Science & Technology for Nutrition & Well-being
Training Topics

- Review of Lonza
  - Carnipure™ - The energy ingredient
    - What it is
    - Science Support
    - Differentiation
- NOW Carnitine Product Info – with Marva Ward
Lonza Overview

- Life sciences driven company founded in 1897
- Headquartered in Basel (Switzerland)
- Sales of CHF 3.925 billion in 2013 (USD 4.100 billion)
- Global operations:
  - 45 major sites
  - Employs over 10,000 people
- Global leader in microbial control and custom manufacturing:
  - Hygiene
  - Water treatment
  - Active Natural Health Product and pharmaceutical ingredients - both chemical and biological
  - Cell therapy
Overview: Lonza Health Ingredients in NOW Products

- Leading producer of L-carnitine
- Producer of vegetarian Omega-3 DHA
- Largest producer/supplier of “Vitamin B3 Ingredients”
End Use Applications – Human Nutrition

- Cardiovascular Health
- Exercise and Recovery
- Healthy Aging
- Brain Health
- Weight Management
- Mother and Child

Lonza
Market Differentiators / Value-Added Services

- Product / production
  - novel technologies - backed by science
  - continuous improvement / process optimization
  - high quality standards
  - security of supply / economies of scale

- Lonza is the largest global manufacturer with market share of > 50% (based on value)

- Continual investment in Science and Research

- Regulatory support and compliance

- Experience – over 30 years of developing Carnitine market
Carnipure™: “The Evidenced-based Carnitine”
What is Carnipure™?

- Premium grade of the energy ingredient: L-carnitine
- Evidenced based ingredient… backed by continual investment in science
- Unique new patented production process
  - Produce directly to the “L” isomer
  - Reduces formation of “d” or “dl” form
What is L-carnitine?

- Discovered in 1905
- A conditionally essential nutrient
- Occurs naturally in the human body and in food
- Essential for fat metabolism and energy production
- Transports fatty acids into the mitochondria and thus helps to convert fat into energy

Sources: Naturally Produced and Dietary Intake

<table>
<thead>
<tr>
<th>Animal Products</th>
<th>Mg/Kg</th>
<th>Vegetable Products</th>
<th>Mg/Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamb</td>
<td>1900</td>
<td>Bread</td>
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<tr>
<td>Beef</td>
<td>1500</td>
<td>Rice</td>
<td>3</td>
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<tr>
<td>Pork</td>
<td>250</td>
<td>Peach</td>
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<tr>
<td>Poultry</td>
<td>130</td>
<td>Banana</td>
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</tr>
<tr>
<td>Fish</td>
<td>30-100</td>
<td>Tomato</td>
<td>1</td>
</tr>
</tbody>
</table>
Transport function and energy production

Cell

Cytosol

CoA + L-carnitine → L-carnitine + CoA

Mitochondria

L-carnitine + CoA → CoA

β-Oxidation

Krebs-Cycle Respiration

Energy (ATP)
Goal: Demonstrate Carnipure’s ability to influence energy production in Normal Healthy individuals

- 3 g/day for 10 days
- Significant ↑ $^{13}$CO$_2$ exhalation after Carnitine

Wutzke & Lorenz. Metabolism. 53:1002-6, ‘04
Research: Energy Take Home Message

Key Point 1
Carnipure™ Increases the Burning of Fat

Key Point 2
Normal, Healthy Individuals
A useful strategy to aid against overweight/obesity is:

- Healthy Eating Habits – Calories
- Regular Exercise
- Safe dietary supplements
- Adequate sleep

Carnitine can provide additional added value for health.
New Carnipure™ Clinical Trial

- **L-carnitine Supplementation in Combination with Motivation Training: Effects on Weight Management in Healthy Volunteers.** *Food and Nutrition Sciences, 2013, 4, 222-231*

- **Key Message:** Carnipure™ is not the Magic Bullet but should be considered as part of a weight management system.

