studies establish that the glitazones are a class of antidiabetic agents which exert a very similar spectrum of biological effects in animals. The studies also establish the ability of the glitazones to be used in combination with a sulfonylurea for the significant increase in hepatic glucose uptake, and the dramatic reduction in plasma glucose levels. The combinations are thus particularly well suited to the treatment of type 2 diabetes, and can be utilized in the treatment of impaired glucose tolerance in order to even prevent or delay the onset of NIDDM.

The glitazones can also be utilized in combination with a biguanide such as metformin, as well as in combination with a biguanide plus a sulfonylurea. Several clinical trials have established the unexpected biological efficacy that is achieved with a combination of troglitazone and metformin, as well as troglitazone, metformin, and glyburide.

In one clinical trial, patients were treated with monotherapy of metformin or troglitazone for 3 months, followed by combination therapy for 3 months. Twenty-nine patients diagnosed as having NIDDM were randomized. Fifteen subjects received metformin monotherapy, 1000 mg orally twice a day for

3 months. A group of 14 subjects were dosed orally with 400 mg of troglitazone once daily for 3 months. One patient randomized to troglitazone terminated participation after 2 weeks. One patient from each group completed the 3-month monotherapy phase, but withdrew prior to initiation of combination therapy. Two additional subjects, initially in the troglitazone monotherapy group, later withdrew from the combination phase before completion. The baseline characteristics of all subjects following the 3-month monotherapy phase are given in Table 5 below.

TABLE 5. Baseline Characteristics of Subjects Who Completed the 3-Month Monotherapy Phase of the Trial

	Metformin Group (n = 15)	Troglitazone Group (n = 13)	p =
Age (years)	51 ($\pm$ 3)	53 ($\pm$ 2)	0.32 (NS)
Weight (kg)	99 ($\pm$ 4)	96 ($\pm$ 7)	0.68 (NS)
BMI (kg/m ²)	33.7 ($\pm$ 1.8)	34.0 ($\pm$ 2.3)	0.94 (NS)
FPG (after "wash-out")	287 ($\pm$ 22)	275 ($\pm$ 21)	0.71 (NS)
HbA _{1c} (at screening)	9.8 ($\pm$ 0.5)	9.3 ($\pm$ 0.5)	0.42 (NS)
Fasting insulin	24 ($\pm$ 3)	35 ($\pm$ 7)	0.16 (NS)
Fasting C-peptide	1.9 ($\pm$ 0.1)	2.3 ($\pm$ 0.2)	0.13 (NS)

The patients were evenly matched for age, body mass index (BMI), fasting plasma glucose (FPG), HbA_{1c}, and fasting insulin and C-peptide. The treatment group was in general obese, moderately diabetic, and had a mean BMI of 33.5 kg/m², a mean HbA_{1c} (prior to starting the study) of 9.6%, and a mean FPG of 280 mg/dL.

After the initial 3-month period of monotherapy, the remaining subjects were dosed with a combination of metformin and troglitazone (1000 mg metformin BID, 400 mg troglitazone QD) for an additional 3-month period.

At 3 months on monotherapy, both metformin and troglitazone caused a 20% decrease from baseline of FPG; 58 mg/dL and 54 mg/dL, respectively (Figure 8). HbA_{1c} levels did not change significantly with either drug. Mean post-prandial glucose decreased about 25% for both groups (metformin 87 mg/dL, troglitazone 83 mg/dL), as shown in Figure 9. Post-prandial circulating insulin

-24-

and C-peptide decreases were insignificantly different from baseline for both treatment groups. Following a 12-hour fasting period, all subjects were given a hyperinsulinemic-englycemic clamp assay. After the 3-month monotherapy treatment, EGP decreased from 108 to 87 mg/m²/min (18%) in the metformin-treated group (Figure 10A), while troglitazone had no effect on EGP (Figure 10B). In contrast, metformin caused less than 27% increase in glucose disposal rate (GDP) (240 to 272 mg/m²/min) (Figure 10B), whereas troglitazone caused a 97% increase (172 to 265 mg/m²/min) (Figure 10B).

When the study patients were given the combination of metformin and troglitazone for 3 months, dramatic and unexpected effects were observed. Fasting plasma glucose levels decreased an additional 18% (41 mg/dL) as shown in Figure 8. Compared to baseline values, the mean decrease in FPG in all subjects over the entire 6-month treatment period was 98 mg/dL, or 35%. During the meal tolerance test, combination therapy caused an additional 21% decrease in plasma glucose (PG), or 54 mg/dL (Figure 11). During the entire 6-month treatment period, total PG fell 41% or 140mg/dL. HbA_{1c} levels decreased 1.2% during the combination therapy (Figure 12).

The foregoing study establishes that the combination of metformin and troglitazone causes a clinically significant and unexpected further lowering of both fasting and post-prandial glucose compared to either agent used alone. The combination provided by this invention thus provides further improvement in glucose control, without stimulation of insulin secretion.

Even more surprising are the clinical results observed when using a three-way combination of biguanide, sulfonylurea, and glitazone. A clinical trial was carried out assessing the effects of metformin, glyburide, and troglitazone when compared to a typical treatment regimen of glyburide and metformin. Two hundred NIDDM patients were enrolled in a double-blind, randomized, placebo-controlled multicenter study. All enrolled patients had compromised glycemic control and were currently treated with a sulfonylurea (comparable in dosage to at least 20 mg of glyburide) and at least 1500 mg of metformin daily. Of the 200 patients enrolled, 178 completed the 24-week trial. The study population consisted of 57% males, 43% females, with median age of 59. Patients had an

-25-

average duration of NIDDM of 11.3 years. The population had an average weight of 85 kg (187 lbs), and BMI of 30.1 kg/m². At the start of the trial, 101 patients received oral dosing of troglitazone (400 mg once daily), a sulfonylurea (SU), and metformin. The control group of 99 subjects received a sulfonylurea and metformin. The primary efficacy parameter measured was HbA_{1c}. Secondary efficacy parameters were FSG, C-peptide, serum total insulin, BMI weight, triglycerides, total cholesterol (TC), high-density lipoprotein (HDL), and low-density lipoprotein (LDL). Baseline glycemic levels at the start of the trial were: HbA_{1c}: 9.7%; FPG: 234 mg/dL; circulating insulin level: 14.4 µIN/mL; C-peptide: 3.4 ng/mL. The results of the clinical study after 24 weeks of treatment are presented in Table 6.

