



LEVEL 4

SEMESTER 2

MODULE CODE: SHSS4068

MODULE TITLE: THE SCIENCE OF NUTRITION

ASSESSMENT TYPE: ESSAY

ASSESSMENT/COMPONENT: 1

COMPONENT WEIGHTING: 100 %

WORD COUNT: 3000

MODULE TUTOR: David Gardner

SUBMISSION DETAILS: by 3.00 pm through turnitin

- Complete all 3 essays to be submitted through Turnitin UK via moodle.
- Each essay to be no more than 1000 words, excluding figures, tables and references.

By 28th February 2020

Describe the hormonal and enzyme regulation of the digestion process.

or

Describe the digestive process with particular reference to gut flora and bioavailability.

By 27th March 2020

Describe the mechanisms of cell signalling.

or

Describe the processes of gene expression.

By 1st May 2020

Describe the roles and importance of vitamins or minerals during energy catabolism.

or

With reference to a specific vitamin or mineral discuss the implications of deficiency and toxicity.

Assessment Criteria

Details relating to the specific requirements levels grading for the essays are provided in the generic level descriptor provided on moodle.

Specific details and an example session will be provided during lectures.

School of Sport, Health & Outdoor Education

Assessment Feedback Sheet

Student No./Name:

Module Code: SHSS4068

Module: The Science of Nutrition

Personal Evaluation – to support your academic progress please complete the section below BEFORE submitting your work.									
What do you consider to be the best aspects of this work?		The quality of the references used and the explanations of terms that I felt needed explaining.							
Which aspects do you consider could have been improved in this piece of work?		Possibly being more concise in areas but I couldn't find a way to shorten it without losing the important information.							
What have you found most satisfying whilst undertaking this submission?		Expanding my knowledge in regards to iron deficiency and toxicity.							
ASSESSMENT CRITERIA	Learning Outcome	GRADE							
		Poor 0-25%	Unsatisfactory 26-39%	Satisfactory 40 – 49%	Good 50 – 59%	Very Good 60 – 69%	Excellent 70 – 85%	Exceptional 86– 100%	%
Theoretical explanation	1								70%
Use and appropriateness of references	2								20%
Structure and flow of answer	1								10%
It is expected that students will present work that is proof read, correctly referenced and adheres to the Assessment Checklist . Therefore a range of 0 – 10 marks will be deducted for non-completion of any of the points on the checklist below .									
TUTOR COMMENTS:									
Submission date: via Turnitin		Return date: (at least within 4 weeks)			Tutor:			Mark:	

Assignment Checklist

- ✓ Please complete the **Personal Evaluation** section of the Assessment Feedback sheet, add your name and details, and paste the whole of this assignment document into the front of your assignment
- ✓ Submission is a **single .pdf file, clearly labelled** with your name and module code
- ✓ Font style - Times New Roman, size -12 for text and 14 for headings
- ✓ Ink colour – black only
- ✓ Line spacing – 1.5 line spacing and 2cm- 2.5cm page margins
- ✓ Quotations more than three lines to be indented 1 line spacing
- ✓ One line space between paragraphs, paragraphs must be left aligned
- ✓ Pagination (your assignment should have **page numbers**)
- ✓ All tables and figures are internally referenced and have a title
- ✓ **Word count** checked and written at end of text (before references and any appendix)
- ✓ Assignment is within 10% of the word limit (excluding references and any appendices)
- ✓ **All** references in the text are included in the reference list
- ✓ **Correct referencing as described in UWTSD Harvard Referencing Handbook on the Library website** <https://www.uwtsd.ac.uk/media/uwtsd-website/content-assets/documents/library-and-learning-resources/infoskills/harvard-eng.PDF>
- ✓ Correct spelling and punctuation, using **UK English**
- ✓ Grammar and syntax correct- double check anything that has a green line under it
- ✓ I have read my assignment out loud to myself and it makes sense and is easy to read
- ✓ Somebody else has read my work and it makes sense to him or her!
- ✓ **I have checked and I have not plagiarised**

**Failure to follow these guidelines will
cost you marks!**

Implications of Deficiency and Toxicity of Iron Within the Human Body

Iron is a vital part of the human diet as it is needed and used in many metabolic processes such as oxygen transport, DNA synthesis and electron transport (Abbaspour, Hurrell and Kelishadi 2014). There are two forms of dietary iron; organic haem iron and inorganic non-haem iron (Lean and Combet 2017). Organic haem iron must be hydrolysed in order for it to be able to be absorbed by the body and can be gained by consuming foods of animal origin, however, inorganic haem iron must be solubilized as well as hydrolysed before it can be absorbed and can be gained from consuming plant foods (Lean and Combet 2017). The absorption of iron is affected by what is ingested alongside the iron, for example, substances such as vitamin C, citric acid and fructose promote the rate of iron absorption whereas substances such as calcium, phosphates and zinc inhibit the rate of absorption (Lean and Combet 2017). With the absorption being affected by various other minerals and vitamins and the important role that iron plays within the body and multiple metabolic processes, it is key to maintaining a healthy balance of iron levels within the body (Abbaspour, Hurrell and Kelishadi 2014). The recommended amount of iron a male aged 19-50 years old should intake a day is 8 mg and 18 mg for women with it increased to 27 mg if the woman is pregnant (NIH 2020).

