

# IRBESARTAN- irbesartan tablet

## Solco Healthcare U.S., LLC

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### HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use IRBESARTAN TABLETS safely and effectively. See full prescribing information for IRBESARTAN TABLETS.

IRBESARTAN tablets, for oral use  
Initial U.S. Approval: 1997

#### WARNING: FETAL TOXICITY

*See full prescribing information for complete boxed warning.*

- **When pregnancy is detected, discontinue irbesartan tablets as soon as possible. (5.1, 8.1)**
- **Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus. (5.1, 8.1)**

#### INDICATIONS AND USAGE

Irbesartan tablets are an angiotensin II receptor blocker (ARB) indicated for:

- Treatment of hypertension, to lower blood pressure. Lowering blood pressure reduces the risk of fatal and nonfatal cardiovascular events, primarily strokes and myocardial infarctions. (1.1)
- Treatment of diabetic nephropathy in hypertensive patients with type 2 diabetes, an elevated serum creatinine, and proteinuria. (1.2)

#### DOSAGE AND ADMINISTRATION

Indication	Dose
Hypertension (2.2)	150 to 300 mg once daily
Diabetic Nephropathy (2.3)	300 mg once daily

#### DOSAGE FORMS AND STRENGTHS

- Tablets: 75 mg, 150 mg, 300 mg (3)

#### CONTRAINDICATIONS

- Hypersensitivity to any component of this product. (4)
- Coadministration with aliskiren in patients with diabetes. (4)

#### WARNINGS AND PRECAUTIONS

- Hypotension: Correct volume or salt depletion prior to administration. (5.2)
- Monitor renal function and serum potassium. (5.3)

#### ADVERSE REACTIONS

- **Nephropathy in type 2 diabetic patients: The most common adverse reactions which were more frequent than placebo were hyperkalemia dizziness, orthostatic dizziness, and orthostatic hypotension. (6.1)**

To report SUSPECTED ADVERSE REACTIONS, contact Solco Healthcare US LLC. at 1-866-257-2597 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).

#### DRUG INTERACTIONS

- Lithium: Risk of lithium toxicity. (7)
- Nonsteroidal Anti-inflammatory Drugs (NSAIDs) and COX-2 inhibitors: Increased risk of renal

- impairment. Reduced antihypertensive effects. (7)
- Dual blockade of the renin-angiotensin system: Increased risk of renal impairment, hypotension, and hyperkalemia. (7)

----- **USE IN SPECIFIC POPULATIONS** -----

- Lactation: Potential for adverse effects in infants. (8.2)

**See 17 for PATIENT COUNSELING INFORMATION.**

**Revised: 7/2021**

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## **FULL PRESCRIBING INFORMATION**

### **WARNING: FETAL TOXICITY**

- **When pregnancy is detected, discontinue irbesartan tablets as soon as possible[see *Warnings and Precautions (5.1)* and *Use in Specific Populations (8.1)*].**
- **Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus [see *Warnings and Precautions (5.1)* and *Use in Specific Populations (8.1)*].**

## **1 INDICATIONS AND USAGE**

### **1.1 Hypertension**

Irbesartan tablets are indicated for the treatment of hypertension, to lower blood pressure. Lowering blood pressure lowers the risk of fatal and non-fatal cardiovascular (CV) events, primarily strokes and myocardial infarction. These benefits have been seen in controlled trials of antihypertensive drugs from a wide variety of pharmacologic classes including this drug.

Control of high blood pressure should be part of comprehensive cardiovascular risk management, including, as appropriate, lipid control, diabetes management, antithrombotic therapy, smoking cessation, exercise, and limited sodium intake. Many patients will require more than 1 drug to achieve blood pressure goals. For specific advice on goals and management, see published guidelines, such as those of the National High Blood Pressure Education Program's Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC).

Numerous antihypertensive drugs, from a variety of pharmacologic classes and with different mechanisms of action, have been shown in randomized controlled trials to reduce cardiovascular morbidity and mortality, and it can be concluded that it is blood pressure reduction, and not some other pharmacologic property of the drugs, that is largely responsible for those benefits. The largest and most consistent cardiovascular outcome benefit has been a reduction in the risk of stroke, but reductions in myocardial infarction and cardiovascular mortality also have been seen regularly.

Elevated systolic or diastolic pressure causes increased cardiovascular risk, and the

absolute risk increase per mmHg is greater at higher blood pressures, so that even modest reductions of severe hypertension can provide substantial benefit. Relative risk reduction from blood pressure reduction is similar across populations with varying absolute risk, so the absolute benefit is greater in patients who are at higher risk independent of their hypertension (for example, patients with diabetes or hyperlipidemia), and such patients would be expected to benefit from more aggressive treatment to a lower blood pressure goal.

Some antihypertensive drugs have smaller blood pressure effects (as monotherapy) in black patients, and many antihypertensive drugs have additional approved indications and effects (e.g., on angina, heart failure, or diabetic kidney disease). These considerations may guide selection of therapy.

Irbesartan tablets may be used alone or in combination with other antihypertensive agents.

## **1.2 Nephropathy in Type 2 Diabetic Patients**

Irbesartan tablets are indicated for the treatment of diabetic nephropathy in patients with type 2 diabetes and hypertension, an elevated serum creatinine, and proteinuria (>300 mg/day). In this population, irbesartan tablets reduce the rate of progression of nephropathy as measured by the occurrence of doubling of serum creatinine or end-stage renal disease (need for dialysis or renal transplantation) [see *Clinical Studies (14.2)*].

## **2 DOSAGE AND ADMINISTRATION**

### **2.1 General Considerations**

Irbesartan tablets may be administered with other antihypertensive agents and with or without food.

### **2.2 Hypertension**

The recommended initial dose of irbesartan tablets is 150 mg once daily. The dosage can be increased to a maximum dose of 300 mg once daily as needed to control blood pressure [see *Clinical Studies (14.1)*].

### **2.3 Nephropathy in Type 2 Diabetic Patients**

The recommended dose is 300 mg once daily [see *Clinical Studies (14.2)*].