TABLE 6. Changes From Baseline at 24 Weeks

	SU + Metformin	SU + Metformin + Troglitazone	Adjusted Difference
HbA _{1c}	+0.1	-1.3 (p < 0.001)	-1.4
FPG	+6	-42 (p < 0.001)	-48
Circulating Insulin	+1.4	-2.8 (p < 0.001)	-3.3
C-peptide	0	-0.2 (p = 0.16)	-0.2
Triglycerides	+43	-36 (p = 0.07)	-67
Total Cholesterol	+6	+8 (p = 0.05)	4.8
HDL	+1	+4 (p = 0.01)	3
LDL	+2	+11 (p = 0.002)	9

In the foregoing study, plasma glucose levels were reduced by 42 mg/dL at Week 8 in the group receiving the triple combination. This is a dramatically rapid reduction in FPG, showing the unexpectedly fast onset of action achieved with the triple combination, and the synergy associated with metformin, sulfonylurea, and glitazone. This represents good glycemic control in about one-half the time period normally observed in clinical settings using antidiabetic agents in monotherapy, or even using a combination of sulfonylurea and biguanide. Equally surprising was the dramatic reduction in endogenous insulin (19%) caused by the triple combination. Moreover, while the sulfonylurea/metformin combination had no

-26-

effect on C-peptide levels, the triple combination of sulfonylurea/biguanide/
glitazone caused a 7% reduction. Similarly, while the sulfonylurea/metformin
treated group had an increase in triglycerides of 43 mg/dL, the sulfonylurea/
glitazone/biguanide combination caused a reduction of 36 mg/dL.

- 5 The foregoing clinical trial establishes that three-way combinations of
sulfonylurea/biguanide/glitazone are surprisingly effective at reducing HbA_{1c}, and
cause a very rapid and significant reduction in plasma glucose levels. Such
combinations are especially well-suited to rapidly bringing under control a patient
suffering from NIDDM and having dangerously high levels of plasma glucose.
- 10 Another important and significant aspect of the foregoing clinical trial is the fact
that the patients experienced very few adverse events, and the dropout rate was
extremely low.

-27-

CLAIMS

What is claimed is:

1. A composition comprising a sulfonylurea antidiabetic agent, a glitazone antidiabetic agent, and a biguanide antidiabetic agent.
- 5 2. A composition of Claim 1 wherein the sulfonylurea is selected from glisoxepid, glyburide, acetohexamide, chlorpropamide, glibornuride, tolbutamide, tolazamide, glipizide, gliclazide, gliquidone, glyhexamide, phenbutamide, and tolcyclamide.
- 10 3. A composition of Claim 2 wherein the glitazone is selected from pioglitazone, troglitazone, and rosiglitazone.
4. A composition of Claim 3 wherein the biguanide is metformin.
5. A composition comprising troglitazone, glyburide, and metformin.
6. A composition comprising rosiglitazone, a sulfonylurea, and metformin.
7. A composition comprising pioglitazone, a sulfonylurea, and metformin.
- 15 8. A composition comprising troglitazone and a biguanide.
9. A composition comprising troglitazone and metformin.
10. A method of treating diabetes by administering to a patient in need of treatment an effective amount of a sulfonylurea antidiabetic agent in combination with an effective amount of a glitazone antidiabetic agent and
20 an effective amount of a biguanide antidiabetic agent.
11. A method according to Claim 10 wherein the sulfonylurea antidiabetic agent is selected from glisoxepid, glyburide, acetohexamide,

46

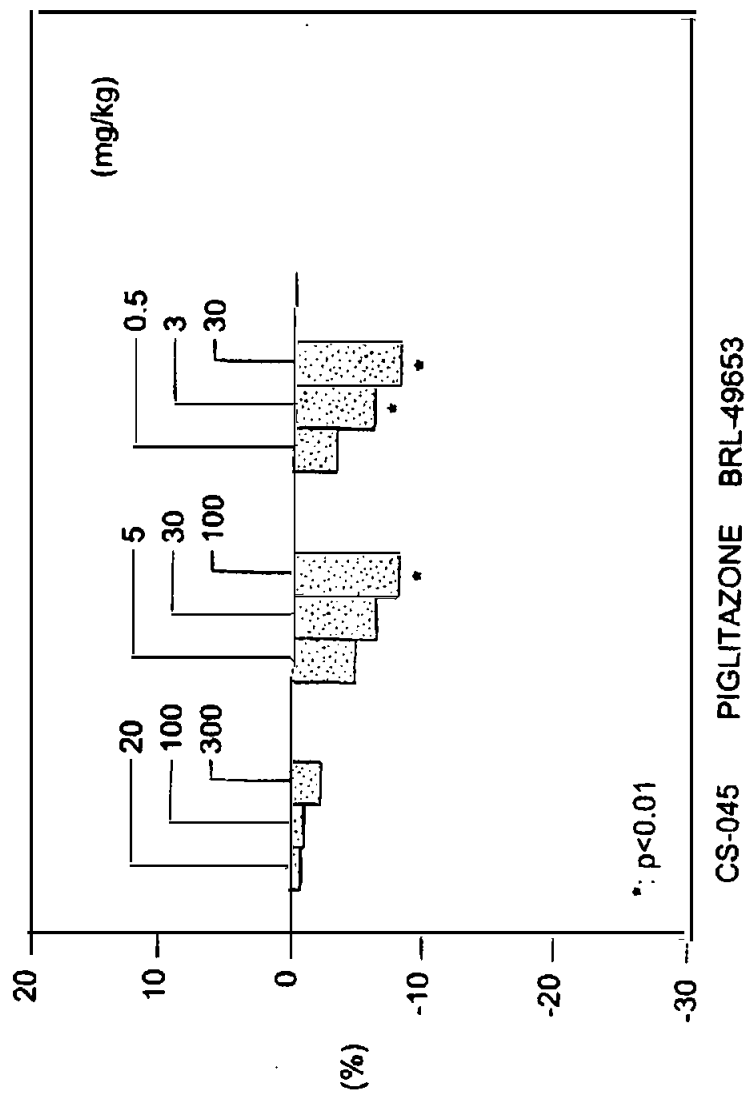
-28-

chlorpropamide, glibornuride, tolbutamide, tolazamide, glipizide, gliclazide, gliquidone, glyhexamide, phenbentamide, and tolcyclamide.

12. A method according to Claim 11 wherein the glitazone antidiabetic agent is selected from troglitazone, pioglitazone, and rosiglitazone.
- 5 13. A method according to Claim 11 wherein the biguanide is metformin.
14. A method according to Claim 13 wherein the glitazone is troglitazone.
15. A method according to Claim 13 wherein the glitazone is rosiglitazone.
16. A method according to Claim 13 wherein the glitazone is pioglitazone.
- 10 17. A method of treating diabetes by administering to a patient in need of treatment an effective amount of rosiglitazone together with an effective amount of metformin and an effective amount of a sulfonylurea.
18. A method of treating diabetes by administering to a patient in need of treatment an effective amount of troglitazone together with an effective amount of metformin and an effective amount of a sulfonylurea.
- 15 19. A method of treating diabetes by administering to a patient in need of treatment an effective amount of troglitazone together with an effective amount of metformin and an effective amount of glyburide.
20. A method of treating diabetes by administering to a patient in need of treatment an effective amount of troglitazone together with an effective amount of metformin.
- 20 21. A method of treating diabetes by administering to a patient in need of treatment an effective amount of rosiglitazone together with an effective amount of metformin.

