

# Hormones and Dance Performance

by Dr Nicky Keay



The right balance and interaction of hormones is crucial for health and optimal dance performance. Hormones are internal chemical messengers determining which and when you produce proteins vital for life (and dance!) encoded in your DNA. To enable your hormones to do the best job they can for your health and dancing, you need to have balanced nutrition, exercise, and sleep. Too much or too little of these elements can lead to imbalance and possible negative health and performance outcomes.

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**Relative Energy Deficiency in Sports (RED-S) refers to health concerns caused by a lack of energy available to support both exercise and normal physiological functioning, or relative energy deficiency.**

**What happens when things go wrong?**

Imbalances in training, nutrition and recovery can affect both male and female dancers. (For details on the specific concerns for women, see the 'For Women' info box) In certain sports and in a variety of dance styles, being of light body weight may give a performance or an aesthetic advantage.

However, striving to be light weight without support and advice from qualified nutritional, physiological, and psychological healthcare practitioners could lead to unhealthy behaviours around exercise and eating, potentially risking disruption of hormone health. Not taking in sufficient nutrition to cover both training and normal day to day function in the body means that you go into energy saving mode. This disrupts the hormone system and consequently has multi-system negative effects such as problems with bone health, immunity, metabolism, cardiovascular health, and cognitive function to mention a few.

There are too many hormones to name individually, but some of the most important to both male and female dancers are:

**Thyroid hormones**

Regulating metabolism, body composition (lean and non-lean mass) and bone health

**Growth hormone family**

Regulating growth in young dancers and in adults supports favourable body composition and bone health

**Sex steroid hormones**

In females, oestrogen and progesterone. In males, testosterone. Vital for optimising body composition, bone health, metabolism and cardiovascular health.

**Andry Oporia**



Photo: Hugo Glendinning, Photoshop Consider This UK

**For Women**

The female athlete triad comprises a spectrum of health in three elements: menstrual periods, nutrition, and bone mineral density. The spectrum ranges from healthy and regular periods to lack of periods (amenorrhea), healthy and adequate nutrition to disordered eating or eating disorders, and healthy strong bones to low bone mineral density.

**What's so good about periods?**

In the case of female dancers, having periods is normal. Not starting and/or missing periods is not. Having excluded some relatively common medical conditions that can cause menstrual issues (like polycystic ovary syndrome which affects ovary function), then does it matter if your periods are slow starting and/or stop? Whether you are a dancer/athlete or not, all women of reproductive age from 16 years of age to menopause (around 51 years of age) should have reasonably regular periods. Periods act as a barometer of good health.

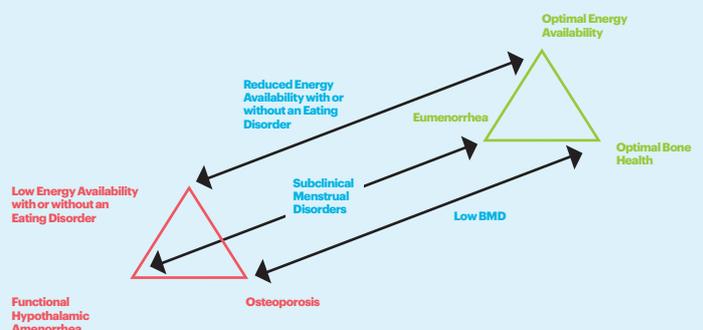
**Amenorrhea**

Is the absence of periods. Primary amenorrhoea is when periods have not started by age 16. Secondary amenorrhoea is when periods stop for more than 6 months (definitions from Royal College of Obstetrics and Gynaecology). Although periods do tend to start later in dancers than non-dancers, medical opinion should be sought if periods have not started by 16, or if they stop for more than 6 months.

Not having periods indicates that your hormones are not at the right levels. You might be thinking everything will be fine once you stop dancing so much, eat a bit more and periods (hopefully) restart. In a study I did of retired dancers, although periods resumed after retiring from dancing full time, in those dancers who started menstruating late and/or periods stopped whilst dancing and/or weight went low, bone loss was irreversible, with values well below that of women of similar age. Some dancers already had osteoporotic bones, or "brittle bone disease," similar to an 80-year-old post menopausal woman, rather than an apparently fit young woman.