### **2.4 Dose Adjustment in Volume and Salt-Depleted Patients**

The recommended initial dose is 75 mg once daily in patients with depletion of intravascular volume or salt (e.g., patients treated vigorously with diuretics or on hemodialysis) [see *Warnings and Precautions (5.2)*].

## **3 DOSAGE FORMS AND STRENGTHS**

Irbesartan tablet USP, 75 mg is a white to off-white biconvex oval tablet debossed 'HH' on one side and '329' on the other.

Irbesartan tablet USP, 150 mg is a white to off-white biconvex oval tablet debossed 'HH' on one side and '330' on the other.

Irbesartan tablet USP, 300 mg is a white to off-white biconvex oval tablet debossed 'HH' on one side and '331' on the other.

## **4 CONTRAINDICATIONS**

Irbesartan tablets are contraindicated in patients who are hypersensitive to any component of this product.

Do not coadministrate aliskiren with irbesartan tablets in patients with diabetes.

## **5 WARNINGS AND PRECAUTIONS**

### **5.1 Fetal Toxicity**

Irbesartan tablets can cause fetal harm when administered to a pregnant woman. Use of drugs that act on the renin-angiotensin system during the second and third trimesters of pregnancy reduces fetal renal function and increases fetal and neonatal morbidity and death. Resulting oligohydramnios can be associated with fetal lung hypoplasia and skeletal deformations. Potential neonatal adverse effects include skull hypoplasia, anuria, hypotension, renal failure, and death. When pregnancy is detected, discontinue irbesartan tablets as soon as possible [see *Use in Specific Populations (8.1)*].

### **5.2 Hypotension in Volume or Salt-Depleted Patients**

In patients with an activated renin-angiotensin system, such as volume or salt-depleted patients (e.g. those being treated with high doses of diuretics), symptomatic hypotension may occur after initialization of treatment with irbesartan tablets. Correct volume or salt depletion prior to administration of irbesartan tablets or use a lower starting dose [see *Dosage and Administration (2.4)*].

### **5.3 Impaired Renal Function**

Changes in renal function including acute renal failure can be caused by drugs that inhibit the renin-angiotensin system. Patients whose renal function may depend in part on the activity of the renin-angiotensin system (e.g., patients with renal artery stenosis, chronic kidney disease, severe heart failure, or volume depletion) may be at particular risk of developing acute renal failure or death on irbesartan tablets. Monitor renal function periodically in these patients. Consider withholding or discontinuing therapy in patients who develop a clinically significant decrease in renal function on irbesartan tablets [see *Drug Interactions (7.3)*].

## **6 ADVERSE REACTIONS**

The following important adverse reactions are described elsewhere in the labeling:

- Hypotension in Volume or Salt-Depleted Patients [see *Warnings and Precautions (5.2)*]
- Impaired Renal Function [see *Warnings and Precautions (5.3)*]

## 6.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. The adverse reaction information from clinical trials does, however, provide a basis for identifying the adverse events that appear to be related to drug use and for approximating rates.

### Hypertension

Irbesartan tablets have been evaluated for safety in more than 4300 patients with hypertension and about 5000 subjects overall. This experience includes 1303 patients treated for over 6 months and 407 patients for 1 year or more.

In placebo-controlled clinical trials, the following adverse reactions were reported in at least 1% of patients treated with irbesartan tablets (n=1965) and at a higher incidence versus placebo (n=641), excluding those too general to be informative and those not reasonably associated with the use of drug because they were associated with the condition being treated or are very common in the treated population, include: diarrhea (3% vs 2%), dyspepsia/heartburn (2% vs 1%), and fatigue (4% vs 3%).

Irbesartan use was not associated with an increased incidence of dry cough, as is typically associated with ACE inhibitor use. In placebo-controlled studies, the incidence of cough in irbesartan-treated patients was 2.8% versus 2.7% in patients receiving placebo.

### Nephropathy in Type 2 Diabetic Patients

*Hyperkalemia:* In the Irbesartan Diabetic Nephropathy Trial (IDNT) (proteinuria  $\geq$ 900 mg/day, and serum creatinine ranging from 1.0-3.0 mg/dL), the percent of patients with potassium >6 mEq/L was 18.6% in the irbesartan tablets group versus 6.0% in the placebo group. Discontinuations due to hyperkalemia in the irbesartan tablets group were 2.1% versus 0.4% in the placebo group.

In IDNT, the adverse reactions were similar to those seen in patients with hypertension with the exception of an increased incidence of orthostatic symptoms which occurred more frequently in the irbesartan tablets versus placebo group: dizziness (10.2% vs 6.0%), orthostatic dizziness (5.4% vs 2.7%) and orthostatic hypotension (5.4% vs 3.2%).

## 6.2 Postmarketing Experience

The following adverse reactions have been identified during postapproval use of irbesartan tablets. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to estimate reliably their frequency or to establish a causal relationship to drug exposure.

Urticaria; angioedema (involving swelling of the face, lips, pharynx, and/or tongue); anaphylactic reaction including anaphylactic shock; increased liver function tests; jaundice; hepatitis; hyperkalemia; anemia; thrombocytopenia; increased CPK; tinnitus.

## **7 DRUG INTERACTIONS**

### **7.1 Agents Increasing Serum Potassium**

Coadministration of irbesartan tablets with other drugs that raise serum potassium levels may result in hyperkalemia, sometimes severe. Monitor serum potassium in such patients.

### **7.2 Lithium**

Increases in serum lithium concentrations and lithium toxicity have been reported with concomitant use of irbesartan and lithium. Monitor lithium levels in patients receiving irbesartan and lithium.

### **7.3 Nonsteroidal Anti-inflammatory Drugs (NSAIDs) Including Selective Cyclooxygenase-2 Inhibitors (COX-2 Inhibitors)**

In patients who are elderly, volume-depleted (including those on diuretic therapy), or with compromised renal function, coadministration of NSAIDs, including selective COX-2 inhibitors, with angiotensin II receptor antagonists (including irbesartan) may result in deterioration of renal function, including possible acute renal failure. These effects are usually reversible. Monitor renal function periodically in patients receiving irbesartan and NSAID therapy.