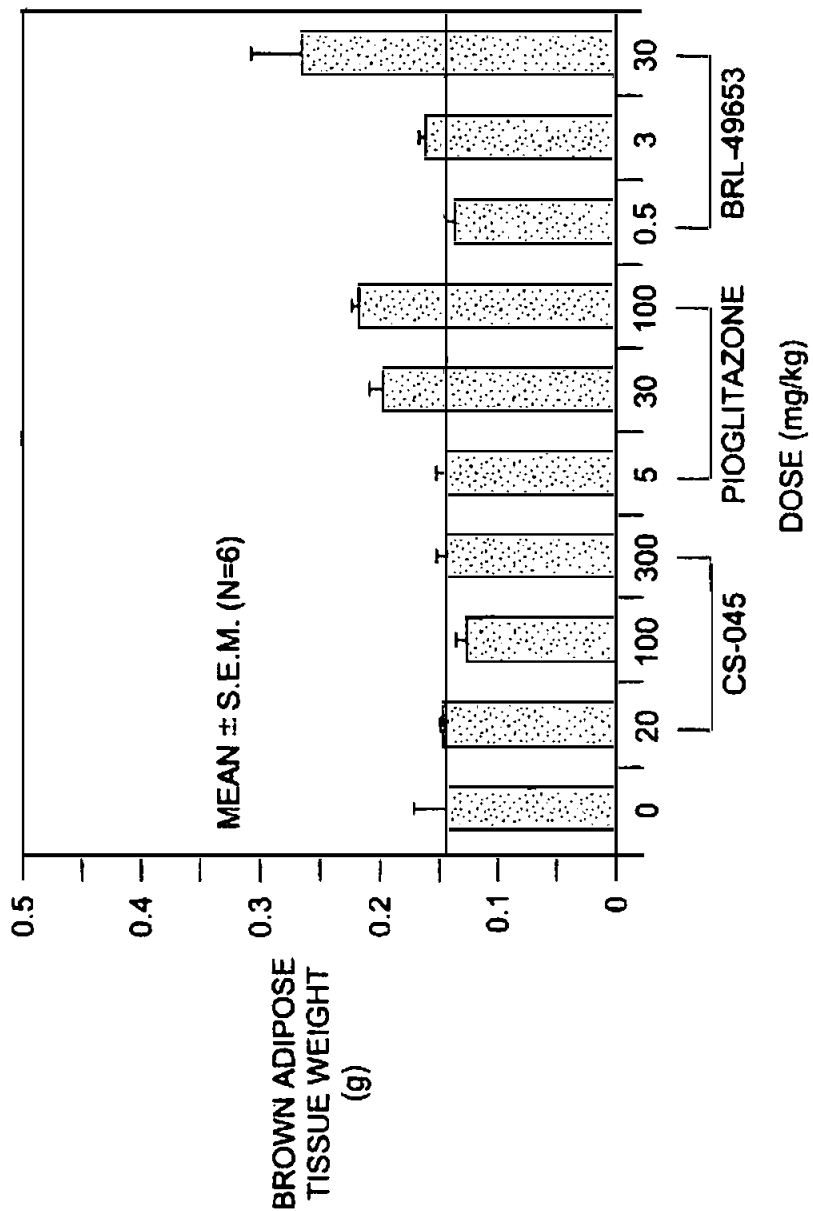
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FIG-1 RED BLOOD CELL COUNTS IN FEMALE RATS