**Hormonal Contraception**

Taking the oral contraceptive pill (OCP) is not a solution for regulating periods in the situation of amenorrhoea. The OCP suppresses ovulation and female hormone production. Although withdrawal bleeds are induced; these are not normal menstrual periods caused by production of your own internal hormones. This is the exact opposite of what you want and need your hormones to be doing. So it is no surprise really that OCP does not help protect bones. Although bone health is dependent on internal oestrogen produced during menstrual cycles, many other naturally produced hormones like the growth hormone group and thyroid hormones are also important for bone health and certainly not contained in the OCP.



**Female Athlete Triad (De Souza BJSM 2014)**

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**Being healthy is key to being able to dance well and to your full potential.**

It is easier to see the warning signs of RED-S in female dancers, (see 'For Women' info box) as issues with periods not starting/stopping are more obvious than less defined signs like feeling tired, getting ill a lot, or mood changes. This does not mean that male dancers are not potentially at risk, it just means that it may not so be easy to recognise if hormones are out of balance.

**Nutrition: quantity, quality, timing**

Although low energy availability and hormonal disruption are the fundamental issues in RED-S, it is not as simple as how many calories consumed. Recent research shows energy deficits over a 24 hour period will disrupt hormones more than consistent energy intake over the same time. (For example, skipping meals and eating larger amount at another time of day.) A full dance schedule and late rehearsals or performances may require planning, such as eating more healthy snacks to prevent missing meals. Try not to be rigid in nutrition choices, and keep in mind that a certain diet may suit one person, or may be popular for a time, but this does not mean it is ideal for all dancers.

Dancers strive for perfection with determination and attention to detail. These usually positive qualities can sometimes result in imbalanced approaches such as restrictive or 'picky' nutrition choices or "clean eating" where only certain foods are considered healthy. Clinically, these eating habits are called orthorexia and can result in health issues. For example, this may occur when dancers exclude certain food groups from their diet.

The guiding principle is to be properly fuelled for dance and life and to refuel regularly relative to energy needs. This fuelling strategy supports bone health and recovery. Needless to say, the quality of your nutrition is important. Include not only a range of food types (carbohydrates, protein, fat, fruits and vegetables), but cover all the micronutrients. These include essential vitamins and minerals, which are best obtained through food sources, or the sun in the case of vitamin D. By ensuring adequate quantity, quality and timing of nutrition, you will be supporting healthy balance of hormone production.

**For more information on healthy nutrition, see One Dance UK's Information Sheet: Nutrition for Dancers.**

**Young dancers**

If young dancers develop RED-S, this can not only compromise health and performance, but growth and development as well. In a study I did of young dancers in training, there was evidence that even low energy availability can disrupt key hormones and accumulation and architecture of bone during a crucial time for bone development. The opportunity to set up strong bones for a dance career is at risk, as peak bone mass is accumulated by your early twenties. It is vital for dancers, parents and teachers to spot potential issues early.

**Performance effects and injury risk**

Why is it so important to prevent RED-S in dancers? Even if you were perfectly in balance beforehand, after just 5 days of reduced energy availability (not eating enough to cover energy demands from exercise and housekeeping demands of body), key hormones are disrupted. Imbalance of hormones has detrimental effects on your dance ability and increases risks of injury, including soft tissue and stress fracture injuries. Hormone disruption due to RED-S also causes deterioration of neuromuscular skills, including balance and proprioception.

**What to do?**

Don't ignore recurrent injury, fatigue or illness. For example, if you have been reducing your food intake, increasing your hours of exercise and dancing, if you have been growing, but feel more tired than usual, or feeling extremely stressed or tired, there may be a simple explanation such as viral infection, or low vitamin D. However, it may be that the underlying reason is hormonal dysfunction due to RED-S. Although you may think you are fine, if your hormones are not working for you, then you will never reach your full potential as dancer.