The antihypertensive effect of angiotensin II receptor antagonists, including irbesartan, may be attenuated by NSAIDs including selective COX-2 inhibitors.

### **7.4 Dual Blockade of the Renin-Angiotensin System (RAS)**

Dual blockade of the RAS with angiotensin receptor blockers, ACE inhibitors, or aliskiren is associated with increased risks of hypotension, hyperkalemia, and changes in renal function (including acute renal failure) compared to monotherapy. Most patients receiving the combination of two RAS inhibitors do not obtain any additional benefit compared to monotherapy. In general, avoid combined use of RAS inhibitors. Closely monitor blood pressure, renal function and electrolytes in patients on irbesartan tablets and other agents that affect the RAS.

Do not coadminister aliskiren with irbesartan tablets in patients with diabetes. Avoid use of aliskiren with irbesartan tablets in patients with renal impairment (GFR <60 mL/min).

## **8 USE IN SPECIFIC POPULATIONS**

### **8.1 Pregnancy**

#### Risk Summary

Irbesartan tablets can cause fetal harm when administered to a pregnant woman. Use of drugs that act on the renin-angiotensin system during the second and third trimesters of pregnancy reduces fetal renal function and increases fetal and neonatal morbidity and death [see *Clinical Considerations*]. Most epidemiologic studies examining fetal abnormalities after exposure to antihypertensive use in the first trimester have not distinguished drugs affecting the renin-angiotensin system from other antihypertensive agents. When pregnancy is detected, discontinue irbesartan tablets as soon as possible.

All pregnancies have a background risk of birth defect, loss or other adverse outcomes regardless of drug exposure. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

### Clinical Considerations

#### Disease-associated maternal and/or embryo-fetal risk

Hypertension in pregnancy increases the maternal risk for preeclampsia, gestational diabetes, premature delivery, and delivery complications (e.g., need for cesarean section and postpartum hemorrhage). Hypertension increases the fetal risk for intrauterine growth restriction and intrauterine death. Pregnant women with hypertension should be carefully monitored and managed accordingly.

#### Fetal/neonatal adverse reactions

Oligohydramnios in pregnant women who use drugs affecting the renin-angiotensin system in the second and third trimesters of pregnancy can result in the following: reduced fetal renal function leading to anuria and renal failure, fetal lung hypoplasia, skeletal deformations, including skull hypoplasia, hypotension, and death.

In the unusual case that there is no appropriate alternative to therapy with drugs affecting the renin-angiotensin system for a particular patient, apprise the mother of the potential risk to the fetus.

Perform serial ultrasound examinations to assess the intra-amniotic environment. Fetal testing may be appropriate, based on the week of pregnancy. Patients and physicians should be aware, however, that oligohydramnios may not appear until after the fetus has sustained irreversible injury. If oligohydramnios is observed, consider alternative treatment. Closely observe infants with histories of *in utero* exposure to irbesartan tablets for hypotension, oliguria, and hyperkalemia and other symptoms of renal impairment. In neonates with a history of *in utero* exposure to irbesartan tablets, if oliguria or hypotension occurs, direct attention toward support of blood pressure and renal perfusion. Exchange transfusion or dialysis may be required as means of reversing hypotension and/or substituting for disordered renal function.

### Data

#### Animal data

Irbesartan crosses the placenta in rats and rabbits. In female rats given irbesartan prior to mating through gestation and lactation at oral doses of 50, 180, or 650 mg/kg/day (1.6 to 21.1 times the maximum recommended human dose (MRHD) based on body surface area), fetuses examined on Gestation Day 20 showed increased incidences of hydroureter and renal pelvic cavitation and/or absence of renal papilla in all irbesartan-treated groups. Subcutaneous edema also occurred in fetuses at maternal doses  $\geq 180$  mg/kg/day (5.8 times the MRHD). These anomalies occurred when female rats received irbesartan from prior to mating through Day 20 of gestation but were not observed in pups postnatally in the same study, or when irbesartan was given to pregnant rats only during organogenesis (Gestation Day 6 through Gestation Day 15) at oral doses from 50 to 450 mg/kg/day (up to 14.6 times the MHRD). In addition, no adverse effects on kidney development were observed in pups from dams given irbesartan from Gestation Day 15 through Lactation Day 24 at doses of 50, 180, or 650 mg/kg/day (up to 21.1 times the MHRD). The observed effects are believed to be late gestational effects of the



drug. Pregnant rabbits given oral doses of irbesartan of 30 mg/kg/day (1.9 times the MRHD based on body surface area) experienced a high rate of maternal mortality and abortion. Surviving females had a slight increase in early resorptions and a corresponding decrease in live fetuses.

Radioactivity was present in the rat and rabbit fetuses during late gestation following oral doses of radiolabeled irbesartan.

Radioactivity was present in the rat and rabbit fetus during late gestation and in rat milk following oral doses of radiolabeled irbesartan.

## **8.2 Lactation**

There are no available data on the presence of irbesartan in human milk, effects on milk production, or the breastfed infant. Irbesartan or some metabolite of irbesartan is secreted in the milk of lactating rats [see *Clinical Pharmacology (12.3)*]. Because of the potential for adverse effects on the nursing infant, the use of irbesartan tablets in breastfeeding women is not recommended.

## **8.4 Pediatric Use**

Irbesartan, in a study at a dose of up to 4.5 mg/kg/day, once daily, did not appear to lower blood pressure effectively in pediatric patients ages 6 to 16 years.

Irbesartan tablets have not been studied in pediatric patients less than 6 years old.

## **8.5 Geriatric Use**

Of 4925 subjects receiving irbesartan tablets in controlled clinical studies of hypertension, 911 (18.5%) were 65 years and over, while 150 (3.0%) were 75 years and over. No overall differences in effectiveness or safety were observed between these subjects and younger subjects, but greater sensitivity of some older individuals cannot be ruled out. [See *Clinical Pharmacology (12.3)* and *Clinical Studies (14.1)*.]