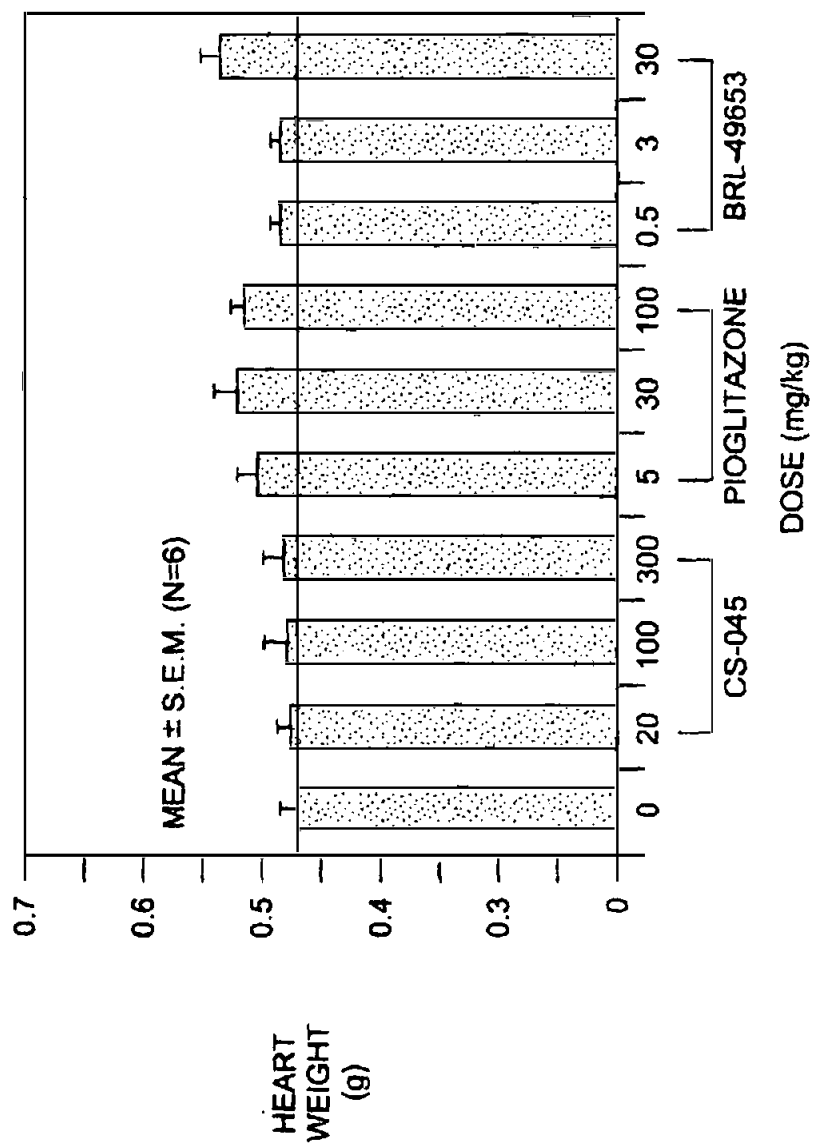


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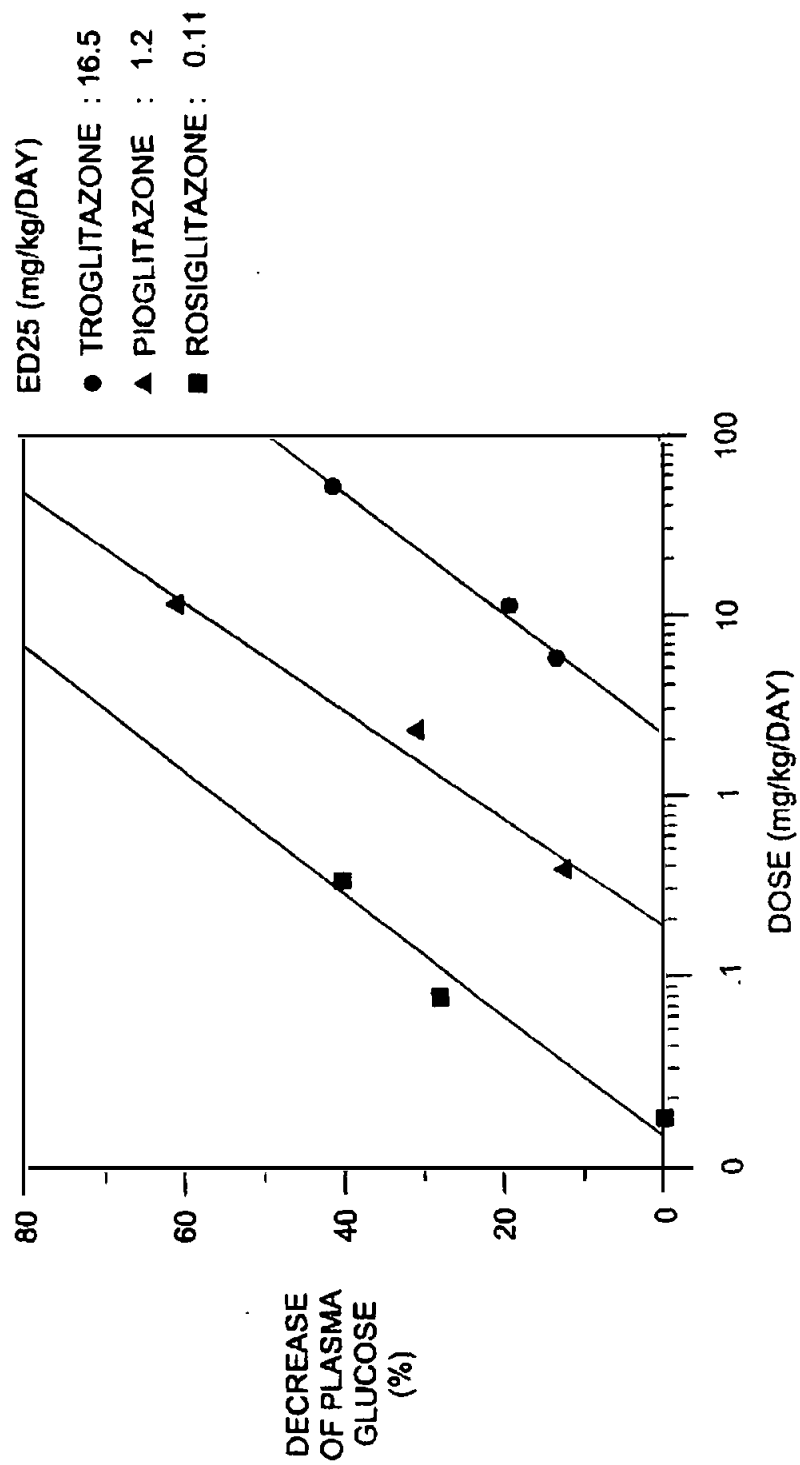
FIG--2 BROWN ADIPOSE TISSUE



