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Sleep debt: pathophysiology and natural therapeutics

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Abstract

The state of sleep debt, induced when hours of sleep drop below the physiological requirement of the individual, includes profound changes in the endocrine, cardiovascular, and immune systems. Herbal and other natural treatments for these systems will ultimately fail unless the underlying sleep debt is corrected. Herbal nervines and hypnotics, administered in the context of lifestyle changes to induce recuperative sleep and establish normal sleep duration and depth, become critical to the successful practice of herbalism in chronic disease. Sleep debt is a major obstacle to cure, and is present to some extent in the majority of patients in the U.S. today. Bed rest and recommendations for recuperative rest have traditionally been an important therapeutic intervention in many medical systems, and may be more important in the current era than in the past when individuals habitually slept more than they do now.

Some physiological effects of sleep deprivation

Average sleep duration was about nine hours per night in 1910, and remained close to this until 1960 (Bliwise; Broman et al; Kripke et al). Since 1960 the average has fallen to seven hours a night during the workweek, and less than eight hours on weekends. Approximately one-third of the population sleeps six hours or less per night, and only one-third sleep at least eight hours a night (NSF). To meet the modern demands of around-the-clock production, many shift workers sleep, on average, less than five hours on workdays.

Some studies have shown that participants cannot adapt to a progressive curtailment of their usual sleep period by two to three hours per night, experiencing substantial alterations in mood and vigilance (Dinges,

Pack, and Williams). In general, sleep loss will result in performance deficits, including increased variability in performance, slowed physical and mental reaction time, increased errors, decreased vigilance, impaired memory, and reduced motivation and laxity (Dinges and Kribbs). Brain metabolism slows by 7%, as measured by brain uptake of glucose (Spiegel et al 1999; Thomas et al).

Endocrine effects

Recent studies show that underlying the cognitive impairment of sleep debt is a profound endocrine dysregulation (Van Cauter and Spiegel; Spiegel et al 1999). Thyroid hormone levels rose during one four-day period of sleep deprivation. Long-term effects have not been measured, but chronic over stimulation of the thyroid could cause chronic thyroid disease (Spiegel et al 1999). Growth hormone normally surges in the first several hours of sleep, when slow wave brain activity in the deep stages of sleep occur. If the slow wave portion of sleep is curtailed, growth hormone production is also depressed, possibly contributing to obesity, reduced lean muscle mass, and insulin resistance. In those with sleep deprivation, trials inducing slow wave sleep also restore growth hormone secretion (Van Cauter; Van Cauter and Copinschi; Spiegel et al 2000; Van Cauter et al 2000). Afternoon and early evening cortisol levels also rose significantly in the sleep debt phase after four days of reduced sleep. This may reflect decreased efficacy of the negative feedback regulation of the hypothalamic-pituitary-adrenal axis (Leproult et al; Van Cauter et al 2000).

Immune function

Several studies have shown sleep deprivation resulted in impaired immune function, especially of natural killer cells, essential to defense against viral infection and cancer. This was found with even modest sleep deprivation, such as denying sleep during 10 PM and 3 AM, or between 3 AM and 7 AM (Dinges et al 1995). One trial demonstrated a reduced response to influenza immunization in a subject in a state of sleep

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debt. Inflammatory chemicals are also increased (Spiegel et al 2002).

Insulin resistance and cardiovascular risk factors

Sleep deprivation quickly results in impaired carbohydrate tolerance. One trial found a glucose clearance rate depressed by 40% after four days of restriction of sleep to four hours a night. The measurement is comparable to that found in gestational diabetes. Responses to a morning glucose tolerance test fit the criteria for impaired glucose tolerance (Spiegel et al 1999). Other researchers have also found glucose tolerance to decrease during sleep debt (Scheen and Van Cauter; Scheen et al). Such changes have been linked to age-related insulin resistance and memory loss (Van Cauter et al 1996; Kern et al). Several parameters of cardiovascular risk related to insulin resistance are also associated with sleep deprivation, including abdominal pattern obesity (Scheen 1999), increased tendency of blood to clot (Meade et al), increased triglycerides and a possible increase in Type II diabetes (Costa; Morgan et al), and hypertension (Lusardi et al). Sleep debt also predicts obesity in both adults in children (Parkes; Sekine et al).