## **10 OVERDOSAGE**

No data are available in regard to overdosage in humans. However, daily doses of 900 mg for 8 weeks were well-tolerated. The most likely manifestations of overdosage are expected to be hypotension and tachycardia; bradycardia might also occur from overdose. Irbesartan is not removed by hemodialysis.

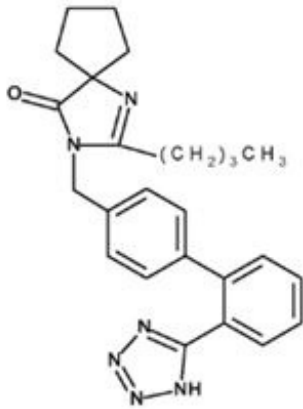
Acute oral toxicity studies with irbesartan in mice and rats indicated acute lethal doses were in excess of 2000 mg/kg, about 25-fold and 50-fold the MRHD (300 mg) base on body surface area, respectively.

## **11 DESCRIPTION**

Irbesartan is an angiotensin II receptor (AT<sub>1</sub> subtype) antagonist.

Irbesartan is a non-peptide compound, chemically described as a 2-butyl-3-[p-(o-1H-tetrazol-5-ylphenyl)benzyl]-1,3-diazaspiro[4.4]non-1-en-4-one.

Its empirical formula is C<sub>25</sub>H<sub>28</sub>N<sub>6</sub>O, and the structural formula:



Irbesartan is a white to off-white crystalline powder with a molecular weight of 428.5. It is a nonpolar compound with a partition coefficient (octanol/water) of 10.1 at pH of 7.4. Irbesartan is slightly soluble in alcohol and methylene chloride and practically insoluble in water.

Irbesartan tablets are available for oral administration in unscored tablets containing 75 mg, 150 mg, or 300 mg of irbesartan. Inactive ingredients include: lactose monohydrate, microcrystalline cellulose, croscarmellose sodium, hypromellose, and magnesium stearate.

## 12 CLINICAL PHARMACOLOGY

### 12.1 Mechanism of Action

Angiotensin II is a potent vasoconstrictor formed from angiotensin I in a reaction catalyzed by angiotensin-converting enzyme (ACE, kininase II). Angiotensin II is the primary vasoactive hormone of the renin-angiotensin system, and an important component in the pathophysiology of hypertension. It also stimulates aldosterone secretion by the adrenal cortex. Irbesartan blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II by selectively binding to the AT<sub>1</sub> angiotensin II receptor found in many tissues (e.g., vascular smooth muscle, adrenal gland). There is also an AT<sub>2</sub> receptor in many tissues, but it is not involved in cardiovascular homeostasis.

Irbesartan is a specific competitive antagonist of AT<sub>1</sub> receptors with a much greater affinity (more than 8500-fold) for the AT<sub>1</sub> receptor than for the AT<sub>2</sub> receptor and no agonist activity.

Blockade of the AT<sub>1</sub> receptor removes the negative feedback of angiotensin II on renin secretion, but the resulting increased plasma renin activity and circulating angiotensin II do not overcome the effects of irbesartan on blood pressure.

Irbesartan does not inhibit ACE or renin or affect other hormone receptors or ion channels known to be involved in the cardiovascular regulation of blood pressure and sodium homeostasis.

## 12.2 Pharmacodynamics

In healthy subjects, single oral irbesartan doses of up to 300 mg produced dose-dependent inhibition of the pressor effect of angiotensin II infusions. Inhibition was complete (100%) 4 hours following oral doses of 150 mg or 300 mg and partial inhibition was sustained for 24 hours (60% and 40% at 300 mg and 150 mg, respectively).

In hypertensive patients, angiotensin II receptor inhibition following chronic administration of irbesartan causes a 1.5-fold to 2-fold rise in angiotensin II plasma concentration and a 2-fold to 3-fold increase in plasma renin levels. Aldosterone plasma concentrations generally decline following irbesartan administration, but serum potassium levels are not significantly affected at recommended doses.

In hypertensive patients, chronic oral doses of irbesartan (up to 300 mg) had no effect on glomerular filtration rate, renal plasma flow, or filtration fraction. In multiple dose studies in hypertensive patients, there were no clinically important effects on fasting triglycerides, total cholesterol, HDL-cholesterol, or fasting glucose concentrations. There was no effect on serum uric acid during chronic oral administration, and no uricosuric effect.

## 12.3 Pharmacokinetics

### Absorption

The oral absorption of irbesartan is rapid and complete with an average absolute bioavailability of 60% to 80%. Following oral administration of irbesartan tablets, peak plasma concentrations of irbesartan are attained at 1.5 to 2 hours after dosing. Food does not affect the bioavailability of irbesartan.

Irbesartan exhibits linear pharmacokinetics over the therapeutic dose range.

### Distribution

Irbesartan is 90% bound to serum proteins (primarily albumin and  $\alpha_1$ -acid glycoprotein) with negligible binding to cellular components of blood. The average volume of distribution is 53 to 93 liters.

Studies in animals indicate that radiolabeled irbesartan weakly crosses the blood-brain barrier and placenta. Irbesartan is excreted in the milk of lactating rats.

### Elimination

Total plasma and renal clearances are in the range of 157 to 176 mL/min and 3.0 to 3.5 mL/min, respectively. The terminal elimination half-life of irbesartan averages 11 to 15 hours. Steady-state concentrations are achieved within 3 days. Limited accumulation of irbesartan (<20%) is observed in plasma upon repeated once-daily dosing and is not clinically relevant.

### Metabolism

Irbesartan is an orally active agent that does not require biotransformation into an active form. Irbesartan is metabolized via glucuronide conjugation and oxidation. Following oral or intravenous administration of  $^{14}\text{C}$ -labeled irbesartan, more than 80% of the circulating plasma radioactivity is attributable to unchanged irbesartan. The primary circulating metabolite is the inactive irbesartan glucuronide conjugate (approximately 6%). The remaining oxidative metabolites do not add appreciably to irbesartan's pharmacologic

activity.