3/12

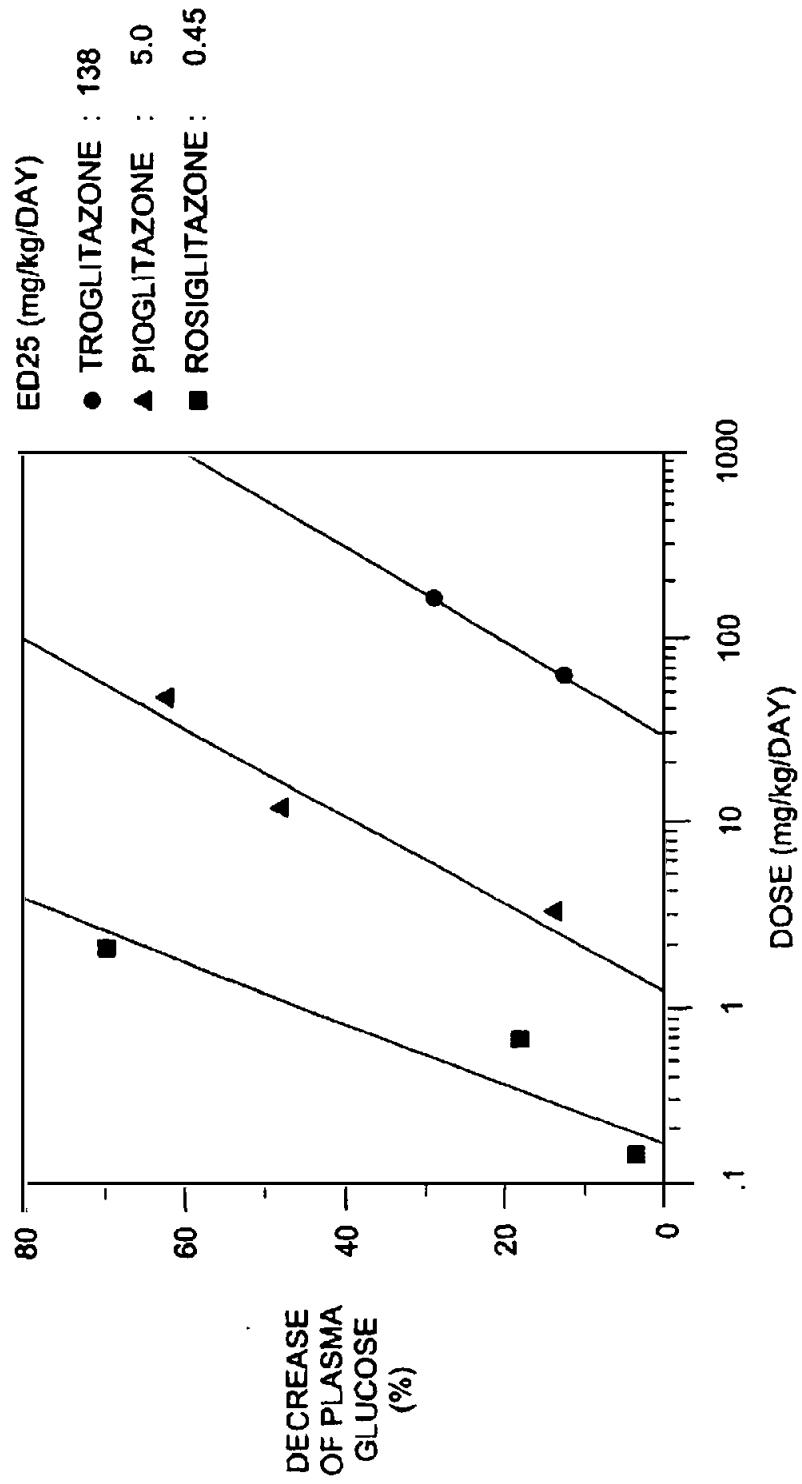
FIG-3 HEART

4/12

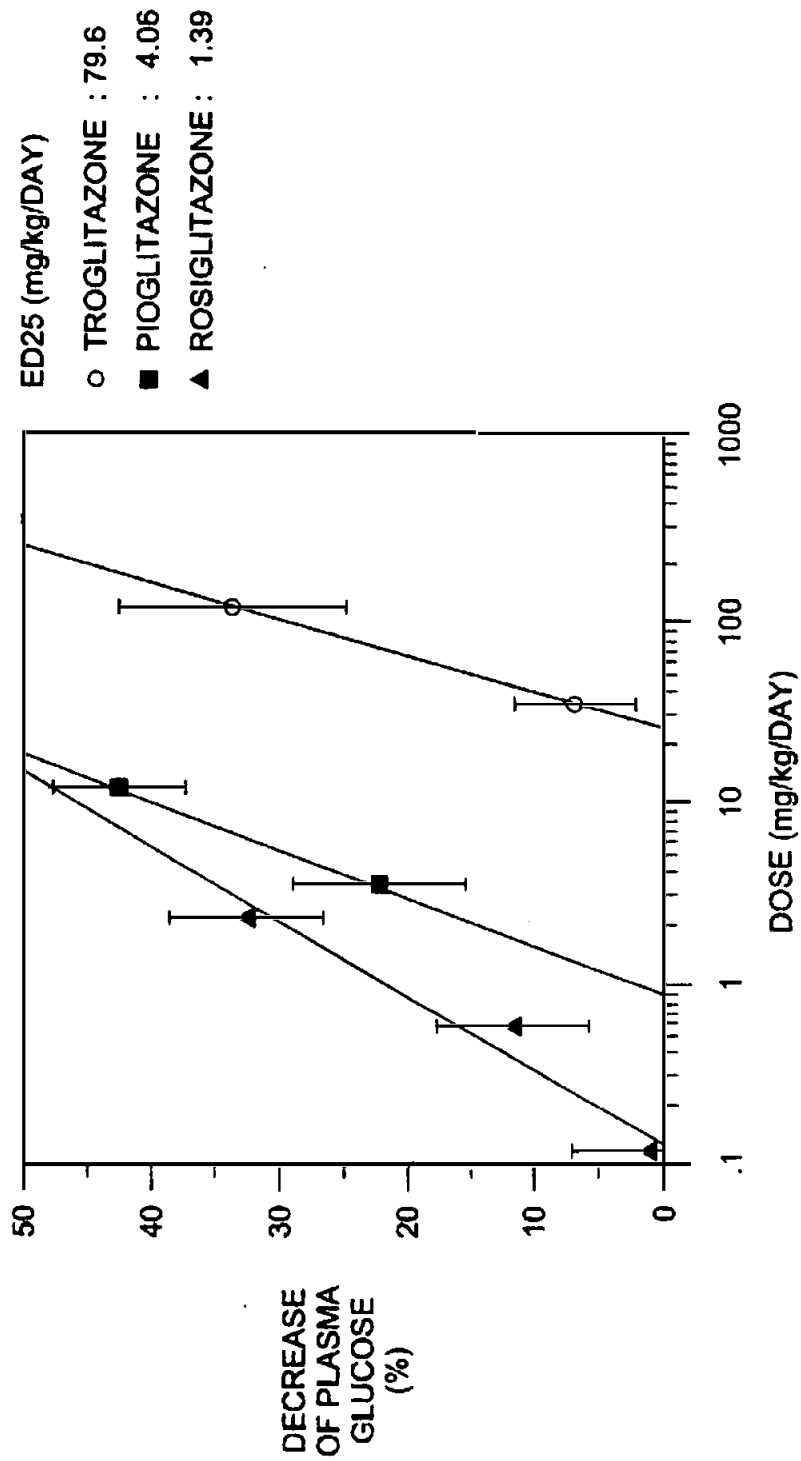
FIG-4 KK MICE (FOOD ADMIXTURE FOR 7 DAYS)

5/12

FIG-5 ZDF RATS (FOOD ADMIXTURE FOR 10 DAYS)



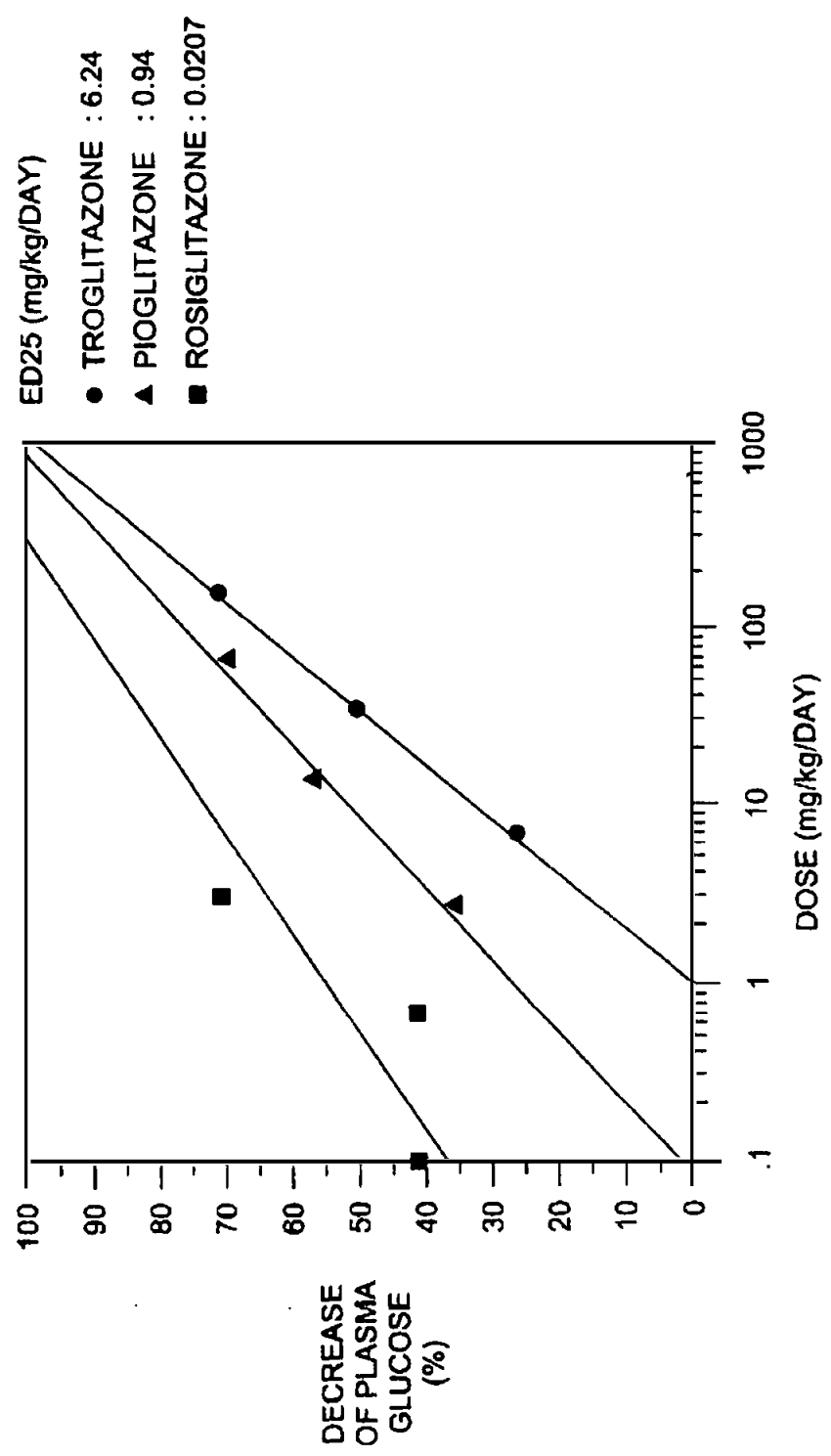
6/12

FIG-6 GK RATS (FOOD ADMIXTURE FOR 14 DAYS)

