The role of Oat Beta Glucan and Water Soluble Tomato Concentrate in improving heart health and preventing disease

Dr Rob Winwood CSci FIFST - Scientific Communications Manager EMEA

14:50 Wednesday, November 18th, 2015 at Food Matter Live, Room 16, Excel, London
Programme

1. Nutritional ingredients interventions for cardiovascular health

2. Water soluble tomato concentrate

3. Oat beta glucan
• Cardiovascular disease was virtually unknown one hundred years ago

• Today, One in Four of us will die of it.

• How can we improve things?
Nutrients for cardiovascular health

• Targeted nutritional interventions can have a major effect in delaying or even preventing, the onset of cardiovascular disease

• This presentation will consider nutritional interventions with oat beta glucan and water soluble tomato concentrate that have an existing EFSA 13.1 Health Claim relating to cardiovascular health, with particular attention to maintaining good blood circulation and healthy blood lipid profiles.

• DSM offers a wide range of heart healthy ingredients under our “Guard your Heart” health benefit solutions, see the following link: http://www.dsm.com/en_US/foodandbeverages/public/home/pages/sol-guard-your-heart.jsp
Nutrition and heart health

Nourish your heart

• Small dietary changes can lead to a large reduction in the burden of CVD

• Improving your diet is a key factor in preventing and managing cardiovascular diseases

• Numerous scientific studies showed that nutrients can reduce the risk of CVD and promote a healthy heart

• Nutritional epidemiology showed that specific nutrients play a key role in maintaining a healthy heart

Source: International Osteoporosis Foundation www.iofbonehealth.org
Cardiovascular Disease

CVD is a multi-factorial disease. The efficacy of any nutritional intervention thus needs to be determined by a relevant basket of validated biomarkers.

Examples of Risk Factors:
- Stress
- Smoking
- Obesity,
- Sedentary lifestyle
- Dyslipidemia
- Hypertension
- Genetic predisposition
- Metabolic syndrome
- Poor diet (high salt/trans-fats)
- Infection

Proven treatment interventions:
- Exercise
- Reduce blood pressure
- Regularise blood lipid profile
- Reduce inflammation
- Reduce blood viscosity/clotting
Cardiovascular diseases: Disorders of the heart and blood vessels

Cardiovascular diseases

- Coronary heart disease (CHD)
  - Myocardial infarction (heart attack)
  - Angina pectoris (chest pain)
- High blood pressure (hypertension)
- Congestive heart failure
- Stroke
- Congenital cardiovascular defects
- Arrhythmias (disorders of heart rhythm)
- Diseases of arteries
  - Atherosclerosis
  - Peripheral arterial disease
- Rheumatic heart disease
- Vascular heart disease
- Venous thromboembolism

There are many forms of cardiovascular diseases

- 50% of individuals who die suddenly of CHD have no previous symptoms of the diseases
- 95% of people who have a sudden cardiac arrest die from it, often within minutes
Six ways to improve the workings of a healthy heart

1. Promote healthy heart function
2. Promote healthy blood lipids
3. Prevent LDL cholesterol oxidation
4. Promote healthy blood pressure
5. Support healthy circulation and blood vessels
6. Prevent inflammation (of vascular epithelium)

Marine omega 3 Oils
Water soluble tomato concentrate
Oat beta glucans and olive polyphenols
Water soluble tomato concentrate, scientifically substantiated solution for healthy blood flow
Vascular function & the platelets: support healthy blood flow

- The platelets are small, disk-shaped anuclear cell fragments derived from megakaryocytes in bone marrow.
- Platelets have numerous surface receptors which are activated by various agonists.
- Platelet reactivity is key necessary to stop bleeding upon damage of our blood vessels.
- Early stages of atherosclerosis lead to low grade inflammation and platelet hyperreactivity which participate in the development of heart diseases.
- A reduction in platelet hyper-reactivity could reduce atherosclerosis plaque development and improve long term heart health.
- Thus reducing platelet hyper-reactivity will support a healthy blood circulation.
What is Fruitflow®

- The first natural, scientifically substantiated solution for healthy blood flow

- Fruitflow® is a breakthrough ingredient. In human trials it has shown to reduce platelet aggregation and improve blood flow and works in 97% of subjects. The effect takes place within 1.5 hours of consumption and lasts for up to eighteen hours after a single dose. The effect is maintained if taken on a daily basis.