Iron deficiency is a reduction of iron stores and an important problem as it can cause health risks such as anaemia and is suggested to be connected to the development of cardiovascular disease, cancer and inflammatory bowel disease (Lapice, Masulli and Vaccaro 2013) (Lopez et al 2016). Iron is used in the production of haemoglobin, therefore, with a low iron count people would also have a low haemoglobin count which in turn would cause someone to suffer from Anaemia (Foucher and Pillon 2019). It is suspected that around a third of the world's population suffer from some level of anaemia with pregnant women and women experiencing menstrual blood loss being at a higher risk than anybody else (Lopez et al 2016). Situations that cause anaemia tend to be poverty, malnutrition, famine and blood loss, people on a vegan or vegetarian diet need to pay extra attention to their iron intake as it is harder for them to get iron in to their diet due to not being able to eat red meat (Camaschella 2015). It is important to avoid developing anaemia as it can cause life affecting symptoms, for example, people suffering from anaemia would be expected to experience; dizziness, a lack of energy, become fatigued easily and a fast heartbeat which could lead to heart issues (Foucher and Pillon 2019).

There are a couple of treatments available for iron deficiency depending on the person's circumstances (Camaschella 2015). The easiest way of treating iron deficiency is through oral supplementation of iron tablets as this has been shown to be inexpensive and effective (Camaschella 2015). People given this course of treatment would usually be expected to take the iron tablets for around 6 months and it is suggested to drink orange juice in order to help the absorption as it is high in vitamin C (NHS 2018). The other treatment that a person could focus on would be to change their diet in order to aid the absorption of iron, they could do

this by; eating more leafy vegetables, cereals with fortified iron, meat and pulses whilst also consuming less tea, coffee and dairy (NHS 2018).

As mentioned previously, iron is an essential mineral for many bodily functions, however, in high volumes it can become toxic (Brewer 2009). Excessive amounts of iron can aid in the production of oxidant free radicals which could damage cells and organisms in the body as they can inhibit oxidation (Brewer 2010). Neurons in the brain are delicate and react to degeneration linked to increased oxidant free radicals that can build up over time, the ability for the neurons to survive are dependant on their ability to deal with increased oxidative load (Núñez et al 2012). The damage to the body and brain from the excessive iron levels has been suggested to be involved within the development of Alzheimer's, other neurodegenerative diseases, arteriosclerosis and diabetes (Brewer 2009).

A possible treatment for iron toxicity would be phlebotomy therapy which is the removal of blood from the body through bloodletting or venesection (Kim and Oh 2016). Phlebotomy therapy is not available to everyone however because a person may have secondary conditions which could be worsened by this, these people are recommended to undergo chelation therapy instead (Britton, Leicester and Bacon 2002). Chelation therapy is when a person is injected with ethylenediaminetetraacetic acid where it is sent into the blood stream to combat the iron levels within the blood, this therapy is controversial however and could possibly be dangerous to the subject's health (Flora, Mittal and Mehta 2008) (Poggiali et al 2012).

The importance of iron within the body is widely known but the implications of deficiency and toxicity are less so (Abbaspour, Hurrell and Kelishadi 2014). As mentioned previously, there are many implications due to deficiency of iron such as; anaemia, cardiovascular disease and inflammatory bowel disease (Lapice, Masulli and Vaccaro 2013) (Lopez et al 2016). There are also many implications due to the toxicity of iron, for example; the production of oxidant free radicals that can lead to damage to the body and brain which could develop Alzheimer's, other neurodegenerative diseases, arteriosclerosis and diabetes (Brewer 2009). It is therefore extremely important for people to maintain a healthy level of iron within their body (being 8 mg a day for men aged 19-50 years old and 18 mg for women with it increased to 27 mg if the woman is pregnant) in order for people to live a life with a reduced risk of diseases and complications (NIH 2020).

(986 Words)

Reference List

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- Camaschella, C. (2015) 'Iron-Deficiency Anemia', *The New England Journal of Medicine*. 372 (19), pp1832-1843.
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- Kim, K. H., Oh, K. Y. (2016) 'Clinical application of therapeutic phlebotomy', *Journal of Blood Medicine*. 7, pp139-144.
- Lapice, E., Masulli, M., Vaccaro, O. (2013) 'Iron Deficiency and Cardiovascular Disease: An Updated Review of the Evidence', *Current Atherosclerosis Reports*. 15 (358).
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- NHS (2018) *Iron deficiency anaemia*. Available at: <https://www.nhs.uk/conditions/iron-deficiency-anaemia/> (Accessed 27 April 2020).
- NIH (2020) *Iron – Fact Sheet for Health Professionals*. Available at: <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/#h2> (Accessed 28 April 2020).
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- Poggiali, E., Cassinerio, E., Zanaboni, L., Cappellini, M. D. (2012) 'An update on iron chelation therapy', *Blood Transfusio*, 10 (4), pp411-422.