

## Sleep, Suffering & Solutions

Sleep research has grown enormously in the last decade. Sleep disturbance is endemic. The cost to our development, lives, health and business productivity is looming large. Yet we live in an environment where we seem to do everything possible to mess it up further. We have a very serious issue to sort out. Solutions are simple!

While we have much to learn about sleep and human clinical trials are in short supply, I will review current themes in sleep research. We will keep it accessible and provide clear solutions.

Much of the biological research comes from mouse studies and we may find that these ideas may have to be modified. Nevertheless, the issue is so serious that we have to make an effort to support healthy sleep and the Resilience it brings.

Sleep is fundamental to Resilience. We learn repeatedly that building Resilience must include good sleep. Once we achieve a good night's sleep all the other elements of Resilience are more achievable and even come spontaneously.

### 1. The Role of Sleep

Some of us would like to sleep more and some less but we all know that if we do not sleep our daytime function and health deteriorate. Co-ordination, attention control, decision-making and impulse control all suffer. Then cardiovascular risk, blood pressure, metabolic disorders (obesity and diabetes) and immune system dysfunction increase. Life without sleep is suffering.

During the day's activity we build up adenosine. High levels increase our propensity for sleep. The longer we are alert the deeper our delta-wave sleep. Caffeine works to combat adenosine.

A good night's sleep rejuvenates our subjective experience of life. Deep sleep rejuvenates cells, builds muscle and repairs the brain while dreaming sleep (REM) is important for memory and emotional intelligence.

We are sleeping one to two hours less per day than 100 years ago. Sleep disturbance has become a major personal and medical concern. Our work with thousands of clients confirms this. More worrying is how little we understand about sleep and the practice of a good night's sleep.

Children need more sleep than adults and it is vital for learning, hormonal, brain and muscular development. Sleep disturbances in young people are common, disrupting development and learning. This is the main reason for this newsletter.

### 2. Basic Biology of Sleep

Human sleep is subject to biological clocks the first of which is the circadian rhythm, a 24.5-hour cycle built into the suprachiasmatic (SCN) nucleus. Sitting just behind the eyes this central clock is paced and regulated by light (photoentrainment). In particular, blue light in the early hours of the day effectively resets the clock.

As we waken, our body temperature rises, cortisol is released, blood pressure rises, testosterone peaks and we are alert, co-ordinated and effective. After 7pm body temperature drops, melatonin secretion starts at 9pm and we drop into deep sleep (slow wave or delta) between 10pm and 2am. Human growth hormone is active during this stage facilitating repair, growth and immunity. Dreaming sleep takes up the second two thirds of the night when our body temperature is lowest.

We also have peripheral clocks in almost all cells and particularly in the heart, brain, liver and fat. These peripheral clocks take their cues from both the SCN and other behavioural and nutritional factors. A number of genes have been linked to these biological clocks and it appears that everything works best when they are regular and synchronised. There is much to learn about the peripheral clocks.

In a hunter-gatherer life synchronisation was easy with no artificial light, requirements to get fresh food and the imperative to seek shelter at night.

### 3. 24/7 and Shattered Biology

Today we are perpetually desynchronised by artificial light, heating, electronic stimulation, daylight savings and sleep debt. Many choose to recover sleep debt by sleeping in through the morning whenever we can thus causing sleep-phase delay. Further we are not exposed to adequate blue light in the early part of the day.

The result is a disrupted circadian rhythm. This is easily demonstrated in animals and people. If we are exposed to light, food and stimulation late in the biological day we cause sleep-phase delay. This person struggles to get to sleep and to get up in the morning. If we are exposed to light, food and stimulation in the early morning we cause sleep-phase advance where we sleep earlier and wake earlier.

We have disoriented our central clock and probably the peripheral clocks. Further, the peripheral clocks, which are more susceptible to food and stimulation, can be desynchronised from the central clock. The result is a biological nightmare. The regular phases of brain activity, hormone production and release, body temperature, glucose metabolism, blood pressure and immune protection are thrown out of their normal cycles.

Sleep disturbance, daytime fatigue, immune disorders, diabetes, heart disease, obesity and psychological disorders such as depression become common. Rat and mouse research shows that this can cause changes in the clock-related genes. This gene effect may be the cause of the increased breast, endometrial, colon, and prostate cancer found in people who do shift work such as pilots, nurses and others.