- It is a water-soluble, tomato based concentrate containing multiple active constituents

- Fruitflow® is the first ingredient with an EFSA Art 13.5 health claim.

  “Helps maintain normal platelet aggregation, which contributes to healthy blood flow”

- Natural, healthy and safe. Highly stable and water-soluble, low flavour, odour and colour profile and suitable for use in food, beverages & dietary supplement
Fruitflow® is a breakthrough anti-thrombotic ingredient

Multiple (8) human trials confirm Fruitflow® reduces platelet aggregation safely

- No side effects reported
- Works in 97% of subjects
- Starts to work within 1.5 hours and continues for 12 to 18 hours
- When taken regularly on a once per day basis, the effect is continuous

Study design

- Randomized, placebo-controlled, single-blinded study design.
- 28 normal healthy subjects (40 – 65 y) completed the study.
- Subjects consumed tomato extract equivalent to the total active fraction found in 6 fresh tomatoes or a control drink.
- Blood samples were collected at baseline, 1.5, 3 and 6 hours.

Results

- Onset of antiplatelet effect seen within 1.5 hours after ingestion – measured as a significant difference from baseline platelet function.
- Duration of effect variable, but after 18 hours platelet function returned to baseline in all subjects tested.

O’Kennedy et al. 2006a, AJCN
Setting the scene
Blood vessel with wound
Platelets are activated, get spiky, coagulate and form a clot to stop the bleeding.
...and platelets start to coagulate
and can form unwanted clots
Fruitflow® acts on the first stage of the clotting process: Platelet activation

- Fruitflow® is the only functional food ingredient addressing platelet aggregation, the cause of blood clots.

Non activated /smooth platelet

Activated / spiky platelet

Blood clot

- Platelets can become “spiky” i.e. more prone to clotting due to a variety of factors like stress, overweight, high cholesterol.

- Fruitflow works by keeping blood platelets smooth to avoid aggregation inside blood vessels.

- Fruitflow does not disrupt the rest of the blood clotting process so clotting will still take place as usual after injury.
Blood Clotting and Coagulation - How Does Fruitflow® Work?

Platelets activated:
Injury; roughening of wall (atherosclerosis, aging, obesity, diabetes, WBC-platelet aggregates)

RBC
resting platelet
endothelial
activated platelet
Fruitflow® inhibits markers and mediators of platelet aggregation

1. changes shape “pseudopods” “sticky”
2a. P-selectin GPIIb/IIIa (binds FBN)
2b. membrane phospholipids

Aspirin works on only one specific pathway
Fruitflow effect is reversible, Aspirin effect is not
Fruitflow exerts ~30-50% the inhibition induced by LD-aspirin

- Fruitflow works on multiple aspects of the initial clotting mechanism
- Aspirin works on only one specific pathway
- Fruitflow effect is reversible, Aspirin effect is not
- Fruitflow exerts ~30-50% the inhibition induced by LD-aspirin
Analytics of Fruitflow

- Fruitflow is a natural multi-component product
- 3 major compound clusters
  - Nucleosides (AF 1)
  - Polyphenols (AF 2)
  - Flavonoids (AF 3)
- Representative marker selected
  - Adenosin
  - Chlorogenic acid
  - Rutin
OatWell® with proven health benefits
– from agriculture to consumer

Oat beta glucan
The beneficial properties of oat are attributed to the soluble fibers found in oat, which are called beta-glucan. In OatWell® oat bran the natural viscous fibers are present in high amounts due to a careful milling & sieving process of oat bran.
Functionality of OatWell® oat beta-glucan

To maintain the functional attributes of beta-glucan = viscous polysaccharide (1→3), (1→4)-β-D-glucan, it is important to control and analyse the key parameters in the food matrix.