- **Result:** L-carnitine motivated group showed significant body waste loss ($P<.01$) vs. the non-motivated placebo group.
  - Four week, double-blind randomized placebo-controlled study
  - 24 overweight (BMI 25.8 – 26.6 kg/m²) Japanese males split into 4 groups
    - Group A: Carnipure™ supplement (500 mg L-carnitine/d)
    - Group B: Carnipure™ supplement (500 mg L-carnitine/d) combined with motivation training
    - Group C: Placebo
    - Group D: Placebo plus motivation training
Research: Weight Management

- Effect of Carnipure™ on weight loss in humans
- 5 placebo controlled research studies
- Utilizing 18-100 subjects
- 2 grams of LC/day – Caloric Restriction
- Results: Lost 16% - 5x Body wt loss

Take Home Message:

- Carnipure™ is not the Magic Bullet but should be considered as part of a Weight Management system.
Recovery Mode of Action

Summary of a Decade of Research

Storage area for Increased L-carnitine
Indirect and Direct Assessments for Muscle Damage

MRI: Lighter pixels represent damage tissue 24 hours post squat exercise
Muscle Soreness – Subjective Score

**Men**

Score 0 = Felt Great

Score 3 - 4 = Felt sore

Score 7 = Extreme Soreness

**Women**

Score 0 = Felt Great

Score 3 - 4 = Felt sore

Score 7 = Extreme Soreness
Research: Exercise and Recovery

* P<.05 from corresponding 0 gram dose
MDA - Free Radical Formation Marker

Placebo  1 Gram  2 Gram

Baseline  Pre  IP  5  10  20  30
Research: Exercise and Recovery Take Home Message

Sports Nutrition

Key Point 1

- Better recovery from exercise
- Decrease of exercise-induced muscle disruption/damage
  - therefore, a reduction in muscle soreness

Key Point 2

- Recommend Minimum 1 gram/day
  - Some individuals may require 2 grams / day
    - (eg. vegetarians, elite athlete, etc.)
Studies show L-carnitine in the form of Carnipure™ tartrate is a powerful ingredient that aids in the post-workout recovery process.

All studies attached can be used to support this statement.

Data indicate Carnipure™ supplementation can attenuate the deleterious effects of hypoxic (low oxygen) training and speed up recovery from exercise by increasing blood flow. By increase blood flow important “Life Giving Nutrients” are more available to the muscle tissue thus allowing for faster recovery times.

- Volek et al AJC 2008
- Huang 2012
- Kraemer 2005
- Kraemer 2008

Additionally, Carnipure™ has antioxidant properties as it has been show to reduce free-radical formation, minimize muscle tissue disruption all of which support muscle recovery.

- AJP recovery paper 2002.
- Ho Metabolism 10
Carnipure™ has even been shown to reduce muscle soreness after a workout.
  AJP recovery paper 2002.
  Ho Metabolism 10

Another important effect of L-carnitine is its ability to significantly increase testosterone receptor concentration. Carnipure™ tartrate was shown to significantly increase testosterone (androgen) receptor concentration after only 21 days of supplementation in resistance-trained men. The increase in receptor availability is believed to lead to greater potential of free-testosterone utilization at the muscle fiber level. Free testosterone is the most usable form of testosterone available for pure, unadulterated growth and development of muscle.
  Kraemer et al 2006
  Kraemer 2003

So the findings above certainly seem to warrant regular inclusion of Carnipure™ tartrate in your everyday post-workout eating program. In the short-term, it stands to reason that if you can recover better after each session then you can push harder at your next session, while long term it should improve your strength gains and workout intensity.
Carnipure™ production at Nansha Campus

Large Scale APIs

R&D and Administration

Small Scale APIs
## Carnipure™ Product Line

<table>
<thead>
<tr>
<th>Carnipure™ tartrate</th>
<th>Carnipure™ crystalline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>68% L-carnitine 32% L-tartaric acid</strong></td>
<td><strong>100% L-carnitine</strong></td>
</tr>
<tr>
<td>Non-hygroscopic salt</td>
<td>Hygroscopic</td>
</tr>
<tr>
<td>pH and heat stable (180°C)</td>
<td>pH and heat stable (180°C)</td>
</tr>
<tr>
<td>Solubility: &gt;1000g/1000ml</td>
<td>Solubility: 250g/100ml</td>
</tr>
<tr>
<td>Liquid and solid applications</td>
<td>Liquid applications</td>
</tr>
<tr>
<td>Citrus like taste</td>
<td>Tasteless</td>
</tr>
</tbody>
</table>
Carnipure™ Quality Standards

- FSSC certified (Food Safety Systems Certification)
- ISO 22'000 and 14’001 certified
- OU Kosher certified
- MUI Halal certified
- Allergen Free
- High frequency / level safety audits (eg. infant nutrition)
Lonza’s Master File # granted by Health Canada for Carnipure™ tartrate & Carnipure™ crystalline.