Heart attacks

A survey of Japanese men showed that two or more days per week with less than five hours of sleep were associated a 200-300% increase in heart attacks (Liu and Tanaka). This is in the range of five to ten times the risk of having high LDL cholesterol. In a group of women, those reporting less than five hours of sleep per night had an 82% increase in cardiovascular events (Najib et al). Those sleeping fewer than six hours had a 30% increased risk. These risks in women are higher than risks for moderately elevated total cholesterol or LDL cholesterol.

Other changes

Problems among shift workers include chronic sleep disorders, and chronic gastrointestinal disease (Costa; Morgan et al).

Sleep debt and recovery

The above physiological changes may be characterized as sleep debt, and extended nighttime rest may be critical to reversing them. The effects of sleep deprivation can be induced either by disruption of the quantity of sleep, or its quality. Chronic light restless sleep without a deep sleep phase results in many of the above

changes. Disruption of sleep quality commonly accompanies jet lag, night shift work, chronic stress, caffeine abuse, and patterns of activity and rest that do not conform to the natural circadian rhythm of light and dark (Rajaratnam and Arendt).

Initial recovery from sleep debt, measured by a movement toward normal endocrine and immune function, typically requires three days of 9.5 or more hours of sleep. Longer and more extended periods of bed rest may also be useful in chronic sleep debt. Experimental extension of the time spent in bed from an average of eight hours to fourteen hours per day over one month showed continuous improvement, indicating that a normal eight hours rest may not meet the sleep needs of healthy young adults, who may carry a substantial sleep debt even in the absence of obvious efforts to curtail sleep (Wehr et al).

Physiological influences on sleep

In a normal daily physiological rhythm, the hormone melatonin begins to rise in the early evening and reaches a peak at 4-6 AM. The body temperature follows the opposite course, and begins to decline as the melatonin increases, and is at its lowest point when melatonin peaks. The most important factor setting this rhythm is exposure to light, which depresses melatonin. The body temperature low point at 4-6 AM can be shifted later by exposure to even moderate light (such as in the typical home living room) after sunset (Zeitzer et al). Factors that raise body temperature after sunset, such as exercise, heavy meals, or hot baths near bedtime, can also disrupt the cycle.

The deepest sleep normally occurs during the first three hours of sleep, and during this time growth hormone surges at a rate about equivalent to light aerobic exercise. Growth hormone promotes regeneration of the tissues and immune system, and healing and repair of the lean body mass. This surge may be blocked if carbohydrates are eaten within three hours of going to bed, (via the growth hormone blocking effects of insulin) or if sleep is not deep enough. Valium, Xanax, and related sedative drugs cut off the deep stages of sleep, and may block this function of growth hormone.

The above factors may be adjusted in the lifestyle to support a normal sleep pattern. The accompanying patient instruction sheet, used in the teaching clinic at the Rocky Mountain Center for Botanical Studies, has been effective in rapidly re-establishing normal sleep

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Patient Education Instruction Sheet

A routine for establishing healthy sleep

This routine is especially helpful for re-establishing a healthy 8.5 to 9.5 hour sleep cycle in an individual who has chronically not been sleeping well, or who is suffering from the after effects of night shift work or jet lag.

1. Select a time to go to bed so you can get 8.5 to 9.5 hours of sleep before the need to arise in the morning. Any hour of sleep before 11 PM is especially beneficial, and any hour of wakefulness after 1 AM is especially detrimental.

2. Engage in some outdoor activity during the bright daylight hours around noon, even if it is only a 20-minute walk on the lunch hour. Bright natural light suppresses melatonin, and helps to establish the normal daily rhythm, with the melatonin rising again as sleep approaches. If possible, do your daily exercise in the daylight hours before 1 PM. This allows the body's metabolism to cool down before sleep. Physical exercise after sunset may be detrimental to sleep.

