CANADIAN ACADEMY OF SPORTS NUTRITION

Let's Excel Together

Lecture 37:

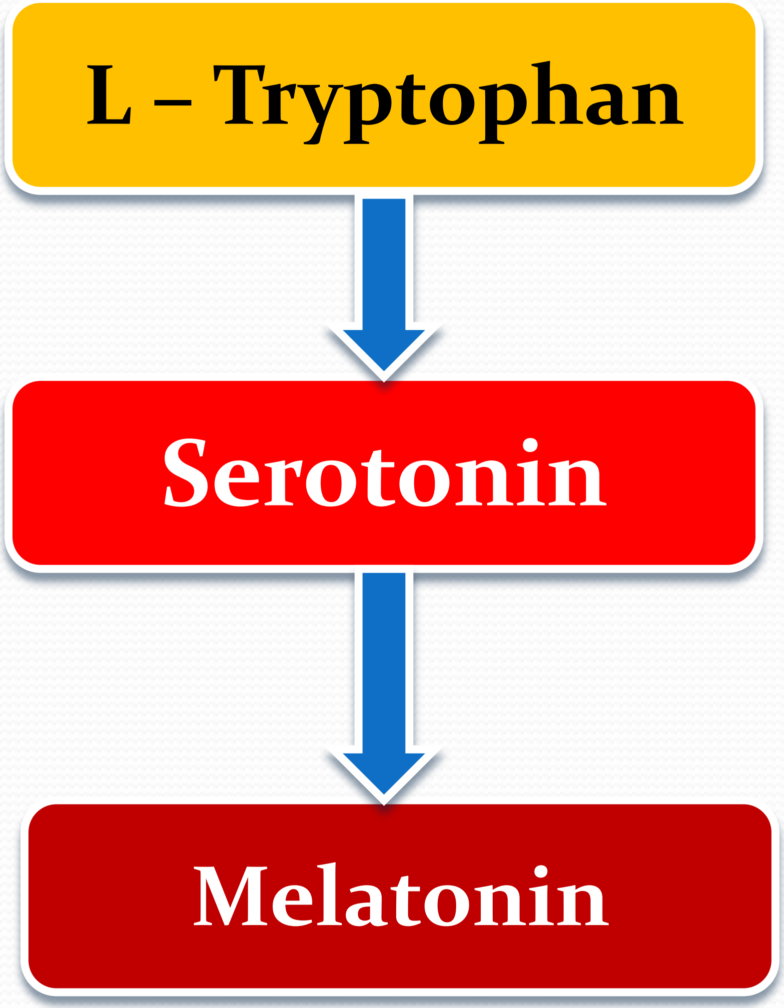
Antioxidants

Part 3

- **Melatonin.**
- **NAC (N – acetyl cysteine).**
- **Resveratrol.**
- **Silymarin.**

Melatonin:

- Also known as sleep hormone, melatonin is a naturally occurring hormone in the body.
- It is released from the pineal gland from the brain in response to darkness.
- Melatonin is produced from the essential amino acid tryptophan and regulates circadian biological clock and sleep cycles.



L – Tryptophan

Serotonin

Melatonin

The production of melatonin will be disrupted in the following conditions:

- 1) Travelling across time zones.
- 2) Staying up late to study for an exam or to work on a project.
- 3) Working rotational night-work-shifts.

Travelling across time zones disrupts the production of melatonin.

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Athletic Benefits of Melatonin:

The popularity of melatonin among athletes is for the following reasons:

- a) Relieves symptoms of jet lag.
- b) Helps adjust sleeping pattern.
- c) May help with pre-competition anxiety.

Non - Athletic Benefits of Melatonin:

Melatonin may be beneficial in the following conditions:

- **a) As an anti – aging.**
- **b) Insomnia and any other sleep disorders.**
- **c) Cluster headaches.**
- **d) Migraine.**
- **e) Depression.**
- **f) Schizophrenia.**
- **g) Seasonal affective disorder.**

- h) Tardive dyskinesia.
- i) Fibromyalgia.
- j) Glaucoma.
- k) Age- related cognitive decline.
- l) Tinnitus (ringing in the ears).
- m) Sexual dysfunction.
- n) Weight management (as a support).
- o) As a support in cancers of the colon, lung, breast, and prostate.
- p) Autism.

Dosage and Side Effects:

- Typical dosage of melatonin is 3 – 9 mg per day at bedtime. Taking melatonin in a continuous manner for more than 3 months is strongly discouraged.

Possible side effects include:

- Daytime drowsiness.
- Dizziness.
- Stomach upset.
- Irritability.
- Nausea.

Interactions:

- a) **Sedative medications and tranquilizers:** melatonin increases their effectiveness.
- b) **Birth control pills**: they may increase production of melatonin.
- c) **Caffeine:** it reduces the effectiveness of melatonin.
- d) **Anti – depressant medications of SSRI group**: they may increase production of melatonin.
- e) **Anti – diabetes**: melatonin may increase blood sugar.
- f) **Anti – histamines**: melatonin may increase their sedative effects.