*In vitro* studies indicate irbesartan is oxidized primarily by CYP2C9; metabolism by CYP3A4 is negligible.

#### Excretion

Irbesartan and its metabolites are excreted by both biliary and renal routes. Following either oral or intravenous administration of <sup>14</sup>C-labeled irbesartan, about 20% of radioactivity is recovered in the urine and the remainder in the feces, as irbesartan or irbesartan glucuronide.

#### Specific Populations

##### Sex

No sex-related differences in pharmacokinetics are observed in healthy elderly (age 65-80 years) or in healthy young (age 18-40 years) subjects. In studies of hypertensive patients, there is no sex difference in half-life or accumulation, but somewhat higher plasma concentrations of irbesartan are observed in females (11%-44%). No sex-related dosage adjustment is necessary.

##### Geriatrics

In elderly subjects (age 65-80 years), irbesartan elimination half-life is not significantly altered, but AUC and C<sub>max</sub> values are about 20% to 50% greater than those of young subjects (age 18-40 years). No dosage adjustment is necessary in the elderly.

##### Race/ethnicity

In healthy black subjects, irbesartan AUC values are approximately 25% greater than whites; there is no difference in C<sub>max</sub> values.

##### Renal impairment

The pharmacokinetics of irbesartan is not altered in patients with renal impairment or in patients on hemodialysis. Irbesartan is not removed by hemodialysis. No dosage adjustment is necessary in patients with mild to severe renal impairment unless a patient with renal impairment is also volume depleted [*see Warnings and Precautions (5.2) and Dosage and Administration (2.4)*].

##### Hepatic insufficiency

The pharmacokinetics of irbesartan following repeated oral administration are not significantly affected in patients with mild to moderate cirrhosis of the liver. No dosage adjustment is necessary in patients with hepatic insufficiency.

#### Drug-Drug Interactions

*In vitro* studies show significant inhibition of the formation of oxidized irbesartan metabolites with the known cytochrome CYP2C9 substrates/inhibitors sulphenazole, tolbutamide and nifedipine. However, in clinical studies the consequences of concomitant irbesartan on the pharmacodynamics of warfarin were negligible. Based on *in vitro* data, no interaction would be expected with drugs whose metabolism is dependent upon cytochrome P450 isoenzymes 1A1, 1A2, 2A6, 2B6, 2D6, 2E1, or 3A4.

In separate studies of patients receiving maintenance doses of warfarin, hydrochlorothiazide, or digoxin, irbesartan administration for 7 days has no effect on

the pharmacodynamics of warfarin (prothrombin time) or pharmacokinetics of digoxin. The pharmacokinetics of irbesartan are not affected by coadministration of nifedipine or hydrochlorothiazide.

## **13 NONCLINICAL TOXICOLOGY**

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

No evidence of carcinogenicity was observed when irbesartan was administered at dosages of up to 500/1000 mg/kg/day (males/females, respectively) in rats and 1000 mg/kg/day in mice for up to 2 years. For male and female rats, 500 mg/kg/day provided an average systemic exposure to irbesartan ( $AUC_{0-24 \text{ hour}}$ , bound plus unbound) about 3 and 11 times, respectively, the average systemic exposure in humans receiving the maximum recommended dose (MRHD) of 300 mg irbesartan/day, whereas 1000 mg/kg/day (administered to females only) provided an average systemic exposure about 21 times that reported for humans at the MRHD. For male and female mice, 1000 mg/kg/day provided an exposure to irbesartan about 3 and 5 times, respectively, the human exposure at 300 mg/day.

Irbesartan was not mutagenic in a battery of *in vitro* tests (Ames microbial test, rat hepatocyte DNA repair test, V79 mammalian-cell forward gene-mutation assay). Irbesartan was negative in several tests for induction of chromosomal aberrations (*in vitro*-human lymphocyte assay; *in vivo*-mouse micronucleus study).

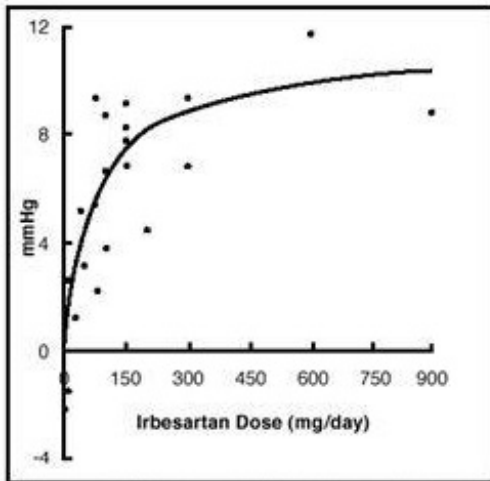
Irbesartan had no adverse effects on fertility or mating of male or female rats at oral dosages  $\leq 650$  mg/kg/day, the highest dose providing a systemic exposure to irbesartan ( $AUC_{0-24 \text{ hour}}$ , bound plus unbound) about 5 times that found in humans receiving the MRHD of 300 mg/day.

## **14 CLINICAL STUDIES**

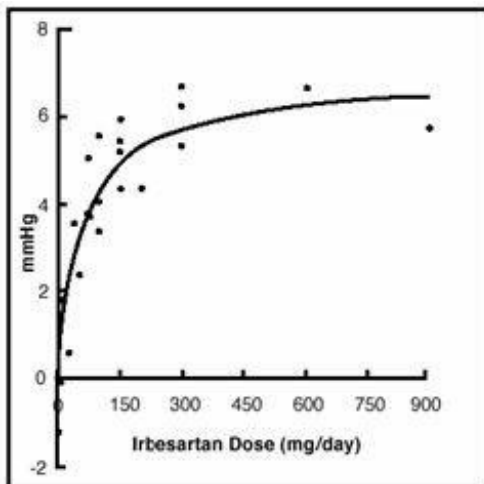
### **14.1 Hypertension**

The antihypertensive effects of irbesartan tablets were examined in 7 placebo-controlled 8- to 12-week trials in patients with baseline diastolic blood pressures of 95 to 110 mmHg. Doses of 1 to 900 mg were included in these trials in order to fully explore the dose-range of irbesartan. These studies allowed comparison of once or twice-daily regimens at 150 mg/day, comparisons of peak and trough effects, and comparisons of response by sex, age, and race. Two of the seven placebo-controlled trials identified above examined the antihypertensive effects of irbesartan and hydrochlorothiazide in combination.