Carnipure™ is the first L-carnitine which has self affirmation GRAS status (Generally Recognized As Safe) by U.S. FDA

Carnipure™ is the first L-carnitine to get approval in Japan

Lonza has submitted a dossier to the European Union for the registration of Carnipure™ tartrate in the PARNUTS directive (Commission Directive 2004/5/EC)

By Lonza initiative, Carnipure™ tartrate is now approved for the use in infant formula (Commission Directive 2006/141/EC)

Switzerland: Increase of daily intake from 600 mg to 1000 mg due to initiative of Lonza

Lonza has submitted Health Claims on L-carnitine to the European authorities according to Regulation 2006/1924/EC (article 13 claims)

Lonza’s research on Carnipure™ makes these achievements possible
Think Carnipure™ for Your MANY Customers

- Fertility problems
- Women, Pregnancy & Infants
- Elderly people Healthy Aging
- Cardiovascular Health
- Cognitive Function
- Sarcopenia, Myopenia Osteopenia
- Stress, Fatigue, Immune System
- Vegetarians Vegan
- Exercise Athletes
- Weight Management
AMINO ACIDS

Created and Presented by Marva Ward, CNP
L-Carnitine

- Continually essential AA - Carnitine synthesized from Methionine and Lysine
- Produced in the body in the presence of co-factors
  - Vitamin C, B3, B6, Iron
- L-Carnitine is essential for transporting long-chain fatty acids across the mitochondrial membrane
  - Transports fatty acids to the mitochondria for metabolism – for burning and processing energy
  - Energy production = ATP recycling process
  - Antioxidant
    - Protective affect against lipid peroxidation of phospholipid membranes
    - Oxidative stress induced in the myocardial and endothelial cell level
L-Carnitine

- Multiple health applications – multiple forms:
  - Heart
    - Propionyl-L’Carnitine
    - L-Carnitine Tartrate
  - Brain
    - Acetyl L-Carnitine – formed by circulating Carnitine and Acetyl-CoA in the mitochondria
    - Crosses blood brain barrier
    - L-Carnitine Tartrate – can support Acetyl-L-Carnitine production
  - Muscle
    - L-Carnitine Tartrate
    - Most widely studied for muscle recovery and weight loss
L-Carnitine 500mg & 1000mg

- Carnitine Tartrate - the most researched form
- Trademarked “Carnipure”
  - Trusted for 30 years
  - Most researched form over 7000 studies world wide
  - Switzerland Company “Lonza”

- 2 capsules, 2x daily – 2000mg
- Available:
  - L-Carnitine 500mg - 60 vcaps
  - L-Carnitine 500mg - 180 vcaps
  - L-Carnitine 1000mg – 100 tablet
NOW Liquid L-Carnitine 473mL

- Delicious Citrus Flavour
- Sweetened with Stevia and vegetable glycerin
- No artificial flavours, sweeteners, or colours
- L-Carnitine Crystalline (free-form)
- L-Carnitine 1000mg per 15 ml (tablespoon)
  - B5 - when converted into Coenzyme A - it works directly with Carnitine to convert food to ATP
  - B6 – cofactor

- Trademarked “Carnipure”
  - 30 years –
  - Most researched form over 7000 studies worldwide
  - Switzerland Company “Lonza”
NOW Carnipure™ Summary

Unique Selling Points

- Purest form – direct to “L” process
- Most-researched
- Proven safety record – 30 yrs
- Trusted brand
Carnitine Retail Tools

Brochure

Ad / Poster
Amino Retail Support Tools

**LIT93007**
Amino Acid Display Header Card

**LIT93005**
Amino Acid Poster 11x17

**Display**

**Posters**

**Coop Ads**

THE BUILDING BLOCKS OF HEALTH 36
Amino Acid Brochure / Guide

AMINOS... The Building Blocks of Health

Amino acids are the building blocks of life. In the molecular driving force of proteins, they carry atoms for every essential life function. Amino acids are the vital nutrients that form the basis of all life. They are essential for the growth, development, and maintenance of all living organisms. Amino acids are the building blocks of life.