Any concerns should be checked by your GP and, if necessary, referred for further help to the dedicated NIDMS RED-S/Endocrine clinic for dancers, jointly run by Dr Roger Wolman and Dr Nicky Keay at the Royal National Orthopaedic Hospital, Bolsover Street, London.

Every care has been taken in preparing this advice but no responsibility can be accepted by the authors or One Dance UK for any harm, however caused, which results from this advice.



Jade Wallace

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**Performance effects of RED-S (IOC statement BJSM 2014)**

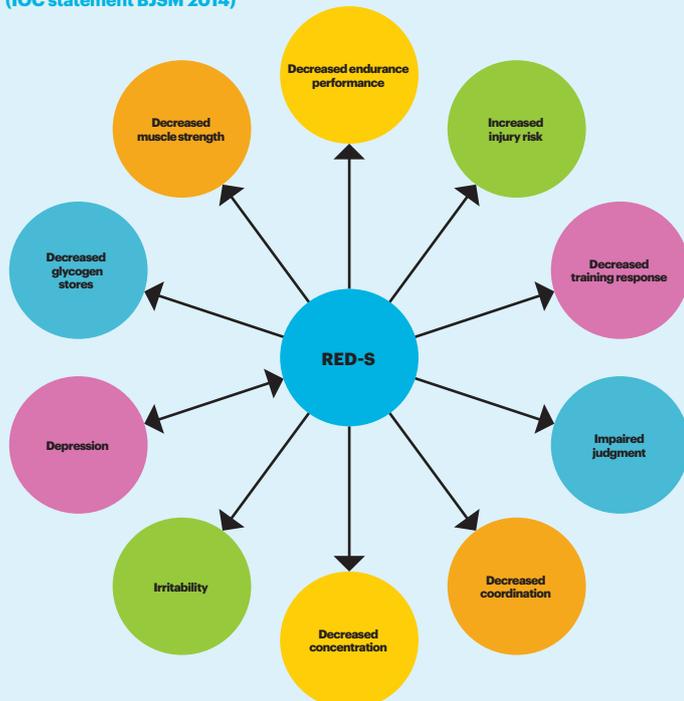


Photo: Simon Wright

**Check points**

- Are you suffering with frequent injuries/fatigue/illness over last 3 months or more?
- Female dancers: if 16 years or older have your periods not started? Have you missed more than 3 consecutive periods?

If yes to any of above, seek medical advice at NHS RED-S dedicated clinic. For full information visit [nidms.co.uk/red-s-clinic](http://nidms.co.uk/red-s-clinic)

**Key Points**

- Striving to be light weight for dance can lead to restrictive eating patterns and without nutritional and training support and advice could lead to unhealthy behaviours around exercise and eating
- Insufficient nutrition intake (quantity and quality) for demands of dance results in RED-S and multiple hormonal disruption
- RED-S has detrimental effects on health and dance performance, and consequences can be both short and long term
- Some consequences of RED-S are irreversible, unless intervention is swift.

**Resources**

- British Association of Sport and Exercise Medicine Educational resource for athletes/dancers, coaches/teachers, healthcare professionals on RED-S [health4performance.co.uk](http://health4performance.co.uk)
- NIDMS NHS RED-S clinic Royal National Orthopaedic Hospital, London

**References**

2018 UPDATE: Relative Energy Deficiency in Sport (RED-S) British Journal of Sports Medicine 2018

What is Dance Medicine? British Journal of Sports Medicine 2018

Optimal health: including female athletes! Part 1 Bones British Journal of Sports Medicine 2017

Optimal health: including male athletes! Part 2 Relative Energy Deficiency in sports British Journal of Sports Medicine 2017

Optimal Health: Especially Young Athletes! Part 3 - Consequences of Relative Energy Deficiency in Sports British Journal of Sports Medicine 2017

Optimal Health: For All Athletes! Part 4 - Mechanisms British Journal of Sports Medicine 2017

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