The 7 studies of irbesartan monotherapy included a total of 1915 patients randomized to irbesartan (1-900 mg) and 611 patients randomized to placebo. Once-daily doses of 150 mg and 300 mg provided statistically and clinically significant decreases in systolic and diastolic blood pressure with trough (24 hours post-dose) effects after 6 to 12 weeks of treatment compared to placebo, of about 8-10/5-6 mmHg and 8-12/5-8 mmHg, respectively. No further increase in effect was seen at dosages greater than 300 mg. The dose-response relationships for effects on systolic and diastolic pressure are shown in Figures 1 and 2.



**Figure 1.** Placebo-subtracted reduction in trough SeSBP; integrated analysis



**Figure 2.** Placebo-subtracted reduction in trough SeDBP; integrated analysis

Once-daily administration of therapeutic doses of irbesartan gave peak effects at around 3 to 6 hours and, in one ambulatory blood pressure monitoring study, again around 14 hours. This was seen with both once-daily and twice-daily dosing. Trough-to-peak ratios for systolic and diastolic response were generally between 60% and 70%. In a continuous ambulatory blood pressure monitoring study, once-daily dosing with 150 mg gave trough and mean 24-hour responses similar to those observed in patients receiving twice-daily dosing at the same total daily dose.

In controlled trials, the addition of irbesartan to hydrochlorothiazide doses of 6.25 mg, 12.5 mg, or 25 mg produced further dose-related reductions in blood pressure similar to those achieved with the same monotherapy dose of irbesartan. HCTZ also had an approximately additive effect.

Analysis of age, sex, and race subgroups of patients showed that men and women, and patients over and under 65 years of age, had generally similar responses. Irbesartan was effective in reducing blood pressure regardless of race, although the effect was somewhat less in blacks (usually a low-renin population).

The effect of irbesartan is apparent after the first dose, and it is close to its full observed effect at 2 weeks. At the end of an 8-week exposure, about 2/3 of the antihypertensive effect was still present one week after the last dose. Rebound hypertension was not observed. There was essentially no change in average heart rate in irbesartan-treated patients in controlled trials.

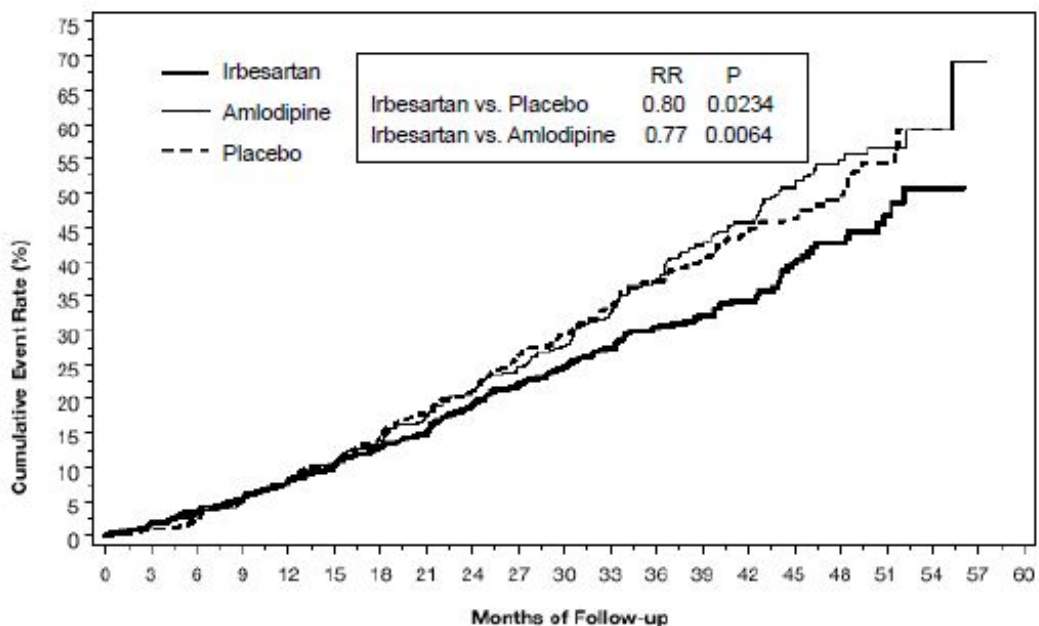
## **14.2 Nephropathy in Type 2 Diabetic Patients**

The Irbesartan Diabetic Nephropathy Trial (IDNT) was a randomized, placebo- and active-controlled, double-blind, multicenter study conducted worldwide in 1715 patients with type 2 diabetes, hypertension (SeSBP >135 mmHg or SeDBP >85 mmHg), and nephropathy (serum creatinine 1.0 to 3.0 mg/dL in females or 1.2 to 3.0 mg/dL in males and proteinuria  $\geq$ 900 mg/day). Patients were randomized to receive irbesartan tablets 75 mg, amlodipine 2.5 mg, or matching placebo once-daily. Patients were titrated to a maintenance dose of irbesartan tablets 300 mg, or amlodipine 10 mg, as tolerated. Additional antihypertensive agents (excluding ACE inhibitors, angiotensin II receptor antagonists and calcium channel blockers) were added as needed to achieve blood pressure goal ( $\leq$ 135/85 or 10 mmHg reduction in systolic blood pressure if higher than 160 mmHg) for patients in all groups.