NAC (N – Acetyl Cysteine):

- NAC is a derivative of the amino acid cysteine.
- It is a potent antioxidant normally found in the body.
- Being used as a mucolytic agent (mucus thinner), NAC helps the body produce glutathione.
- Normally, NAC by itself is not found in the foods. However, cysteine can be found in foods high in protein.

Potential Health Benefits of NAC:

- a) Acetaminophen overdose or toxicity.
- b) As a mucus thinner in bronchitis, chronic obstructive pulmonary disease (COPD), cystic fibrosis (CF), pneumonia, and pulmonary fibrosis.
- c) To increase glutathione level.
- d) Liver detoxification.
- e) Angina pectoris.
- f) Immediately after a heart attack.
- g) Immune support in HIV/AIDS.

- h) Gastritis.
- i) Reducing risk of developing colon cancer in people with colon polyps.
- j) It may improve athletic endurance and performance.
- k) Prevention of kidney damage due to contrast medium.
- l) Prevention of the bladder inflammation after using the chemotherapeutic agent cyclophosphamide.

- **m) Useful in psychiatric disorders, such as depression, mania, autism, and schizophrenia.**

- **n) Drug addiction (it may reduce craving and desire for cocaine, methamphetamine, and marijuana).**

Dosage, Side Effects, and Interactions:

- Daily dosage of NAC is 500 – 1500 mg.
- A small percentage of NAC users may report headache, dizziness, nausea, abdominal pain, and dry mouth.
- It may also increase urinary loss of zinc and copper.

Resveratrol:

- Resveratrol is a flavonoid from the subtype stillbenoid.

- It is a powerful antioxidant that is famous for its lifespan-increasing and cardiovascular health-improving activities.

- Even though many French people do not exercise much, the risk of heart disease is low among them. This is called the "French paradox". It is because of moderate drinking of red wine daily, which provides them resveratrol.

Natural Sources:

Resveratrol is found in

- red wine.
- red grapes (with highest concentration in the skin).
- sprouted peanuts.
- berries especially red mulberries and blueberries.
- dark chocolate.
- cocoa powder.

Health Benefits of Resveratrol:

- a) Promotes cardiovascular health by reducing risk of atherosclerosis.
- b) Extends cellular life span by activating the enzyme “sirtuin I”.
- c) Improves insulin sensitivity.
- d) May be used in weight management by boosting body metabolism and acting as a potential calorie restriction mimetic.

- E) May help reduce blood sugar level in diabetes.

- f) Shows anti-cancer activity against cancers of the pancreas, lung, skin, and especially prostate by inducing apoptosis (programmed cell death) in unhealthy cells and blocking angiogenesis.

- g) May have a neuroprotective effect against neurodegenerative diseases, such as Alzheimer`s disease, multiple sclerosis (MS), Parkinson`s disease, and amyotrophic lateral sclerosis (ALS).

- h) May exhibit anti – inflammatory activity in RA (rheumatoid arthritis), and asthma.

- i) Demonstrates activity against the viruses herpes simplex (types I and II), HIV, cytomegalovirus, and varicella zoster (causative agent for Zona or Shingles).

- j) May have phytoestrogen activity.

- k) May increase testosterone level by inhibiting the enzyme aromatase.

Dosage:

- **Resveratrol is taken 50 – 250 mg per day.**
- **People with breast cancer should exercise caution when taking resveratrol, as there are controversial reports about that.**

Silymarin:

- Silymarin is a unique flavonoid complex and the active ingredient in "**milk thistle**".
- It has an antioxidant activity and can increase the **glutathione level** in the liver by as much as 50%.
- **Silibinin** is the key component of silymarin.

- In terms of antioxidant activity, silymarin is **10 to 20 times** stronger than vitamin E.

- Silymarin stimulates the body to manufacture **glutathione** and **superoxide dismutase**.

- It also **protects the liver cells** from damage caused by toxins and medications.

Potential Benefits of Silymarin:

- a) Alcohol-related liver diseases.
- b) Hepatitis.
- c) Liver cirrhosis.
- d) Anti – cancer activity against colon, prostate, and skin cancers.
- e) Promotes milk production in humans.
- f) Protects the liver in poisoning with amanita mushroom.
- g) Improves insulin sensitivity in diabetic people.

- h) **Liver detoxification.**
- i) **Psoriasis.**
- j) **Halitosis (bad breath).**
- k) **Improves liver function and decreases liver damage caused by medications in HIV/AIDS.**
- l) **Liver involvement in IBD (inflammatory bowel disease).**
- m) **Non – alcoholic fatty liver disease.**
- n) **May have a protective effect against Alzheimer’s disease.**

Dosage:

- **Silymarin is usually used 400 – 800 mg per day.**

Homework:

- 1) Describe the benefits of Resveratrol.
- 2) Describe the indications for which you may recommend milk thistle.