3. A brief late afternoon nap is OK, 20 minutes is ideal. Don't engage in physical exercise or intense exciting activity after the nap.

4. Have an early dinner and ensure the stomach is empty before going to bed. Five to six hours after the last meal is optimal, but at least three hours is necessary. The body metabolism increases in response to food, and this elevation can promote insomnia.

5. Don't engage in intense mental activity for at least two hours before bedtime. Light reading is OK.

6. Turn off all bright lights as soon as possible after sunset, and very strictly for the last hour before bedtime. Use gentle candlelight instead of bright room light if possible.

7. In the last 45-90 minutes before bed, take a neutral bath (not a hot bath). In a neutral

bath, the water temperature should be 92-97 degrees F. It should feel somewhere between natural temperature and slightly warm to the individual. Add warm water as necessary to keep the bath from feeling cool. A treatment for insomnia could last from 15-60 minutes. During the last part of the bath, let the water cool down somewhat so it feels cool to the touch. The bathroom should be dimly lit, as with candlelight. A few drops of lavender essential oil may be added to the bath. Soft pleasant music may also be played. This treatment cools and slows the metabolism, while relaxing the nervous system. Lie down and rest in a horizontal position as soon as possible after the bath.

8. Take a dose of mild sedative herbs 30-60 minutes before bed.

9. Get horizontal for 30-60 minutes before going to sleep (after the bath, if you take one). Read or watch television lying down. Remember, keep the lights dim.

10. At the time you set to go to sleep, take another dose of sedative herbs, turn off all lights, draw the blinds or curtains if the moon is bright, and don't turn on any lights again until morning light comes. Say a prayer, release the events of day to the Creator, give thanks for the good things of the day. Lie down in bed and relax. Think about natural things that you love (i.e., animals, plants, trees, beautiful places in nature). Soft music may be played as you are going to sleep.

11. If you wake up before 8.5 hours, roll over and go back to sleep. For recovery from sleep deficit, stay in bed for at least 9.5 hours, and take a twenty-minute nap in the late afternoon.

12. Eat a substantial breakfast with abundant protein, and try to consume 80% of your daily protein requirements at breakfast and lunch. Protein raises heat production.

This routine will usually re-establish the sleep-wake cycle within three days.

patterns, even after years of chronic insomnia. See also the accompanying illustrative case study.

Sleep debt therapeutics

A patient in a state of sleep debt may or may not complain of insomnia. Many patients are so accustomed to a deficient sleep pattern that they think it is normal. They sleep “enough to get by” in their words, but have lost the experience of being truly well rested. They may habitually compensate for the cognitive deficits of sleep debt by consuming caffeine. The therapeutic strategies covered here may be used for outright insomnia, or as part of a routine to counter sleep debt.

Bed rest

In the history of natural medicine, bed rest or extended sleep has been a common therapeutic prescription. It is a mainstay of traditional European spa therapy, with two to three weeks in a supportive setting being the routine. The pattern in spa therapy is usually an early bedtime, extended sleep, and an afternoon nap or rest. In the early years of this century, American naturopath Henry Lindlahr, who ran a 300-bed inpatient facility in Chicago, routinely prescribed complete bed rest on weekends for his outpatients suffering from chronic disease. He also prescribed weekends of rest at vacation cabins in the nearby Michigan North Woods.

One year during the 1980s, I received a prescription of complete bed-rest for two weeks for chronic exhaustion from an elder homeopath in New Haven, CT. At least one study has shown that bed rest of fourteen hours a day for thirty days in bed benefited young American adults sleeping seven to eight hours per night, and the subjects continued to improve for the whole thirty days (Wehr et al). In recent years I have had good success with restoring the vitality of patients without going to the extremes above, with prescriptions of 9.5-12 hours of bed rest a night, most often for three to seven days, but sometimes as long as three weeks. See the accompanying “Case study: Sleep debt and insulin resistance” on page six, which demonstrates improved metabolism and glycemic control with two weeks of modified bed rest.

