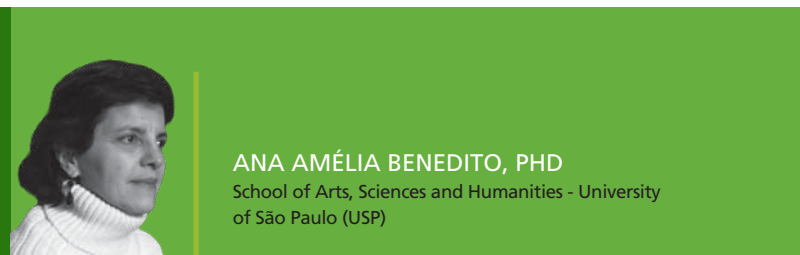




JET-LAG: EFFECTS OF TIME ZONE CHANGING ON SPORT PERFORMANCE



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During flights across several time zones, the wake-sleep cycle, a biological rhythm sensitive to temporary changes in the environment, is subject to a phase change. In west-bound flights, São Paulo - Los Angeles, for example, the wake-sleep cycle is delayed to enable adaptation to the new local time, while in east-bound flights, São Paulo - Paris, for example, the wake-sleep cycle is subject to a six-hour advancement. Such phase changes generate a feeling of general discomfort, known as jet-lag¹.

Jet-lag is the set of symptoms that affect individuals after flights across three (03) or more time zones. Jet-lag subjective symptoms are similar to fatigue caused by long flights. With jet-lag, however, symptoms do not disappear overnight. Generally, we do not feel well and it seems that our body time and local time are mismatched. In the specific case of athletes, physical exercise becomes harder until this "mismatch" disappears.

Most important symptoms associated to jet-lag²:

- Fatigue during the day and problems to fall asleep at night;
- Difficulty in performing activities requiring concentration;
- Difficulty in carrying out tasks requiring precise movements;
- Loss of appetite, nausea;
- Headache, irritability, disorientation, mental confusion;

As a rule, jet-lag is more pronounced and lasting after flights to the east direction than after west-bound flights, across the same number of time zones; jet-lag increases as the time difference from the origin increase; youths and well conditioned individuals tend

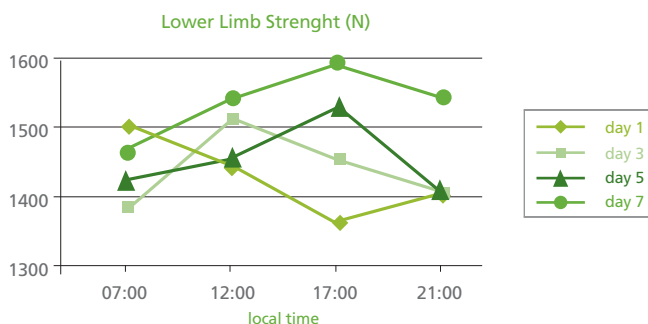
to suffer less than older citizens; women tend to take it harder than men. Furthermore, individual differences occur for the same reasons. It is well known that sport performance is strongly dependent on sleep – a performance loss of about 10% occurs after a less than three (03) hour-night sleep, which could easily occur after a time zone change.

Wright et al.² have shown differences in the times achieved by sprinters and medium distance runners after an east-bound flight across more than six (06) time zones.

Changes have also been seen in the measured handgrip force of rugby players who had traveled from England to Australia force measurement in the afternoon, when competitions were held, exceeded morning figures and just on the 7th day the circadian rhythms had gone back to the standards measured in England^{3,4}.

The city of Beijing where the 2008 Olympic Games will be held is eleven time zones east of Brasilia time zone.

Similar results were found in the leg strength of athletes who had traveled west, with a five-hour difference between local times: it took them five days to reach maximum peak force at five pm, which corresponded to competition time (figure below⁵).



Lower limb force changes, in four time zones, on the 1st, 3rd, 5th and 7th day, after flying 5 times zones to the west⁵



We are suggesting that athletes should be informed about jet-lag symptoms and the best time to go to sleep, train and expose themselves to bright light in their first days in Beijing.



It is well known that it is hard to separate concrete effects that cause biological clock loss of sync from those resulting from changes of scenario, competition stress, fatigue from trip, etc. However, the research carried out by Recht et al.⁶ with American basketball league players evidenced that home teams had a higher probability of winning and additionally, this probability was further increased if the visiting team had crossed many time zones.

Many methods can be found in the literature for alleviating jet-lag symptoms. Among such methods the most frequently used ones are light and melatonin therapy – yet, a cure for jet-lag is still to be found.

Light therapy involves using a high intensity light, administered at certain times during the day, with the purpose of inducing phase, sleep time and melatonin secretion advancement. Therapeutic application of light therapy requires full control over individual exposure to light along the day⁷.

Management using melatonin is based on taking melatonin capsules at night – when the intent is to advance sleep time, that is, going to sleep earlier, or in the morning – when delaying sleep time is the target. It still has to be defined if melatonin treatment success is due to melatonin action has a natural hypnotic or as a body clock adjustment promoter. The choice of the time when melatonin is to be administered is critical to the success of jet-lag treatment.

The city of Beijing, where 2008 Olympic Games will be held, is eleven time zones east of Brasília time zone. In order to alleviate losses caused by traveling across so many time zones, we are suggesting that athletes should be informed about jet-lag symptoms and the best time to go to sleep, train and expose themselves to bright light in their first days in Beijing.

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