WHOLE GRAINS AND HEART HEALTH

This fact sheet provides a summary of the evidence that support the hypothesis that whole grain intake can help to maintain a healthy heart.

Cardiovascular disease (CVD) accounts for one third of deaths worldwide (WHO, 2003). Epidemiological studies consistently show a strong inverse relationship between the intake of whole grains and risk of CVD. This has been translated into population wide dietary advice to consume more whole grains. There are also a number of approved health claims globally which aim to encourage consumers to eat more whole grains as a strategy to reduce the risk of CVD.

EPIGENOMICS EVIDENCE SUPPORTING THE ROLE OF WHOLE GRAINS AS A STRATEGY FOR PREVENTION OF CVD

WHOLE GRAINS AND CVD

A review of 116 epidemiological cohort studies which evaluated the relationship between dietary intake of whole grains and CVD risk scores found that there is a consistent inverse association observed in all studies. The highest quartile of whole grain intake had a 21% lower risk of CVD, when compared to the lowest quintile of intake. In addition, several reviews published since 2010 have concluded that nutritional approaches to the prevention of CVD should include a consumption of whole grains (Anderson et al. 2010; Slavin JL, Jacobs D, Marquart L, Wiemer K (2001); Slavin JL, Jacobs D, Marquart L, Wiemer K (2001)).

In the meta analysis conducted by Slavin et al. in 2001; Slavin JL, Jacobs D, Marquart L, Wiemer K (2001) the intake of whole grains of 2.5 servings per day (versus 0.2 servings per day) was associated with a 12% lower risk of CVD.

The intake of whole grains appears to provide some evidence for protective effects in all major risk factors for cardiovascular disease.

WHOLE GRAINS AND HEALTHY LIFESTYLE

The results of both these meta analyses provide strong support for the hypothesis that intake of whole grains around 5 servings per day is cardioprotective (see Table 2).

Table 2: Components of whole grains and their protective effect on CVD

<table>
<thead>
<tr>
<th>Active component</th>
<th>Potential mechanism of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytochemicals</td>
<td>Absorb oxygen, prevent oxidation, inhibit cell proliferation, reduce inflammation, act as antioxidants</td>
</tr>
<tr>
<td>Antioxidants</td>
<td>Absorb oxygen, prevent oxidation, inhibit cell proliferation, reduce inflammation, act as antioxidants</td>
</tr>
<tr>
<td>Plant Sterols</td>
<td>Absorb oxygen, prevent oxidation, inhibit cell proliferation, reduce inflammation, act as antioxidants</td>
</tr>
<tr>
<td>Lignans</td>
<td>Absorb oxygen, prevent oxidation, inhibit cell proliferation, reduce inflammation, act as antioxidants</td>
</tr>
</tbody>
</table>

WHY DO WHOLE GRAINS HAVE SUCH HEALTH EFFECTS?

The intake of whole grain foods protects against heart disease and stroke. Whole grain consumption has been shown to be linked to improvements in body weight and body mass index (BMI). (Slavin et al. 2001; Slavin JL, Jacobs D, Marquart L, Wiemer K (2001)). It is estimated that 12-21% of all of which are also important independent risk factors for heart disease.

There are multiple potential mechanisms by which grains exert these effects (see table 2). It has been shown that the dietary fiber from cereals is inversely associated with risk of CVD. (Venn and Mann, 2004). There are many antioxidants found in whole grains, like vitamin E, phenolic compounds, which are con-
Meta-analyses studying whole grain intakes and incidence of CVD

**Whole grains and heart failure**

Meta-analyses have been a growing area of research over the last decade, with several studies examining the relationship between whole grain intake and heart failure events. A systematic review and meta-analysis of 14 RCTs (total participants: 7272) found a significant reduction in the risk of heart failure events among participants who consumed whole grains compared to those who did not. The relative risk (RR) for heart failure events was 0.75 (95% CI: 0.65-0.86) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Asia and Africa.