The study population was 66.5% male, 72.9% below 65 years of age, and 72% White (Asian/Pacific Islander 5.0%, Black 13.3%, Hispanic 4.8%). The mean baseline seated systolic and diastolic blood pressures were 159 mmHg and 87 mmHg, respectively. The patients entered the trial with a mean serum creatinine of 1.7 mg/dL and mean proteinuria of 4144 mg/day.

The mean blood pressure achieved was 142/77 mmHg for irbesartan tablets, 142/76 mmHg for amlodipine, and 145/79 mmHg for placebo. Overall, 83.0% of patients received the target dose of irbesartan more than 50% of the time. Patients were followed for a mean duration of 2.6 years.

The primary composite endpoint was the time to occurrence of any one of the following events: doubling of baseline serum creatinine, end-stage renal disease (ESRD; defined by serum creatinine  $\geq$ 6 mg/dL, dialysis, or renal transplantation), or death. Treatment with irbesartan tablets resulted in a 20% risk reduction versus placebo ( $p=0.0234$ ) (see Figure 3 and Table 1). Treatment with irbesartan tablets also reduced the occurrence of sustained doubling of serum creatinine as a separate endpoint (33%), but had no significant effect on ESRD alone and no effect on overall mortality (see Table 1).



The percentages of patients experiencing an event during the course of the study can be seen in Table 1 below:

**Table 1: IDNT: Components of Primary Composite Endpoint**

	Comparison with Placebo				Comparison with Amlodipine		
	Irbesartan N=579 (%)	Placebo N=569 (%)	Hazard Ratio	95% CI	Amlodipine N=567 (%)	Hazard Ratio	95% CI
Primary Composite Endpoint	32.6	39.0	0.80	0.66-0.97 (p=0.0234)	41.1	0.77	0.63-0.93
Breakdown of first occurring event contributing to primary endpoint							
2x creatinine	14.2	19.5	---	---	22.8	---	---
ESRD	7.4	8.3	---	---	8.8	---	---
Death	11.1	11.2	---	---	9.5	---	---
Incidence of total events over entire period of follow-up							
2x creatinine	16.9	23.7	0.67	0.52-0.87	25.4	0.63	0.49-0.81
ESRD	14.2	17.8	0.77	0.57-1.03	18.3	0.77	0.57-1.03
Death	15.0	16.3	0.92	0.69-1.23	14.6	1.04	0.77-1.40

The secondary endpoint of the study was a composite of cardiovascular mortality and morbidity (myocardial infarction, hospitalization for heart failure, stroke with permanent neurological deficit, amputation). There were no statistically significant differences among treatment groups in these endpoints. Compared with placebo, irbesartan tablets significantly reduced proteinuria by about 27%, an effect that was evident within 3 months of starting therapy. Irbesartan tablets significantly reduced the rate of loss of



renal function (glomerular filtration rate), as measured by the reciprocal of the serum creatinine concentration, by 18.2%.

Table 2 presents results for demographic subgroups. Subgroup analyses are difficult to interpret, and it is not known whether these observations represent true differences or chance effects. For the primary endpoint, irbesartan tablets's favorable effects were seen in patients also taking other antihypertensive medications (angiotensin II receptor antagonists, angiotensin-converting--enzyme inhibitors, and calcium channel blockers were not allowed), oral hypoglycemic agents, and lipid-lowering agents.

**Table 2: IDNT: Primary Efficacy Outcome within Subgroups**

Baseline Factors	Irbesartan N=579 (%)	Comparison With Placebo		
		Placebo N=569 (%)	Hazard Ratio	95% CI
Gender				
Male	27.5	36.7	0.68	0.53-0.88
Female	42.3	44.6	0.98	0.72-1.34
Race				
White	29.5	37.3	0.75	0.60-0.95
Non-White	42.6	43.5	0.95	0.67-1.34
Age (years)				
<65	31.8	39.9	0.77	0.62-0.97
≥65	35.1	36.8	0.88	0.61-1.29

## 16 HOW SUPPLIED/STORAGE AND HANDLING

Irbesartan tablets are available as white to off-white biconvex oval tablets, debossed with "HH" on one side and a code on the other (see Table below). Unit-of-use bottles contain 30, 90 or 500 tablets as follows:

	75 mg	150 mg	300 mg
Debossing	329	330	331
Bottle of 30	43547-374-03	43547-375-03	43547-376-03
Bottle of 90	43547-374-09	43547-375-09	43547-376-09
Bottle of 500	43547-374-50	43547-375-50	43547-376-50

## 17 PATIENT COUNSELING INFORMATION

### *Pregnancy*

Advise female patients of childbearing age about the consequences of exposure to irbesartan tablets during pregnancy. Discuss treatment options with women planning to become pregnant. Patients should be asked to report pregnancies to their physicians as soon as possible.

## Potassium Supplements

Advise patients receiving irbesartan tablets not to use potassium supplements or salt substitutes containing potassium without consulting their healthcare provider [see *Drug Interactions (7.1)*].

### **Distributed by:**

Solco Healthcare US, LLC

Somerset, NJ 08873, USA

### **Manufactured by:**

Zhejiang Huahai Pharmaceutical Co., Ltd.

Xunqiao, Linhai, Zhejiang 317024, China

**Revised: 07/2021**

**200382-03**

NDC 43547-374-03 Rx only

Irbesartan

Tablets, USP

75 mg

30 Tablets

SolcoHealthcare U.S.

Each tablet contains 75 mg of Irbesartan.  
See package insert for dosing information.  
Store at 20°C and 25°C (68°F and 77°F), excursion permitted to 15°C - 30°C (59°F-86°F). [See USP Controlled Room Temperature]

Manufactured by:  
Zhejiang Huahai Pharmaceutical Co., Ltd.  
Xunqiao, Linhai, Zhejiang 317024, China

Distributed by:  
Solco Healthcare US, LLC  
Somerset, NJ 08873, USA

200371-01 Rev.: 09/2020

**NDC 43547-374-03 Rx only**

**Irbesartan  
Tablets, USP**

**75 mg**

**30 Tablets**

This box is FPO to indicate the area to be left uncoated.