54

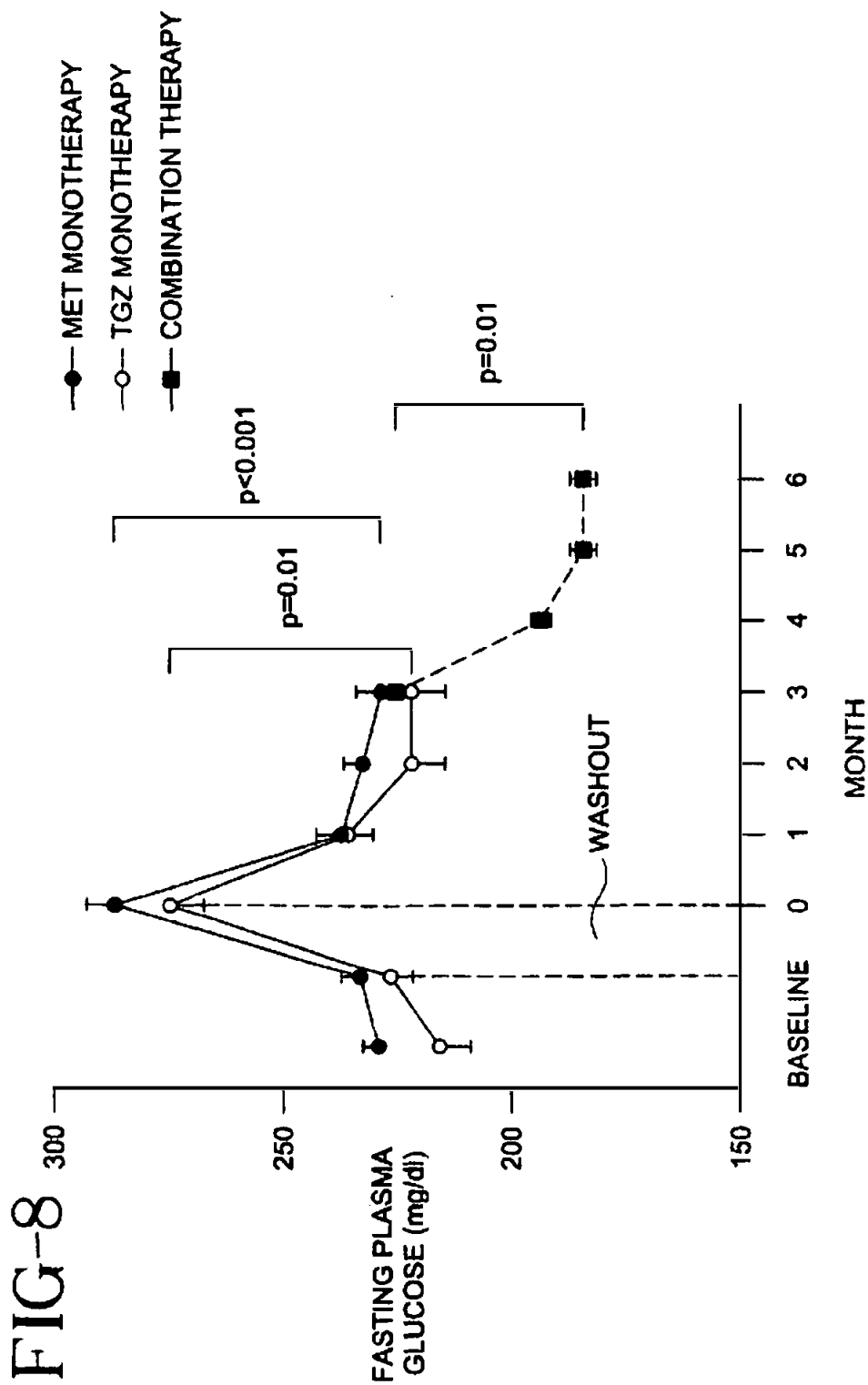
7/12

FIG-7 db/db MICE (7 DAYS, FOODADMIX)