Why Choose NOW® Amino Acids?

- Quality: NOW® Amino Acids are the highest quality amino acids available.
- Value: NOW® Amino Acids are affordable and provide great value.
- Variety: NOW® Amino Acids offer a wide range of amino acids.

Amino Acids are essential for the growth, development, and maintenance of all living organisms. They are the building blocks of life. NOW® Amino Acids are the highest quality amino acids available. NOW® Amino Acids are affordable and provide great value. NOW® Amino Acids offer a wide range of amino acids.

NOW® Amino Acids

Key Building Blocks in the Foundation of Health

Amino acids are the building blocks of proteins. They carry atoms for every essential life function. Amino acids are the vital nutrients that form the basis of all life. They are essential for the growth, development, and maintenance of all living organisms. Amino acids are the building blocks of life.

Amino Acids

- Essential
- Non-Essential
- Conditional

Essential Amino Acids

- Leucine
- Isoleucine
- Valine
- Phenylalanine
- Tyrosine
- Tryptophan
- Histidine

Non-Essential Amino Acids

- Alanine
- Asparagine
- Aspartic Acid
- Cysteine
- Glutamic Acid
- Glutamine
- Glycine
- Proline
- Serine
- Threonine

Conditional Amino Acids

- Arginine
- Lysine

Amino Acid Brochure / Guide

LIT93004

Amino Acid Brochure 15pk

THE BUILDING BLOCKS OF HEALTH

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NOW FOODS – Amino Acids
25 Skus @ 25% Off

Amino Acid Overview

- NOW 80051 - Branch Chain AA – 60 caps
- NOW 80011 - Amino Complex 120 cap
- NOW 80110 - L’ Lysine – 500mg 100 cap
- NOW 80113 – 1000mg Extra Strength 100 tabs
- NOW 80160 - L’Tyrosine 500mg – 60cap
- NOW 80162 - L’Tyrosine 500mg - 120 cap
- NOW 80120 - L’Ornithine 500mg – 60caps
- NOW 80040 - L’Arginine/L’Ornithine 500/250 – 100 caps
- L’ Glutamine 500mg – 120 caps
- NOW 80072 - L’ Carnitine 500mg
- NOW 80066 – L’ Carnitine Liquid Citrus - 473 ml
- NOW 80155 – Taurine – 500mg – 100caps
- NOW 80087 - GABA 500mg + B6 – 100caps
- NOW 80088 - GABA 500mg + B6 - 200 caps
- NOW 80082 - GABA – 250mg Chewable
- NOW 80097 - 5-HTP – 50mg – 30cap
- NOW 80099 - 5-HTP – 50mg – 90 cap
- NOW 80105 - 5-HTP – 100mg 60Vcap
- NOW 80106 - 5-HTP – 100mg 120 Vcap
- NOW 80108 - 5-HTP - 200mg W Tyrosine
- NOW 80109 - 5-HTP – Chewable 90tabs
- NOW 80139 - SAMe – 400mg 30tabs
- NOW 80155 - True Calm – 90caps
- NOW 80207 - Pro-GF (IGF1) – 612gms
- NOW 92087 - N-Acetyl Cysteine (NAC) – 600mg 125 cap - Bonus
- NOW 92030 - L’Arginine – 500mg – 125cap Bonus
- NOW 92189 - GABA 750mg – 125 cap Bonus

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Carnitine Sample

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>NOW80072</td>
<td>L-Carnitine 500mg 60vccap</td>
</tr>
<tr>
<td>NOW80073</td>
<td>L-Carnitine 500mg 180vccap</td>
</tr>
<tr>
<td>NOW80068</td>
<td>L-Carnitine, Double Strength 1000mg 100 tablets</td>
</tr>
<tr>
<td>NOW80065</td>
<td>L-Carnitine Liquid 2X Citrus 473mL</td>
</tr>
</tbody>
</table>

Email:  [brett.kelly@puresource.ca](mailto:brett.kelly@puresource.ca)
Subject: Carnitine Sample
Send info: Acct # for ship to location
Store Name and City/Location
Contact name (receiving sample)
Product code (listed above)

Plus, the answer to this question:
**Q:** Name any 1 of the 4 Unique Selling Points of Carnipure™

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Thank you!

Lonza