NDC 43547-375-03 Rx only

Irbesartan

Tablets, USP

150 mg

30 Tablets

SolcoHealthcare U.S.

Each tablet contains 150 mg of Irbesartan.  
See package insert for dosing information.  
Store at 20°C and 25°C (68°F and 77°F), excursion permitted to 15°C - 30°C (59°F-86°F). [See USP Controlled Room Temperature]

Manufactured by:  
Zhejiang Huahai Pharmaceutical Co., Ltd.  
Xunqiao, Linhai, Zhejiang 317024, China

Distributed by:  
Solco Healthcare US, LLC  
Somerset, NJ 08873, USA

200373-01 Rev.: 09/2020

**Solco**  
Healthcare U.S.  
www.solcohealthcare.com

NDC 43547-375-03 **Rx only**

**Irbesartan  
Tablets, USP**

**150 mg**

**30 Tablets**

This box is FPO to indicate the area to be left uncoated.

NDC 43547-376-03 Rx only

Irbesartan

Tablets, USP

300 mg

30 Tablets

SolcoHealthcare U.S.

Each tablet contains 300 mg of Irbesartan.  
See package insert for dosing information.  
Store at 20°C and 25°C (68°F and 77°F), excursion permitted to 15°C - 30°C (59°F-86°F). [See USP Controlled Room Temperature]

Manufactured by:  
Zhejiang Huahai Pharmaceutical Co., Ltd.  
Xunqiao, Linhai, Zhejiang 317024, China

Distributed by:  
Solco Healthcare US, LLC  
Somerset, NJ 08873, USA

200375-01 Rev.: 09/2020

**Solco**  
Healthcare U.S.  
www.solcohealthcare.com

NDC 43547-376-03 **Rx only**

**Irbesartan  
Tablets, USP**

**300 mg**

**30 Tablets**

This box is FPO to indicate the area to be left uncoated.

## IRBESARTAN

irbesartan tablet

### Product Information

<b>Product Type</b>	HUMAN PRESCRIPTION DRUG	<b>Item Code (Source)</b>	NDC:43547-374
<b>Route of Administration</b>	ORAL		

### Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
<b>IRBESARTAN</b> (UNII: J0E2756Z 7N) (IRBESARTAN - UNII:J0E2756Z 7N)	IRBESARTAN	75 mg

## Inactive Ingredients

Ingredient Name	Strength
LACTOSE MONOHYDRATE (UNII: EWQ57Q8I5X)	
MICROCRYSTALLINE CELLULOSE (UNII: OP1R32D61U)	
HYPROMELLOSE, UNSPECIFIED (UNII: 3NXW29V3WO)	
CROSCARMELLOSE SODIUM (UNII: M28OL1HH48)	
MAGNESIUM STEARATE (UNII: 70097M6I30)	

## Product Characteristics

Color	white (white to off-white)	Score	no score
Shape	OVAL (biconvex oval)	Size	9mm
Flavor		Imprint Code	HH;329
Contains			

## Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:43547-374-03	30 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	
2	NDC:43547-374-09	90 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	
3	NDC:43547-374-50	500 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	

## Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA203071	06/13/2016	

## IRBESARTAN

irbesartan tablet

## Product Information

Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:43547-375
Route of Administration	ORAL		

## Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
IRBESARTAN (UNII: JOE2756Z7N) (IRBESARTAN - UNII:JOE2756Z7N)	IRBESARTAN	150 mg

## Inactive Ingredients

Ingredient Name	Strength
LACTOSE MONOHYDRATE (UNII: EWQ57Q8I5X)	
MICROCRYSTALLINE CELLULOSE (UNII: OP1R32D61U)	
HYPROMELLOSE, UNSPECIFIED (UNII: 3NXW29V3WO)	
CROSCARMELLOSE SODIUM (UNII: M28OL1HH48)	
MAGNESIUM STEARATE (UNII: 70097M6I30)	

## Product Characteristics

Color	white (white to off-white)	Score	no score
Shape	OVAL (biconvex oval)	Size	12mm
Flavor		Imprint Code	HH;330
Contains			

## Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:43547-375-03	30 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	
2	NDC:43547-375-09	90 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	
3	NDC:43547-375-50	500 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	

## Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA203071	06/13/2016	

## IRBESARTAN

irbesartan tablet

## Product Information

Product Type	HUMAN PRESCRIPTION DRUG	Item Code (Source)	NDC:43547-376
Route of Administration	ORAL		

## Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
IRBESARTAN (UNII: J0E2756Z7N) (IRBESARTAN - UNII:J0E2756Z7N)	IRBESARTAN	300 mg

## Inactive Ingredients

Ingredient Name	Strength
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<b>LACTOSE MONOHYDRATE</b> (UNII: EWQ57Q8I5X)	
<b>MICROCRYSTALLINE CELLULOSE</b> (UNII: OP1R32D61U)	
<b>HYPROMELLOSE, UNSPECIFIED</b> (UNII: 3NXW29V3WO)	
<b>CROSCARMELLOSE SODIUM</b> (UNII: M28OL1HH48)	
<b>MAGNESIUM STEARATE</b> (UNII: 70097M6I30)	

### Product Characteristics

<b>Color</b>	white (white to off-white)	<b>Score</b>	no score
<b>Shape</b>	OVAL (biconvex oval)	<b>Size</b>	16mm
<b>Flavor</b>		<b>Imprint Code</b>	HH;331
<b>Contains</b>			

### Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:43547-376-03	30 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	
2	NDC:43547-376-09	90 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	
3	NDC:43547-376-50	500 in 1 BOTTLE; Type 0: Not a Combination Product	06/13/2016	

### Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA203071	06/13/2016	

**Labeler** - Solco Healthcare U.S., LLC (828343017)

**Registrant** - Prinston Pharmaceutical Inc. (967289799)

### Establishment

Name	Address	ID/FEI	Business Operations
Zhejiang Huahai Pharmaceutical Co., Ltd.		530732460	MANUFACTURE(43547-374, 43547-375, 43547-376)

Revised: 7/2021

Solco Healthcare U.S., LLC