

## What is Anaemia ?

Anaemia is most often manifested by a deficiency in the quantity of haemoglobin and the size or number of red blood cells. Sports anaemia is most commonly seen in athletes, but only iron deficiency anaemia is directly related to diet.



## Sports Anaemia

Sports anaemia, also known as "haemodilution", has a similar iron status to iron deficiency anaemia but the red blood cells are normal in size and colour.

Possible causes are as follows:

1. plasma volume expansion
2. reduced haemoglobin synthesis
3. increased destruction of red blood cells (e.g. foot strike destroys red blood cells, especially in long distance running)

Other factors which increase the risk of sports anaemia include sudden increase in training volume or intensity, especially at the start of an intensive program. A diet low in iron aggravates the condition, but short term sports anaemia is an early adaptation to intense training and is not necessarily diet related.

Endurance athletes are susceptible to having a below normal haemoglobin level which may be due to an increase in plasma volume and does not always indicate the presence of anaemia.

Treatment depends on the cause and may include:

1. diet modification to match increased training
2. supplementation with iron under the instruction of medical doctor
3. modification of training intensity upon discussion with coach

## Iron Deficiency Anaemia

The following conditions are present in individuals with this disease:

1. low haemoglobin (Hb) and haematocrit levels (Hct) (Norm Hb : 14 – 16mg/dL (M); 12 – 14mg/dL(F)) (Norm Hct: 40 – 50% (M); 35 – 46% (F))
2. the average size of red blood cells are smaller than normal
3. blood with a lighter red colour than normal
4. the total haemoglobin concentration in red blood cells (i.e. MCHC) are fewer than normal (Norm: 32.6 – 36.6g/dL)

In addition, the following conditions may also be present:

1. a low serum ferritin level (Normal: 45 – 300ng/ml (M); 35 – 150ng/ml(F))
2. a low serum iron level (Normal: 65 – 170µg/dL (M); 50 – 170µg/dL(F))
3. a low transferrin saturation level (Normal: 15 – 50%)

## Causes of Iron Deficiency Anaemia

1. depleted iron stores
2. increased losses of iron (e.g. in urine, sweat, internal bleeding, injury, etc.)

## Symptoms of Anaemia

Fatigue, paleness, increased incidence and duration of infection, mood changes, diminished appetite and decreased aerobic capacity.

Haemoglobin carries oxygen in the blood to muscles and other cells. Therefore, anaemia can affect sports performance, especially in athletes who engage in endurance events.

If you feel abnormally tired during training and get sick easily, inform your coach and seek help from the Sport Nutritionist and Sport Biochemist to see if you are suffering from anaemia.

## Sources of Dietary Iron

- Haem iron
- highly absorbable
  - found in meat, seafood, poultry
- Non-haem iron
- less absorbable than haem iron
  - found in cereal, beans, leafy vegetable and eggs

## Major Sources of Dietary Iron

Foods	Amount of Iron (mg/100g food)
<b>Breads and Cereals</b>	
Different types of breakfast cereals	5.3 – 12.6
White bread	3.5
White rice, cooked	0.2
<b>Fruits and Vegetables</b>	
Spinach	2.7
Dried apricot	2.7
Amaranth leaf	2.3
Bok choy	0.8
<b>Meats and Alternates</b>	
Pork liver	17.9
Cashew nut	6.0
Tofu	1.9
Egg	1.8
Lamb	1.6
Lean beef tenderloin	1.6
Lean pork tenderloin	1.2
Baked bean	1.2
Chicken breast (without skin)	0.9
Groupers	0.9
<b>Milk and Dairy Products</b>	
Processed cheese	0.4
Milk	0.05

Source: USDA

## Percentage of Iron in Food Absorbed by the Body

Food	Percentage of Iron Absorption
meat/seafood	10 – 20 %
eggs	1 – 3 %
rice	1 – 2 %

## How to Increase Iron Intake and Absorption ?

1. increase iron content of food by cooking with iron cookware, e.g. an iron wok
2. limit use of foods containing inhibitors of iron absorption, e.g. tea, coffee, excessive dietary fibre, e.g. from fibre supplements
3. increase the use of foods containing enhancers of iron absorption, e.g. vitamin C and food from animal sources

## Excessive Amounts of Iron May have Detrimental Effects

Iron is prone to oxidation, a person without iron deficiency should not take iron supplement to prevent anaemia. Excessive iron intake may interfere with the absorption of other minerals such as copper and zinc, causing deficiencies of these nutrients. Iron in excess will be deposited in liver cells causing symptoms of cirrhosis. It may also be deposited in joints, pancreas, heart and lungs.

The above information is provided by the Sport Nutrition Unit of the Athlete and Scientific Services Division. All information is for reference only.