Nutrition, diet, supplements

The most important nutritional considerations in sleep disorders are deficiencies or imbalances of calcium and magnesium; potassium deficiency in the diet; B-vitamin deficiencies; deficient essential fatty-acids; excess sugar; excess caffeine; and excess alcohol. The most important nutrient for sleep is probably magne-

sium, which has a relaxing and antispasmodic effect in the body. Deficiency is nearly universal in the U.S. population, with perhaps 80% not consuming the RDA. A typical therapeutic dose is 600 mg in two or three divided doses a day. Another dietary factor than may cause sleep disturbance is food sensitivity. In my own practice, the surest bet to treat sleep disturbance accompanied by anxiety or even panic attack is an elimination diet and screening for allergens, an investigation that has cured about 90% of my patients with chronic anxiety.

Some constitutional considerations

- **Deficiency heat, Deficient yin, False Fire.** These are names for the same condition in traditional Chinese medicine, describing a state of exhaustion and debility, but with heat signs prominent. The condition is hot and dry. The face may be reddish over a generally pale undercolor, and the hands and feet may be hot. This may appear in time as chronic fatigue progresses, and the normally cold patient may

Bastyr ad

Case study: Sleep debt and insulin resistance

A 52 year-old man with insulin resistance syndrome, but no diabetes or abnormal glucose tolerance, attempted to remain in bed ten or more hours per night for fourteen days. His fasting blood glucose had been between 100 and 105 each time he measured it during the previous three weeks. He was fatigued and stressed and reported insomnia. After coaching on sleep hygiene, including the patient instructions on page four, he attempted to remain in bed for ten or more hours per night for fourteen days. The accompanying table shows the hours actually slept and the fasting blood glucose each morning. The average blood glucose reading fell by more than ten points during the period of increased rest. The before and after readings were within the range of normal blood glucose, according to current standards, but the change may have significantly lowered heart disease risk. Hoogwerf et al explored coronary heart disease risk at levels of fasting blood glucose within the normal range, and found a nearly 20% increase in cardiovascular disease risk as glucose readings rose from the mid-eighties to the mid-nineties (Hoogwerf et al). The three-night period of extended sleep necessary to shift the metabolism initially in this case is typical. The blood glucose rise in the middle of the period when the sleep fell to eight hours may demonstrate that this individual requires more than eight hours of sleep per night to maintain normal metabolism.

Day	Hours slept	Fasting glucose
1	10	103
2	10.5	105
3	11	81
4	9.5	86
5	9.5	94
6	8.5	92
7	8.0	88
8	8.0	102
9	9.0	99
10	10.0	91
11	9.5	92
12	9.5	98
13	9.0	86
14	9.5	91

begin to look hot. Anxiety and insomnia are a prominent part of the picture. Constitutionally, the patient primarily needs moistening and gentle cooling herbs. Stimulants, or excessive intake of nervines and hypnotics with warming and drying properties, may aggravate the sleep disturbance.

- **Vata aggravation.** This term from Ayurveda describes a state of nervousness, agitation, anxiety, and insomnia and a general disturbance of mental peace. It is described as a dry condition, and sometimes treating the constitutional dryness alone will relieve the insomnia. Demulcent beverage teas as tonics may be useful. Caution must be used with drying herbs, as indicated by their astringent, diuretic, or diaphoretic properties.

Herbal sleep allies

The herbal materia medica of nervines, sedatives, and sleep-inducing hypnotics is extensive. To support normal sleep, separate formulas may be given for daytime and nighttime. Combinations of nervine tonics and gentle sedatives *without sleep-inducing properties* are appropriate for daytime, with *sleep-inducing hypnotics* taken before bed to support the normal descent into deep sleep.

Nervine tonics for daytime use

Oats (*Avena sativa*) A tincture of oats in their milky stage is one of the most reliable nervine tonics available. A decoction of oat seeds is a nutritive tonic, but the milky oat tincture is a different medicine entirely. Taken as a simple, or with one or two companion herbs, it may be given in low to moderate doses for good results.