SS

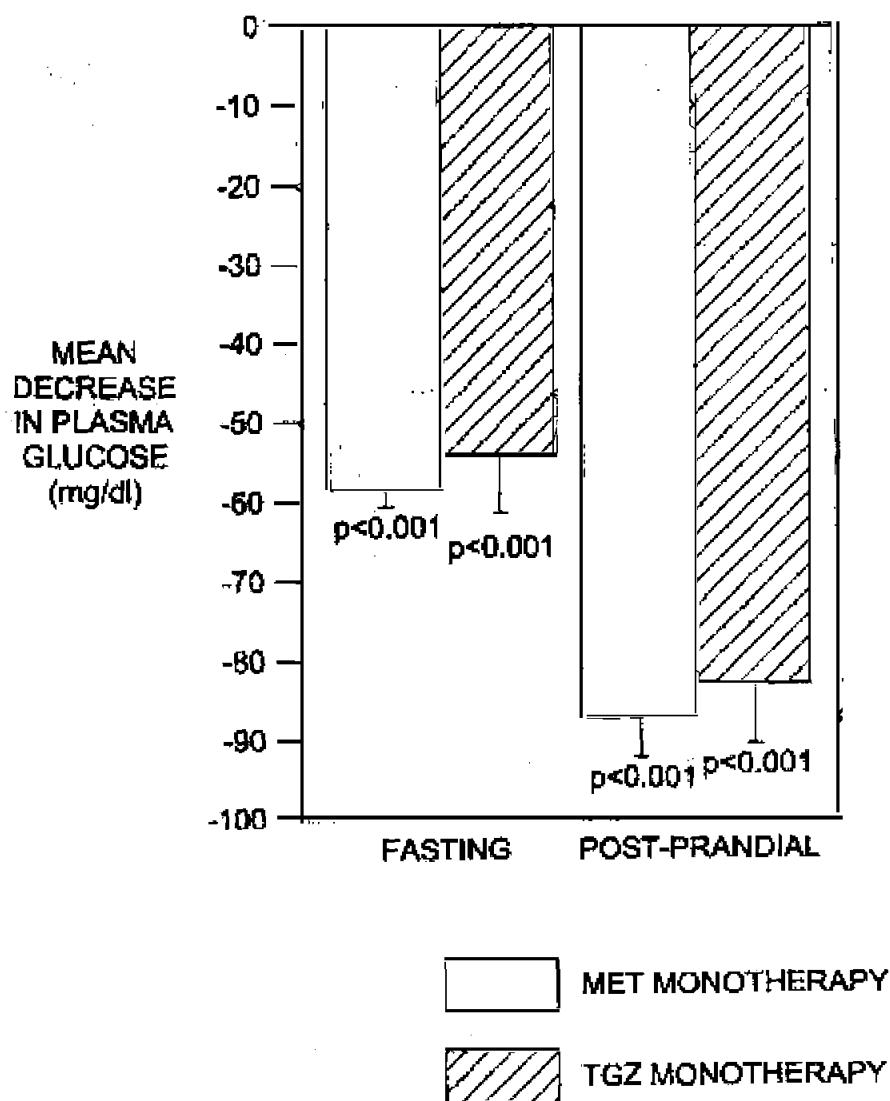
8/12



56

9/12

FIG-9



10/12

FIG-10B

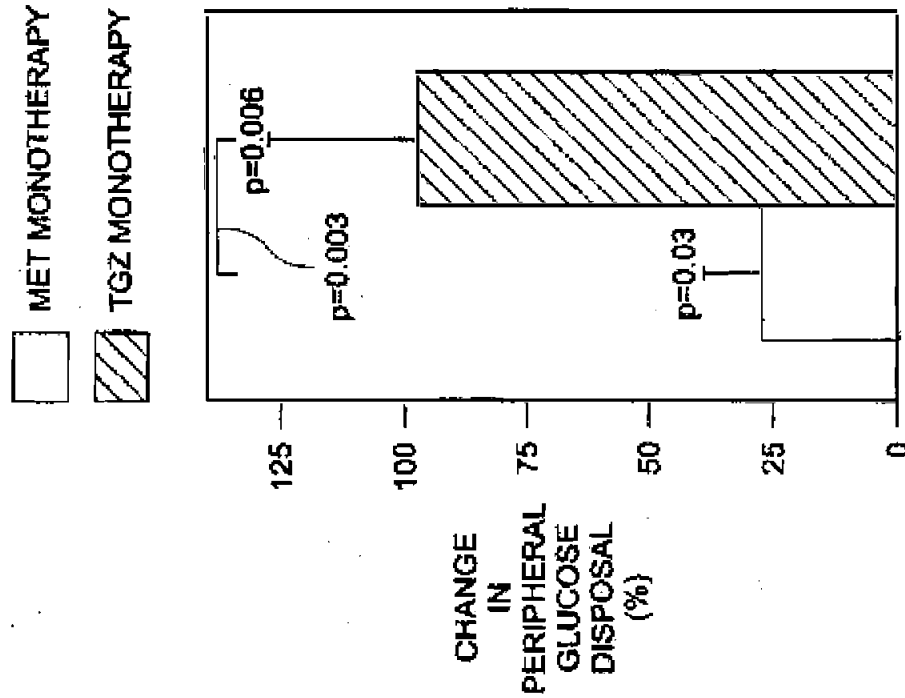
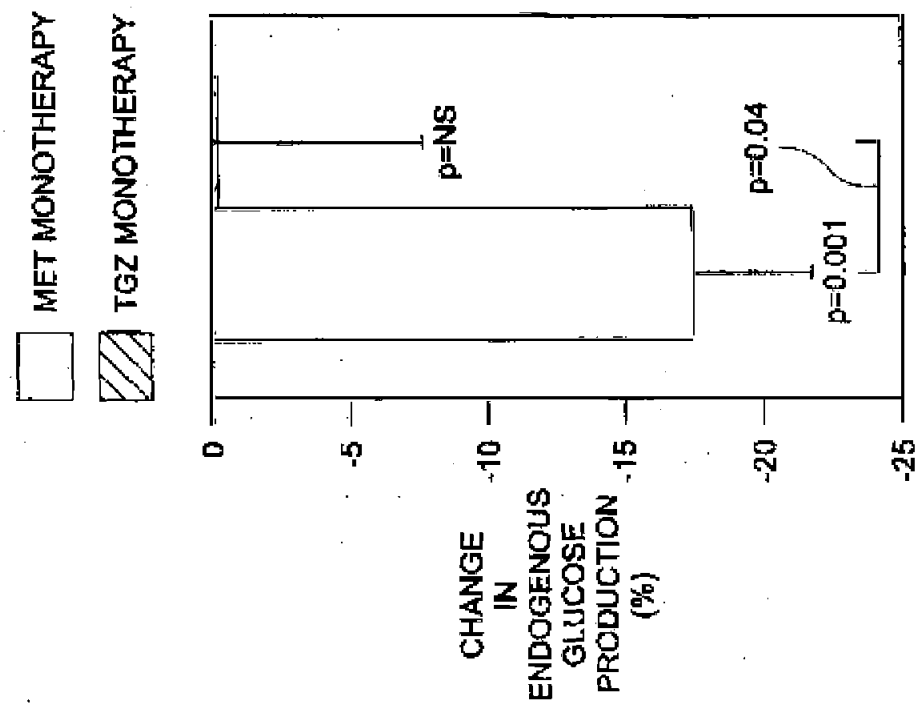
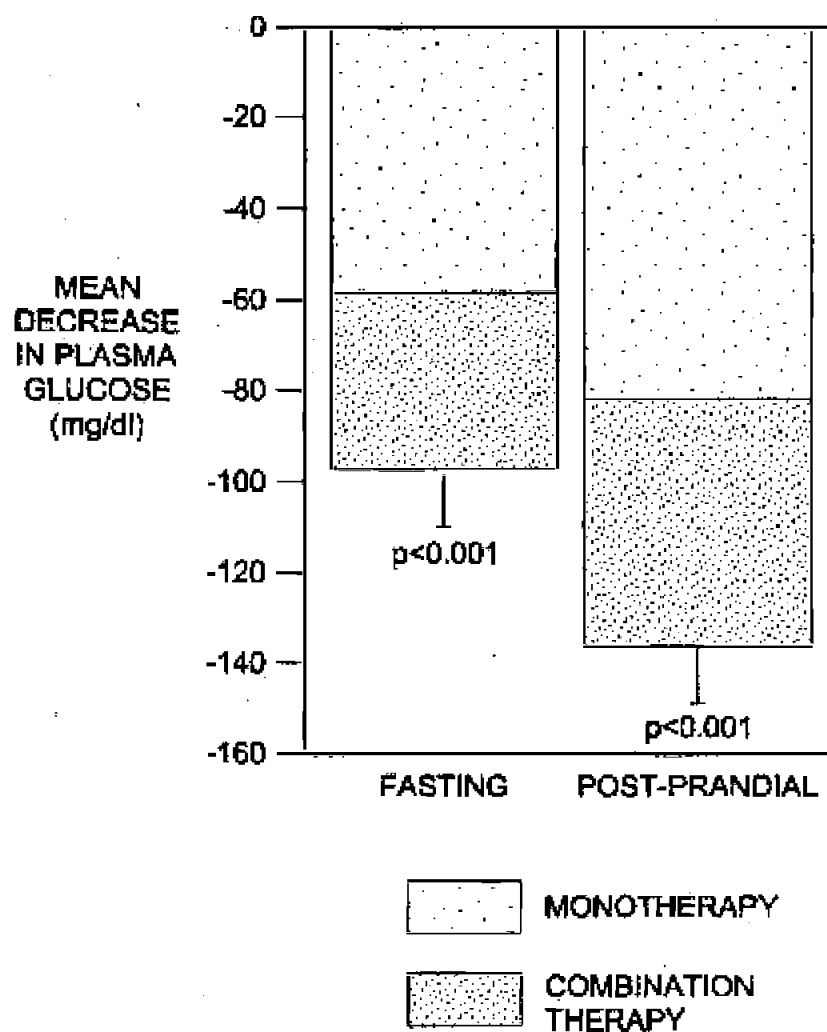


