

jet lag. Jet lag refers to a group of symptoms that affect travellers following rapid transition across multiple time zones. The syndrome includes feelings of fatigue and inertia, difficulties in concentrating and in sleeping, gastrointestinal problems, and a general malaise. It is distinct from travel fatigue which is associated with tiredness after the hassles of a long journey, and which occurs after flying north or south. Jet lag is therefore a relatively modern phenomenon, associated exclusively with long-haul flights.

The cause of jet lag is disturbance of the normal circadian rhythms, referring to biological cycles that recur over the solar day. These rhythms are controlled by the body 'clock' located in the suprachiasmatic nucleus cells of the hypothalamus. Nerve connections with the pineal gland (which secretes melatonin) and the retina allow the body clock to react to light in the external environment. Consequently, the body responds rhythmically to the alternations of light and darkness. The hormone melatonin is secreted as darkness falls, causing peripheral vasodilation, a drop in body temperature, and promoting sleep. Melatonin is inhibited by light and so alertness and wakefulness are associated with daytime light. The alternation of light and darkness in the environment locks the timing of the internal body clock into a 24-hour cycle.

The synchronization of the human circadian rhythm with external local time is disrupted after travelling across different time zones. It takes some days for the body clock to adjust to the new environment, depending on the direction of flight and the number of time zones crossed. Jet lag is more severe and lasts longer, the greater the number of time zone transitions. It takes longer to adjust going eastwards compared with westward travel, the body clock coping more easily with a phase delay. Physical fitness helps combat the effects of jet lag, whilst ageing individuals compensate for any reduced capability to cope by using their previous experience. Generally it takes on average one day for each time zone traversed for symptoms to disappear totally.

Various means have been promoted to help cope with jet lag. These include pharmacological, dietary, and behavioural methods. Effective treatments are based on influencing the body clock directly or manipulating the sleeping or wakefulness phases of the day. Behavioural

methods attempt to accelerate the phase advance or phase delay of the body clock, according to requirements of the trip.

The influence of a drug on jet lag symptoms depends on its mode of action. A chronobiotic refers to a direct effect on the body clock whereas a hypnotic initiates the drug's sleep-promoting characteristics. This explains why sleeping pills have been used as antidotes to jet lag. In particular the benzodiazepines have been adopted for use. Temazepam has been the minor tranquillizer of choice, although it may have hangover effects in some individuals. Shorter-acting hypnotics such as zolpidem are preferable for individuals severely affected.

Synthetic versions of melatonin may benefit travellers, but there are cautions. Timing of administration is crucial and should fit the phase-response curve of the drug. Administration of the drug in the hours before the trough of the body temperature rhythm is likely to advance the body clock, whilst administration of melatonin in the hours after this nadir should delay it. Melatonin is available only by prescription in most European countries, although it can be accessed in any drugstore in the USA. The British Olympic Association has not recommended use of melatonin or sleeping pills as a means of coping with jet lag.

Light visors have been suggested for promoting adjustment to the new time zone. Light inhibits melatonin secretion and constitutes a major environmental signal for the brain's timekeeping function. Bright light is necessary to fulfil this role and its phase-response curve is the opposite of melatonin's. Travellers should seek natural daylight early in the morning after travelling westwards, but would benefit from a lie-in for two days or so after travelling east.

The macronutrients in diet have been proposed for promoting alertness and drowsiness as required while the body's rhythms are desynchronized. The theory is that carbohydrates contain tryptophan, a precursor of serotonin, and so would increase drowsiness. By contrast, a protein diet would increase tyrosine levels, a substrate for noradrenaline (norepinephrine), thereby promoting alertness during the day. As yet there is no convincing evidence that dietary manipulation relieves jet lag: the timing rather than the type of meals seems to be the key.

Caffeine can help maintain wakefulness during the day but should be avoided before retiring to bed owing to its effect in stimulating the central nervous system. Alcohol too is a poor nightcap as its promotion of diuresis is likely to disrupt sleep. It is important to drink more than the normal daily intake, since the body may be dehydrated after the long time in the aircraft's dry air.

Indeed attention to fluids should start during flight. Fruit juices are preferable to tea, coffee, and alcohol which have diuretic effects. Light exercise—such as isometric

Jung, Carl Gustav

contractions while seated, or gentle stretching at the back of the plane—will help to avoid joint stiffness and risk of deep vein thrombosis. The latter refers to blood clotting due to staying in a restricted seated posture for too long. Use of elasticated stockings to avoid blood pooling in the lower limbs has also been advocated.