Functional key-parameters of oat beta-glucan to ensure the adequate viscosity in the gut:
- Beta-glucan concentration
- Molecular weight
- Solubility / Viscosity

Functionality can be reduced due to:
- extraction
- uncontrolled processing
- enzymatic influence
- excessive heat or pressure
Oat beta-glucan: Health benefits

Functionality drivers

3-4 grams bioactive oat beta-glucan daily required

Cholesterol lowering (Heart Health)
Blood glucose Control (Diabetes)
Gut Health (IBS)
Weight Control (Obesity)

EFSA art. 14 EC approved
EFSA art. 13.1 EC approved
EFSA art. 13.1 EC approved
Project: EFSA art. 13.5

EU Commission approved*
Science & Regulatory

Scientific evidence:
• Over 50 human studies
• 3 Meta analysis
• Proven physiochemical properties of bioactive OatWell® oat beta-glucan

Regulatory approvals:
• EFSA (art. 14) / FDA / FASANZ / ASIA / HC

Opinion leaders:
• Supported by WHO
• International cholesterol lowering education programmes (National Cholesterol Education Program; JAMA, 2001)
• American Dietetic Association
• European Society of Cardiology and European Arteriosclerosis Society (ESC/EAS) Guidelines for the management of dyslipidemias recommend consumption of oat beta-glucan as one strategy to reduce LDL cholesterol
ESC/EAS Guidelines for the management of dyslipidaemias

The Task Force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and the European Atherosclerosis Society (EAS)

Developed with the special contribution of: European Association for Cardiovascular Prevention & Rehabilitation

6.4 Dietary supplements and functional foods active on plasma lipid values

Dietary fibre
Available evidence consistently demonstrates a TC- and LDL-C-lowering effect of water-soluble fibre from oat bran (β-glucan). Foods enriched with this fibre are well tolerated, effective and recommended for LDL-C-lowering.
EU claim for Oat Beta Glucan

Claim:
• “Oat beta-glucan has been shown to reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease.”

Conditions of use:
• The beneficial effect is obtained with a daily intake of 3g oat beta-glucan. The claim can be used for foods which provide at least 1g of oat beta glucan per quantified portion.

Target customers:
• Health conscious consumers
• People with increased cholesterol levels
• People with high cholesterol levels and additional CHD risk factors

<table>
<thead>
<tr>
<th>Dosage 1g BG / serving</th>
<th>14%</th>
<th>22%</th>
<th>28%</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 g</td>
<td>4.5 g</td>
<td>3.6 g</td>
<td></td>
</tr>
</tbody>
</table>
# Summary: nutrients for your heart

<table>
<thead>
<tr>
<th>Heart health benefits</th>
<th>Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood lipid</td>
<td>Omega-3 LC-PUFA (EPA, DHA), oat beta glucan, olive polyphenols</td>
</tr>
<tr>
<td>Oxidative stress</td>
<td>Vitamin C and E,</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Omega-3 LC-PUFA (EPA, DHA), CoQ10, vitamin D</td>
</tr>
<tr>
<td>Vascular function</td>
<td>Omega-3 LC-PUFA (EPA, DHA), vitamin E, water soluble tomato concentrate</td>
</tr>
<tr>
<td>Heart function</td>
<td>Omega-3 LC-PUFA (EPA, DHA), CoQ10</td>
</tr>
</tbody>
</table>
Thank you!

BRIGHT SCIENCE. BRIGHTER LIVING™

This information is based on DSM’s current knowledge. Although DSM has used diligent care to ensure that the information provided herein is accurate and up to date, DSM makes no representation or warranty of the accuracy, reliability, or completeness of the information. This information only contains scientific and technical information for business to business use. Use of this information shall be at your discretion and risk. Nothing herein relieves you from carrying out your own suitability determinations and tests. We do not assume any liability in connection with your product and its use. This information does not relieve you of your obligation to comply with all applicable laws and regulations and to observe all third party rights. Country or region-specific information should also be considered when labelling or advertising to final consumers.

This information does not constitute or provide scientific or medical advice, diagnosis, or treatment and is distributed without warranty of any kind, either expressly or implied. In no event shall DSM be liable for any damages arising from the reader’s reliance upon, or use of, these materials. The reader shall be solely responsible for any interpretation or use of the material contained herein. The content of this document is subject to change without further notice. Please contact your local DSM representative for more details. All trademarks listed in this brochure are either registered trademarks or trademarks of DSM in The Netherlands and/or other countries.