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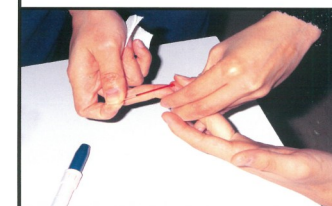
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## 運動營養教育系列手冊 SPORT NUTRITION EDUCATION SERIES III

### 貧血知多點 Learn More About Anaemia



## 什麼是貧血

貧血的徵狀是血紅蛋白的數目低於正常及紅血球的數目及體積太少或形狀有異。在運動員身上常出現是運動性貧血，但只有缺鐵性貧血與營養有直接關係。



## 運動性貧血

運動性貧血或稱為“稀釋性貧血”與貧血病患者的鐵指標差不多，但是紅血球的大小和顏色是正常。

成因與下列因素有關：

- 1) 血漿容量增加
- 2) 血紅蛋白的製造減少
- 3) 紅血球的破壞增加 (例如：長跑運動員的長時間踏步會破壞很多紅血球)

其它誘發因素包括訓練量或強度突然增加，尤其在這種訓練的初期。一個鐵質不足的飲食會令問題加劇，但是短暫的運動性貧血是劇烈訓練的早期適應反應並不一定是因為飲食習慣出了問題。參與持久性項目的運動員的血紅蛋白指數傾向比正

常低。這個情況或許與血漿容量的增加有關，未必一定是貧血。

處理運動性貧血的方法要視乎其成因：

- 1) 需要改善飲食來配合增加了的訓練
- 2) 於醫生指引下服用鐵質補充劑
- 3) 與教練商討調整訓練量

## 缺鐵性貧血

患有此症者，會有下列的情況出現：

1. 血紅蛋白和血壓積指數偏低 (血紅蛋白正常值：14 – 16mg/dL (男)；12 – 14 mg/dL (女)) (血壓積正常值：40 – 50% (男)；35 – 46% (女))
2. 紅血球的體積比正常的小
3. 血液的顏色較正常的淺
4. 血紅蛋白在紅血球中的濃度 (即：平均紅細胞血色素濃度) 偏低 (正常值：32.6 – 36.6g/dL)

此外，以下的情況也會出現：

1. 血清鐵蛋白低於正常 (正常值：45 – 300ng/ml (男)；35 – 150ng/ml (女))
2. 血清鐵低於正常 (正常值：65 – 170 µg/ml (男)；50 – 170 µg/ml (女))
3. 轉鐵蛋白飽和度低於正常 (正常值：15 – 50%)

## 缺鐵性貧血的成因

- 1) 鐵質的貯存量不足
- 2) 鐵質的流失量增加 (例如：尿液、汗液、內出血、受傷等)

## 貧血的病徵

疲勞、臉色蒼白、患傳染病的次數及痊癒時間增加、性情改變、缺乏胃口、帶氧功能下降。

血紅蛋白負責將血液中的氧氣帶給肌肉及其它細胞。所以貧血會直接影響運動員的表現，尤其是參與持久性項目的運動員。

如果你發覺最近在訓練時異常容易疲累，及容易患病，請告知教練並與運動營養師及運動生化主任聯絡，查看是否患上貧血。

## 認識飲食中鐵質的來源

血紅鐵質：容易吸收  
：來自肉類、海產及家禽

非血紅鐵質：吸收幅度較血紅鐵質低  
：來自五穀食物、豆類、綠葉蔬菜及蛋類

## 食物中鐵質的來源

食物	鐵含量 (毫克/100克食物)
<b>五穀類</b>	
各類早餐麥片	5.3 – 12.6
白麵包	3.5
白飯	0.2
<b>蔬果類</b>	
菠菜	2.7
杏脯乾	2.7
苜蓿	2.3
白菜	0.8
<b>肉類及代用品</b>	
豬肝	17.9
腰果	6.0
豆腐	1.9
雞蛋	1.8
羊肉	1.6
瘦牛柳	1.6
瘦豬柳	1.2
茄汁豆	1.2
雞胸肉 (去皮)	0.9
石斑魚	0.9
<b>奶及奶品類</b>	
片裝芝士	0.4
奶	0.05

資料來源：美國農業部

## 食物中的鐵質被人體吸收的百分比

食物	鐵質吸收的百分比
肉/魚	10-20%
蛋	1-3%
白飯	1-2%

## 怎樣增加鐵質的攝取及吸收？

- 1) 用生鐵鑊煮食會增加蔬菜的鐵質含量
- 2) 少吃含防腐劑鐵質吸收的食物，例如：茶、咖啡、大量的纖維素，例如：纖維素補充劑
- 3) 增加進食有助鐵質吸收的食物，例如：維他命C，源自動物的食品

## 鐵質雖重要，但過量攝取非好事

鐵容易氧化，在沒有缺乏之下，不宜服用鐵丸以防治貧血，過量鐵質會影響其它礦物質的吸收，例如：銅及鋅，引致身體缺乏這些營養素。多餘的鐵質會沉積於肝臟，引起肝硬化的病徵，還會沉積於關節、胰臟、心及肺。

以上資料由運動員及科研事務科轄下的運動營養部提供，只供參考。歡迎轉載以上資料，惟事先須得本院許可；轉載時亦須鳴謝本院。

如有查詢，請致電2681 6277與運動科學部聯絡。

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