### 4. Delayed Sleep-phase Syndrome

Stimulation late in the evening combined with lack of blue light in the morning leads to a difficulty

getting to sleep and needing to sleep in through the morning. Common in adults and the default for many teenagers, it leads to severe de-synchronisation with sleep deficit, inadequate deep sleep and too much REM sleep.

While it is not yet clear how much reduced sleep or sleep-phase change is responsible, adults also are at much higher risk for obesity, blood pressure elevation, diabetes and depression. More than half have psychological illness. It affects men ten times more frequently than women.

In younger people loss of motivation and depression can follow. Studies show that it also increases obesity, high blood pressure, learning difficulty and behavioural difficulty. Abnormalities of glucose metabolism affect sports performance.

Most families fall into this trap with their children. We know that younger people need more sleep so we “help” them sleep in. All too often they are still in bed at lunchtime on the weekend and we feel that we are doing them a favour. Research suggests you are neglecting your parental responsibility! Monday morning will be a crisis!

The modern electronic age has them on Skype, Facebook, cell phones and laptops well into the evening. Deep sleep is disrupted, delayed and shortened and REM sleep increases.

Clearly, we are making our children sick, teaching them bad habits and “encouraging” a toxic physiological environment where hormones, brain function, immune protection, emotions and glucose metabolism is disordered.

### 5. Murder by Daylight Savings

A study in the New England Journal of Medicine, Oct 2008, showed that heart attack rates increase by 5% on the introduction of daylight savings. Younger people and women are more vulnerable. Daylight saving affects 1.5 billion people globally. With heart attack rates of 2.76% this puts 414,000 people at risk. When daylight saving ends in autumn there is a 2% reduction in heart attacks.

Of more concern is the number of children forced into sleep-phase delay by daylight savings. They have to go to school in the dark and are expected to go to bed when the sun is still up.

Supporters of daylight savings claim that it is good for the economy. Of course, we drink more at night, party hard and stimulate the medical economy. The damage to learning, productivity, biological equanimity and resilience is ignored!

Solution: leave countries with daylight savings.

### 6. Negotiating for Change

In some way I suspect every family faces some of these issues. It is the classic situation of getting so smart we no longer have to follow the cues of the environment that shaped our genes. The same genes now face a radically altered environment and we have to learn how to adapt.

My first request is to work with intelligence. If people understand, particularly children, they will help find good solutions. Open this idea to family discussion. Ask your children to do some research. Check the facts yourself.

My second request is to know when you need to draw a line and be firm. Our children, and sometimes ourselves, are too caught up in the drama of life to know when to stop. Sleep problems are serious. Sloppy behaviour becomes bad habit, which creates a syndrome – in this case one that is putting our children at serious risk.

My third plea is to act quickly and definitively. Far too many children are ending up depressed, obese, gadget addicted, disruptive and sick. Once you end up with a doctor or psychiatrist the solutions become complex and expensive.

In most cases the solution is simple. Act with clarity and confidence and follow the very obvious natural biology.

If you have any doubt take your family on a 10 day camping trip without any gadgets or stimulants.

### 8. Get the Basics Right

- a. Get everyone up at a consistent wake up time preferably around dawn. Make it a ritual
- b. Expose yourselves to early morning light. The blue light of dawn, water, or sky is best
- c. Make time for a decent breakfast together
- d. Encourage schools to allow adequate exposure to bright daylight
- e. Get enough morning and afternoon sun on skin without sunscreen for Vitamin D
- f. Change orange/red sunglasses to blue
- g. Get vigorous exercise every day
- h. Have an early and light evening meal
- i. Ditch TV, laptops and gadgets after 7pm
- j. Cool, darken and quieten your bedrooms
- k. Remove TV, phones & laptops from bedroom
- l. Develop a relaxation routine before sleep
- m. Never switch lights on at night
- n. When in sleep deficit discharge it by going to bed early and accumulating deep sleep.

### 9. Firm but Flexible

These basics trigger a wave of defensive resistance. Get over it! Agree on your own routines and engage your children in appropriate routines for their needs. Then be a really good, caring and tough coach. The reward will be a recovery of sustainable Resilience.

Do not become a tyrant! Children need to play and explore. Teenagers should go to the odd party that goes past midnight. You must celebrate and be wild from time to time. Humans are adaptive. Acute short-term disturbance is easily accommodated – provided we catch up the deficit. It is the chronic phase delay that kills!

### 9. References

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