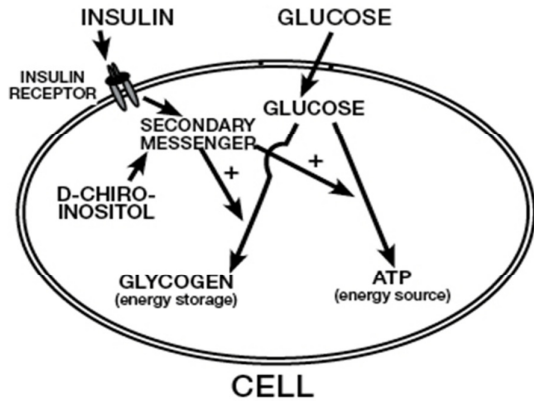


# Carbohydrate Metabolism at the Cellular Level

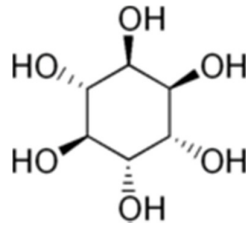


Studies by dedicated researchers such as Drs John E. Nestler, Richard Ostlund, Douglas B. Heimark & Joseph Lerner have given us a much better understanding of cellular carbohydrate metabolism and its dysfunctions.

If you were to ask the average physician, specialist endocrinologist or health care worker today which substances are involved in carbohydrate metabolism, most will only be able to tell you about the hormones insulin and glucagon, glucose, glycogen and the end product of the Krebs cycle – adenosine triphosphate (ATP) which is the basic energy unit for all cells.

Thanks to the dedication, hardwork and successful research of John Nestler and his colleagues in ten years' time most health care workers treating PCOS patients will hopefully be very familiar with d-chiro inositol, DCI-IPGs and the effects that these substances have on carbohydrate metabolism and the cascade of systemic reactions which follow on from dysfunction in these processes and causing the symptoms with which PCOS sufferers are only too well aware – hirsutism, irregular menstruation, hair loss, weight gain, low energy & acne.

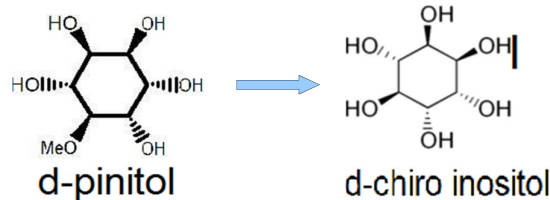
# D Chiro Inositol



(1,2,4/3,5,6-Hexahydroxycyclohexane)

Our DCI is produced under GMP standards in two simple proprietary steps using only water and ethanol. Pinitol is first extracted, purified and isolated from the juice of carob pods. Then the methyl group in the carbon 3 position of the ring is removed creating DCI.

Identifiers	Properties
<b>CAS number:</b> 643 – 12 – 9	<b>Molecular Formula:</b> C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>
	<b>Molar Mass:</b> 180.15 g/mol
	<b>Melting Point:</b> 230 °C



# D Chiro Inositol

A natural human metabolite which can treat the cause of PCOS symptoms like :

- ◆ Hair Loss
- ◆ Obesity
- ◆ Acne
- ◆ Fatigue
- ◆ Facial Hair & Excess Body Hair
- ◆ Constant Hunger & Carb Cravings
- ◆ Infrequent or absent menstrual periods
- ◆ Infertility
- ◆ Beer-Belly
- ◆ Mood Swings
- ◆ Low Energy

Web: [www.mypcos.info](http://www.mypcos.info)  
Phone: + 61 2 8090 5291

Email: [info@mypcos.info](mailto:info@mypcos.info)  
Skype: [mypcos.info](https://www.skype.com/name/mypcos.info)

## What is D Chiro Inositol?

D-Chiro Inositol (DCI) is a member of a family of substances referred to as inositols and generally considered to fall within the B vitamin complex.

It can be found in small amounts in a range of foods such as buckwheat, chickpeas, soya lecithin, pumpkin and pumpkin seeds as well as in the Ayurvedic herb bitter melon (*Momordica charantia*). It is also produced by healthy human bodies from d-pinitol and myo-inositol, both of which are relatively abundant in the average diet.

DCI plays an important role in insulin signal transduction in human metabolism as a secondary messenger. Insulin transports the sugar from the blood into the cell where a d-chiro inositol-containing Inositol Phosphoglycan or DCI-IPG converts the sugar into either adenosine triphosphate (ATP) to be used as energy or glucogen to be stored for later use.

It is currently thought that many cases of insulin resistance, polycystic ovarian syndrome and even type II diabetes mellitus are caused by a functional deficiency of this substance through both dysfunction of the enzyme which produces DCI as well as an overly efficient method of excreting what DCI is present in the body.

Studies have found that women with PCOS excrete DCI in their urine at 6 times the rate of healthy control subjects, whilst tissue biopsies taken from people with Type II diabetes have shown a significantly decreased level of DCI-IPG in their cells.

