



## Chromium in the diet

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Chromium is an essential trace element that enhances insulin function and influences carbohydrate, protein and fat metabolism. It has been suggested that chromium could be used as an adjunct to weight loss and to improve blood sugar control in people with diabetes. This article examines current understanding in these areas and outlines recommendations for chromium consumption.

### Where to find chromium (Cr)

When we speak about dietary chromium as needed by the human body, we refer to the trivalent form ( $\text{Cr}^{3+}$  or Cr (III)). Chromium is all around us; in the air, water and soil and is widely found in the food supply. Like other trace minerals the amount in foods is small and varies depending on exposure to chromium in the environment and during manufacture. In general, meat, shellfish, fish, eggs, wholegrain cereals, nuts, and some fruits and vegetables are good sources of chromium.

**Table 1** Dietary sources of chromium:<sup>1</sup>

<b>Food</b>	<b>Chromium content (<math>\mu\text{g}/100 \text{ g}</math>)</b>
Mussel	128
Brazil nut	100
Oyster	57
Date (dried)	29
Pear	27
Brown shrimp	26
Wholemeal flour	21
Tomato	20
Mushroom	17

Broccoli	16
Barley (wholegrain)	13
Hazelnut	12
Pork chop	10
Maize (wholegrain)	9
Egg yolk	6
Beef	3
Herring	2

## Function in the body

The biological significance of chromium came to light in the late 1950's when brewers' yeast was discovered to prevent the age-related decline in the ability to maintain normal blood sugar levels in rats. An organic chromium complex was identified as the active ingredient and this complex was labelled the 'Glucose Tolerance Factor' (GTF).<sup>2</sup> The precise nature of the GTF and the mechanism by which it boosts insulin function in the body are still not fully understood but it may promote the uptake of insulin into cells by facilitating its transfer across cell membranes.

## Blood sugar control

In type 2 diabetes, although the pancreas is producing enough insulin, muscle cells and other tissues become resistant to the action of insulin, which results in poor control of blood glucose levels. A number of studies have examined the effect of chromium supplements in those with type 2 diabetes. For example, a meta-analysis pooled the results of 41 studies and found that chromium supplements do appear to improve blood sugar control in people with type 2 diabetes, but the authors state that well-designed clinical trials are still required before any firm claims can be made.<sup>3</sup> No benefits of chromium supplements on blood glucose have been found in people without diabetes.

In 2010 the European Food Safety Authority approved the health claims that chromium 'contributes to normal macronutrient metabolism' and 'helps maintain normal glucose concentrations'. However, these claims can only be made for foods containing a significant amount of chromium - over 6 µg per 100 g of product.<sup>4</sup>

## Weight loss

Because chromium has an effect on glucose and fat metabolism, researchers have explored its potential to promote weight loss and enhance body composition (i.e. less fat, more muscle). Although some early studies found that chromium supplements led to greater weight and fat loss compared with the placebo, others did not. A double-blind, randomised trial, where women were fed similar diets (constant energy and nutrients) with or without chromium supplements, found that chromium supplements had no greater effect on weight or fat loss than the placebo.<sup>5</sup>

## Safe intakes

Research on the essentiality of chromium is still scarce. In 2011, an EU regulation on the nutrient

reference value for chromium has been set at 40 µg per day while the tolerable daily intake was 300 µg per kilogram bodyweight.<sup>6,7</sup> There was no evidence that exposure from the diet or from dietary supplements leads to intakes above this threshold. In fact, the most recent estimates for chromium intake for adults in Europe are between 57.3-83.8 µg per day.<sup>6</sup>

While it is unlikely that harmful amounts of chromium could be consumed from regular foods, chromium can be added in the manufacture of foods, and chromium supplements have become popular. There is some concern that high doses of chromium may have adverse effects on DNA and that their use as nutritional supplements and insulin enhancers should be reconsidered.<sup>8</sup>

## Eat a varied diet

As chromium is found widely in foods, eating a varied balanced diet should provide all the chromium you need. Currently, no evidence supports the use of chromium supplements for the general population.<sup>4</sup>

## References

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