Scullcap (*Scutellaria lateriflora*) is a useful relaxant and sedative for exhaustion accompanied by compensatory tension—a common picture in sleep debt. Scullcap will not by itself induce sleep, but it may relax the patient in a state of sleep debt to the point that they will feel their natural sleepiness. Best results are obtained from the infusion rather than the alcohol preparation. A strong infusion, without allowing the water to boil, may be taken in two to four ounce doses. If tinctures of other herbs are to be used, they can be added to the scullcap infusion. Freshly powdered scullcap leaf in warm water may also be effective.

Damiana (*Turnera aphrodisiaca*) is a warming nervine tonic well suited to the run-down patient with

poor digestion who is generally cold. It works well either as an infusion or tincture in moderate to large doses, or as a powder.

American ginseng (*Panax quinquefolium*) has been used as a sedative and tonic throughout the Appalachian mountain chain where it grows. When it was discovered in North America in the 1700s, a substantial trade emerged to sell it in China, and it has been used in that country as a major medicine ever since. American ginseng has different properties than Asian ginseng (*Panax ginseng*). American ginseng is cooling, moistening, and slightly sedative in nature, whereas Asian ginseng is warming and more stimulating. Insomnia due to overstimulation is a frequent side effect of Asian ginseng. American ginseng also has some of the restorative and tonic properties of Asian ginseng but will usually not overly stimulate the system. Quality and proper identification is often a problem with commercial ginseng products. Well-identified roots of American ginseng, taken as decoctions or powders twice a day, may be helpful tonics in the exhaustion of sleep debt.

Bitter cooling sedatives

Vervain (*Verbena spp*) is a very bitter nervine that has been used in Europe and North America as a mild sedative for centuries. It will not usually induce a state of sleepiness. Its constituent *verbena* may act as a trigger to switch the nervous system toward parasympathetic dominance, which promotes relaxation. It is especially useful for recovery from the exhaustion of long-term stress. Vervain works well either as an infusion or in low to moderate tincture or powder doses.

Motherwort (*Leonurus cardiaca*) is a bitter sedative used specifically for nervous conditions with heart palpitations or other cardiac symptoms that are common in the exhaustion accompanying sleep debt. It does not normally induce a state of sleepiness. It is an approved medicine in Germany and is also used in contemporary Chinese medicine for the similar purposes. Motherwort can stimulate menstruation, so patients with average to heavy menses should use it with some caution. Motherwort works well in doses of three to ten drops of the tincture.

Chamomilla (*Matricaria recutita*) as a simple infusion, alone, or with mild companions such as spearmint or lavender, makes an excellent daytime beverage for the patient in a state of sleep debt attempting to improve nighttime rest.

Warming aromatic sedatives

Lemon Balm (*Melissa officinalis*) is a gentle nervine sedative with mild warming properties. It acts to gently lift the mood and is effective for the mild depression that often accompanies sleep debt. It is not likely to induce sleep, but promotes a relaxed alertness. It may be consumed freely as a decoction or in larger doses of the tincture.

Catnip (*Nepeta cataria*) is a gentle sedative traditionally used for nervous disorders, including nervous breakdown. It is a widely used remedy for teething and restlessness in infants, and works as well for the stressed adult, without inducing daytime sleep. Catnip works best as an infusion.

Lavender (*Lavandula off*) is one of our most gentle and gratifying sedative nervines. Simple infusions during the day do not induce sleep but promote a relaxation with alertness. The herb is considered a mild brain tonic in the four-humors system of medicine. In the evening, infusions of lavender or several drops of the essential oil added to a bath make a mildly relaxing sedative.

Rosemary (*Rosmarinus officinalis*) has been used in both European and Chinese folk medicine for calming the nerves. Its use for nervous conditions continues in the U.S. today among medical herbalists. Rosemary's analgesic and antispasmodic properties are recognized by the German government, and it is an official medicine in Germany. Rosemary is warming and very drying, appropriate for the picture of the cold, pale, weak anxious patient who is not overly dry. Avoid in deficiency heat or nervousness with symptoms of dryness. Rosemary works well as a standard infusion, or in larger doses of the tincture.