Supplementing with d-chiro inositol can help to address the functional deficiency and may increase the amount of DCI-IPG available in the cells to properly metabolise glucose into energy.

There is early evidence that DCI may also help those with Type II Diabetes Mellitus, however, further clinical trials will be required before this will be known definitively and the effect quantified. For the time being, taking DCI is an excellent way help minimise the risk of PCOS developing into Diabetes.

## How Much Should I Take?

Studies have shown positive results using a variety of dosage levels

Lean women have shown positive results with as little as 600 mg a day. The majority of the studies have been based on 1200 mg a day, but some have been based on as much as 3000 mg a day in divided doses.

Clinical results indicate that the best outcomes are obtained by women taking:

- 20 mg of DCI per kg of bodyweight per day.
- In divided doses
- 30 mins before meals on an empty stomach
- With a full glass of water
- Starting first thing on waking in the morning

Weight		Daily Dosage at 10 mg/kg	Daily Dosage at 20 mg/kg
132 lb	60 kg	600 mg	1200 mg
154 lb	70 kg	700 mg	1400 mg
176 lb	80 kg	800 mg	1600 mg
198 lb	90 kg	900 mg	1800 mg
220 lb	100 kg	1000 mg	2000 mg

To find out your optimal dose, use the following formula:

You will need to know your weight in kilograms. If you already know this, skip to step 2. Otherwise, Step 1 is to divide your weight in pounds by 2.2.

$$\underline{\hspace{2cm}} \text{ lbs } \div 2.2 = \underline{\hspace{2cm}} \text{ kg}$$

Step 2. Multiply your weight in kilograms by 20 to find out the number of milligrams of DCI you should take to get the optimal dose of 20mg/kg

$$\underline{\hspace{2cm}} \times 20 =$$

Your Weight in Kg

Mg of DCI to take per day

## What Might DCI Help With?

Human clinical studies have so far shown that DCI supplementation in women with PCOS and those who are insulin resistant can improve a whole raft of symptoms and clinical markers such as:

- ◆ Increasing cellular insulin sensitivity
- ◆ Increasing fertility
- ◆ Improving ovulation frequency by 300%
- ◆ Increasing low progesterone levels
- ◆ Reducing serum insulin levels
- ◆ Reducing raised serum androgens (testosterone) both free and total
- ◆ Reducing glycosylated haemoglobin (HbA1c) an
- ◆ Reducing plasma triglyceride levels (the amount of fat in your blood)
- ◆ Reducing (bad) LDL cholesterol
- ◆ Increasing (good) HDL cholesterol
- ◆ Reducing raised blood pressure, both systolic and diastolic

### Scientific Research:

Nestler JE, Jakubowicz DJ, Reamer P, Gunn RD, Allan G (1999). "Ovulatory and metabolic effects of D-chiro-inositol in the polycystic ovary syndrome". *N. Engl. J. Med.* 340 (17): 1314-20. PMID 10219066.

Nestler JE, Jakubowicz DJ, Luorno MJ (2000). "Role of inositolphosphoglycan mediators of insulin action in the polycystic ovary syndrome". *J. Pediatr. Endocrinol. Metab.* 13 Suppl 5: 1295-8. PMID 11117673.

Larner J (2002). "D-chiro-inositol—its functional role in insulin action and its deficit in insulin resistance". *Int. J. Exp. Diabetes Res.* 3 (1): 47-60. PMID 11900279.

Luorno MJ, Jakubowicz DJ, Baillargeon JP, et al (2002). "Effects of D-chiro-inositol in lean women with the polycystic ovary syndrome". *Endocrine practice* 8 (6): 417-23. PMID 15251831.

Sun TH, Heimark DB, Nguyen T, Nadler JL, Larner J (2002). "Both myo-inositol to chiro-inositol epimerase activities and chiro-inositol to myo-inositol ratios are decreased in tissues of GK type 2 diabetic rats compared to Wistar controls". *Biochem. Biophys. Res. Commun.* 293 (3):1092-8. PMID 12051772.

Cheang KI, Essah P, Nestler JE (2004) "A Paradox: The role of inositolphosphoglycans in mediating insulin sensitivity and hyperandrogenism in the polycystic ovarian syndrome" *Hormones* 3(4):244-251

Baillargeon JP, Apridonidze T, Diamanti-Kandarakis E, Luorno M, Ostlund RE, Nestler JE (2006) "Altered D Chiro Inositol urinary clearance in women with polycystic ovarian syndrome" *Diabetes Care* 29(2):300-305

Salley KES, Wickham EP, Cheang KI, Essah P, Karjane N, Nestler JE, (2007) "Glucose Intolerance in PCOS: AES Statement" *J Clin Endocrinol Metab* 92(12):4546-4556

Cheang KI, Baillargeon JP, Essah P, Ostlund RE, Apridonidze T, Islam L, Nestler JE (2008) "Insulin stimulated release of d-chiro inositol-containing phosphoglycan mediator correlates with insulin sensitivity in women with polycystic ovarian syndrome" *Metabolism Clinical and Experimental* 57:1390-13