Behavioural approaches to dealing with jet lag cover activity prior to embarkation, on the plane, and for days after arrival. Being well prepared for the journey and keeping refreshed during it do seem to be beneficial. Adjusting the normal sleep–wakefulness cycle for days prior to departure is too disruptive but an adjustment of bedtime by 1–2 hours can help prior to taking an eastward-bound flight. Strategies for the first few days after arrival will depend on the direction of the flight. After the first day, it should be possible to fit in closely with habitual activity of local residents. Effects of jet lag are transient, periodic, and should not entail avoidance of activity. Nevertheless, business people should allow time to adjust and should not schedule important meetings for the evening (or morning after travelling eastwards) until they have had the time to overcome the worst symptoms. Napping in the afternoons during the period of resynchronization is not advised since it may anchor circadian rhythms in the time zone of departure. For brief visits (a few hours) it is possible to maintain the body clock in its unadjusted state but the strategy required is outside the reach of the vast majority of travellers. For those a positive mindset helps to shrug off transient symptoms when they are at their most severe. Experience of previous personal strategies for coping with travel stress can reduce symptoms to subliminal levels. Travellers can therefore learn some tips on what works best for them when exposed to jet lag. TR Waterhouse, J. M., Minors, D. S., Waterhouse, M. E., Reilly, T., and Atkinson, G. (2002). *Keeping in Time with your Body Clock*.

Jung, Carl Gustav (1875–1961). Swiss psychologist, born at Kesswil, the son of a pastor of the Swiss Reformed Church; his paternal grandfather and great-grandfather were physicians. He enrolled at the University of Basel in 1895, where he took a degree in medicine, and then decided to specialize in psychiatry. In 1900 he went to the Burgholzli, the mental hospital and university psychiatric clinic in Zurich, where he studied under Eugen Bleuler. It was while working at the Burgholzli that he published his first papers on clinical topics, and also a number of papers on the use of word-association tests, which he pioneered (see FREE ASSOCIATION). Jung concluded that through word association one can uncover constellations of ideas that are emotionally charged and give rise to morbid symptoms. The test worked by evaluating the patient in terms of the delay between the stimulus and his response, the appropriateness of the response word, and the behaviour exhibited. A significant deviation from normal indicated

the presence of unconscious affect-laden ideas, and Jung coined the term ‘*complex’ to describe this combination of the idea with the strong emotion it aroused.

In 1906, Jung published a study on dementia praecox, and this work was to influence Bleuler when he proposed the name ‘*schizophrenia for the illness five years later. Jung hypothesized that a complex was responsible for the production of a toxin which impaired mental functioning and acted directly to release the contents of the complex into consciousness. Thus, the delusional ideas, hallucinatory experiences, and affective changes of the psychosis were to be understood as more or less distorted manifestations of the originally repressed complex. This, in effect, was the first psychosomatic theory of schizophrenia, and although Jung gradually abandoned the toxin hypothesis and thought more in terms of disturbed neurochemical processes, he never relinquished his belief in the primacy of psychogenic factors in the origin of schizophrenia.

By the time (1907) that Jung first met Sigmund *Freud in Vienna, he was well acquainted with Freud’s writings, and from the success of this meeting there followed a close association until 1912. In the early years of their collaboration Jung defended Freudian theories, and Freud responded to this support from an unexpected quarter with enthusiasm and encouragement. In fact, at that time Freud felt the psychoanalytic movement to be isolated and under attack, and in 1908 wrote to another colleague: ‘It is only his [Jung’s] arrival on the scene that has removed the danger of psychoanalysis becoming a Jewish national affair.’

In 1910 Jung left his post at the Burgholzli to concentrate on his growing private practice and also began his investigations into myths, legends, and fairy tales and the light that their contents threw onto psychopathology. His first writings on this theme were published in 1911 and indicated both an area of interest which was to be sustained for the rest of his life and an assertion of independence from Freud in their criticism of his classification of instincts as either self-preservative or sexual. Although Jung’s dislike of the conceiving of the libido as essentially sexual was already apparent at this early stage, the significance became clear only much later, when he wrote about individuation. However, it was not only intellectual differences that led to the breach between Freud and Jung. Jung has recorded that he found Freud unduly concerned to preserve the tenets of psychoanalysis as articles of faith, immune from attack, and that this attitude diminished his respect for him. In fact, Jung’s writings reveal that he too was prone to dogmatic assertions, but his fundamental assumptions run counter to those of Freud. Thus, while Freud, characteristically, established causal links stretching back to childhood, Jung was concerned to place man in a historical context which gave his life meaning and dignity and ultimately implied a place in a purposeful