FIG-10A

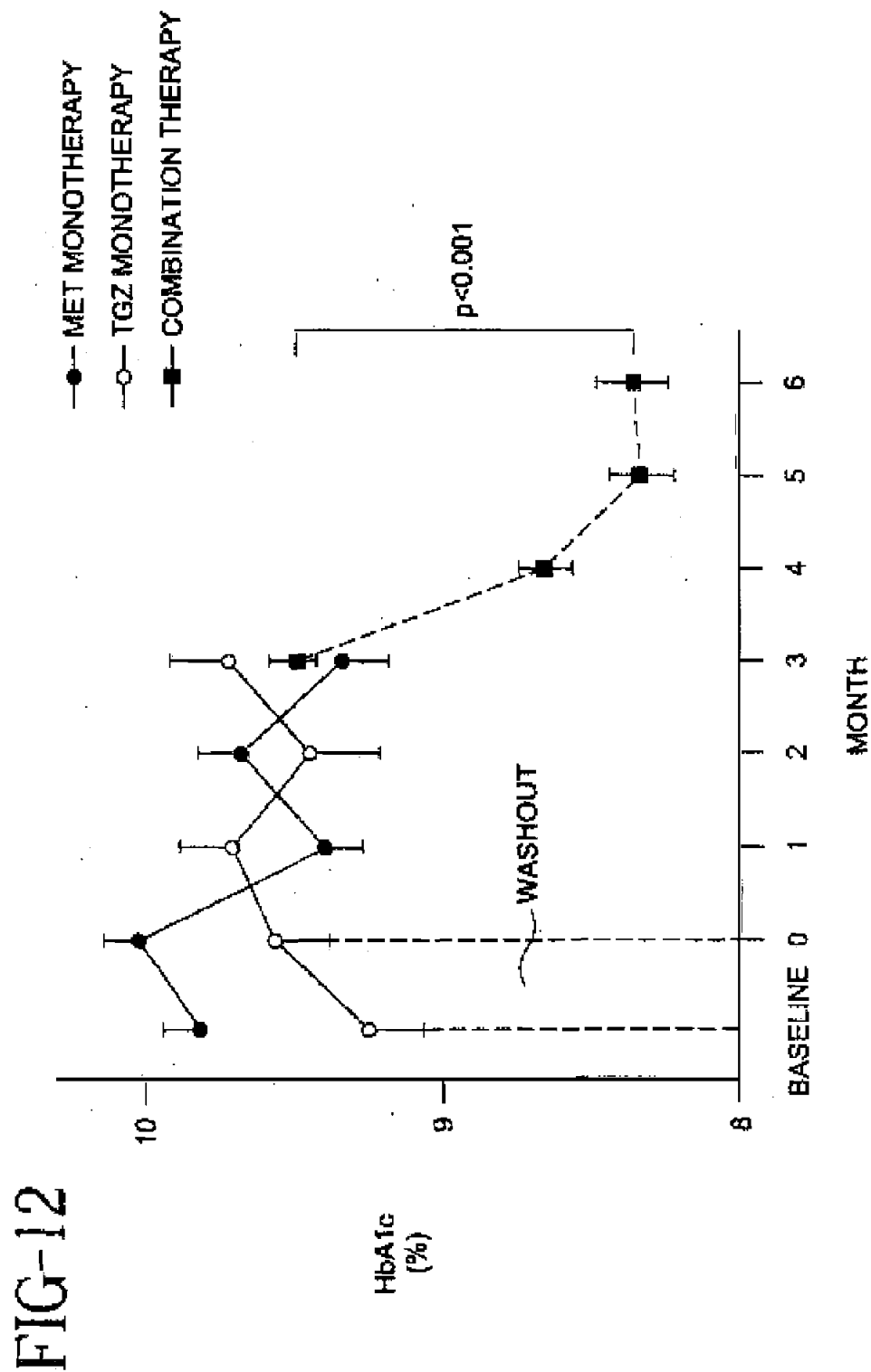


11/12

FIG-11



12/12



INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US 99/18140

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K31/64

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)

IPC 7 A61K

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KAPPEL C ET AL: "Type 2 diabetes: Update on therapy" COMPREHENSIVE THERAPY, US, AMERICAN SOCIETY OF CONTEMPORARY MEDICINE AND, vol. 24, no. 6/07, 1 June 1998 (1998-06-01), pages 319-326, XP002080974 ISSN: 0098-8243 page 323, column 2, paragraph 6 -page 324, column 1, paragraph 1 page 324, column 2, paragraph 2 figure 1 -- -/-	1-22

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" documents 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 doubt 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

"P" 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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

14 February 2000

Date of mailing of the international search report

28/02/2000

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Fax (+31-70) 340-3010

Authorized officer

Cielen, E

INTERNATIONAL SEARCH REPORT

Intern. Appl. No.
PCT/US 99/18140

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X A	EP 0 861 666 A (TAKEDA CHEMICAL INDUSTRIES LTD) 2 September 1998 (1998-09-02) abstract page 3, line 16 - line 55 page 8, line 32 - line 58 page 9, line 42 - line 55 page 10, line 3 - line 17 page 11, line 21 - line 27 claims	21,22 7
X A	SCHEEN AJ ET AL: "Oral antidiabetic agents. A guide to selection" DRUGS, AT, ADIS INTERNATIONAL LTD, vol. 55, no. 2, 1 February 1998 (1998-02-01), pages 225-236, XP002080821 ISSN: 0012-6667 page 226, column 1, paragraph 3 -column 2, paragraph 1 figure 2 page 232, column 1, paragraph 3 page 232, column 2, paragraph 1 page 234, column 1, paragraph 1	8,9 1-7, 10-22
X	WASIELEWSKI S: "Troglitazone in type II diabetes mellitus" DEUTSCHE APOTHEKER ZEITUNG, DE, DEUTSCHER APOTHEKER ZEITUNG, STUTTGART, vol. 138, no. 27, 2 July 1998 (1998-07-02), pages 28-29, XP002080883 ISSN: 0011-9857 page 29, column 1, paragraph 2 -column 2, paragraph 1	8,9

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63

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 99/18140

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 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. ☒ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
Remark: Although claim(s) 10-22
is(are) 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. ☐ 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. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(e).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

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

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all
searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment
of any additional fee.
3. ☐ 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. ☐ 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.
- ☐ No protest accompanied the payment of additional search fees.

64

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/US 99/18140

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