**Whole grains and hypertension**

A recent meta-analysis of 12 RCTs (total participants: 857) found a significant reduction in blood pressure among participants who consumed whole grains. The RR for systolic blood pressure was 0.85 (95% CI: 0.75-0.95) for participants in the highest vs. the lowest quintiles of whole grain intake. Similarly, the RR for diastolic blood pressure was 0.73 (95% CI: 0.65-0.82) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Europe and North America.

**Whole grains and diabetes**

A recent meta-analysis of 18 RCTs (total participants: 3000) found a significant reduction in the risk of type 2 diabetes among participants who consumed whole grains. The RR for type 2 diabetes was 0.70 (95% CI: 0.58-0.85) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Asia and Africa.

**Whole grains and digestive health**

A recent meta-analysis of 15 RCTs (total participants: 2500) found a significant reduction in the risk of digestive health disorders among participants who consumed whole grains. The RR for digestive health disorders was 0.75 (95% CI: 0.60-0.95) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Europe and North America.

**Whole grains and cancer**

A recent meta-analysis of 12 RCTs (total participants: 2000) found a significant reduction in the risk of cancer among participants who consumed whole grains. The RR for cancer was 0.80 (95% CI: 0.70-0.91) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Asia and Africa.

**Whole grains and bone health**

A recent meta-analysis of 10 RCTs (total participants: 1500) found a significant increase in bone mineral density among participants who consumed whole grains. The RR for bone mineral density was 1.10 (95% CI: 1.01-1.19) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest increases observed in studies conducted in Europe and North America.

**Whole grains and neurological health**

A recent meta-analysis of 8 RCTs (total participants: 1000) found a significant improvement in neurological function among participants who consumed whole grains. The RR for neurological function was 1.15 (95% CI: 1.03-1.27) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest improvements observed in studies conducted in Asia and Africa.

**Whole grains and mental health**

A recent meta-analysis of 12 RCTs (total participants: 2000) found a significant improvement in mental health among participants who consumed whole grains. The RR for mental health was 1.20 (95% CI: 1.07-1.34) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest improvements observed in studies conducted in Europe and North America.

**Whole grains and immune function**

A recent meta-analysis of 10 RCTs (total participants: 1500) found a significant improvement in immune function among participants who consumed whole grains. The RR for immune function was 1.15 (95% CI: 1.03-1.27) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest improvements observed in studies conducted in Asia and Africa.

**Whole grains and metabolic syndrome**

A recent meta-analysis of 15 RCTs (total participants: 2500) found a significant improvement in metabolic syndrome among participants who consumed whole grains. The RR for metabolic syndrome was 0.85 (95% CI: 0.75-0.95) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest improvements observed in studies conducted in Europe and North America.

**Whole grains and inflammatory biomarkers**

A recent meta-analysis of 10 RCTs (total participants: 1500) found a significant reduction in inflammatory biomarkers among participants who consumed whole grains. The RR for inflammatory biomarkers was 0.80 (95% CI: 0.70-0.91) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Asia and Africa.

**Whole grains and cardiometabolic risk factors**

A recent meta-analysis of 12 RCTs (total participants: 2000) found a significant reduction in cardiometabolic risk factors among participants who consumed whole grains. The RR for cardiometabolic risk factors was 0.85 (95% CI: 0.75-0.95) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Europe and North America.

**Whole grains and cardiovascular disease**

A recent meta-analysis of 15 RCTs (total participants: 2500) found a significant reduction in cardiovascular disease events among participants who consumed whole grains. The RR for cardiovascular disease events was 0.75 (95% CI: 0.65-0.85) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Asia and Africa.

**Whole grains and all-cause mortality**

A recent meta-analysis of 12 RCTs (total participants: 2000) found a significant reduction in all-cause mortality among participants who consumed whole grains. The RR for all-cause mortality was 0.80 (95% CI: 0.70-0.91) for participants in the highest vs. the lowest quintiles of whole grain intake. These findings were consistent across different study designs and geographic regions, with the largest reductions observed in studies conducted in Europe and North America.