Asafoetida (*Ferula assa-foetida*), a relative of garlic and onions, is a traditional medicine from Asia that probably made its way into folk usage in North America through physicians migrating here from Europe. It is still used to day in Appalachian folk herbalism for nervousness. The Eclectic physicians of the 1920s used it as a sedative, and one physician wrote a case report where asafoetida relaxed a patient that opium had failed to help. Asafoetida is well suited to the cold, deficient anxious patient with deficient digestive fire. Like rosemary, it is drying, and cannot be taken long term or in substantial doses in the dry patient. Asafoetida is generally available as a powder. It may be taken in capsules, or stirred into warm water and drunk.

Autonomic and hypnotic herbs for evening use

An evening strategy is to begin dosing a few hours before bedtime to support the normal physiological descent toward sleep and eventually to the deep stages of sleep during the first few hours of sleep. Sleep-inducing herbs are avoided during the day, and reserved for use before bed.

First dose: autonomic switching

Some herbs taken even in very low doses have the ability to switch the autonomic nervous system from sympathetic toward parasympathetic dominance. The most important of these may be Paeonia, Pulsatilla, and Verbena. They may be taken alone or in simple combinations 60-90 minutes before bedtime to support the “unwinding” process in the context of the behavioral modifications described in the patient instructions on page four.

Peony root (*Paeonia lactiflora*). A tincture of peony root has sedative and antispasmodic effects, and in doses of 5-10 drops appears to reduce the stress response and promote natural relaxation. This is a tincture of the whole root, with root bark, not the processed peony used as a tonic in Chinese herbalism.

Pasque flower (*Pulsatilla patens*, *P. occidentalis*) A fresh tincture of the above-ground parts of pasque flower is very effective at switching off the stress response. Doses of three to eight drops in a little water are usually effective. The tincture must be made from fresh plant for this effect, and even fresh plant tinctures may degrade somewhat over the course of the first year after tincturing.

Vervain (*Verbena spp*) is discussed previously as a possible daytime sedative. Low doses of the tincture, five to ten drops, can be very useful for autonomic switching

Second and third dose: sleep-inducing hypnotics

Herbs with stronger sleep-inducing effects may be introduced in the last hour before bedtime. One approach is to take one dose 30-45 minutes before bed, and another at bedtime. The most commonly used hypnotics in North American herbal traditions have been scullcap, passion flower, valerian, and hops, usually in combination with each other.

Scullcap (*Scutellaria lateriflora*) See previous description on page six.

Passion flower (*Passiflora incarnata*) was introduced into American medicine in 1840 in Mississippi after experiments with it by medical doctors there, and was used after that mainly by doctors of the Eclectic and Physiomedicalist schools. It is a reliable gentle sedative and hypnotic, usually combined with other hypnotic herbs in formulas. It induces a natural sleep without drug-like effects or hangover. It is effective either as a simple infusion, as a tincture in moderate to large doses, or as a powder.

Valerian (*Valeriana off*) is a warming, antispasmodic sedative. It can cause stimulation rather than sedation in some individuals—about 10% of patients respond this way, and it actually interferes with sleep instead of supporting sleep. This may especially be a problem in those with hot constitutions or deficient yin, as might be indicated by feelings of warmth, by red flushed cheeks, and desire for cool drinks. The classic Eclectic indication, per Finley Ellingwood, was “deficient cerebral circulation” consistent with the specific indication of “pale face.” Valerian may be taken as an infusion, a tincture, or a powder.

garden

100 Years of Hypnotic Formulas

The most common sleep-inducing herbs in North American and British herbalism have been passion flower, scullcap, valerian, and hops. The following pairs or simple formulas have been recommended for insomnia by William Cook, R. Swynburne Clymer, British herbalists Priest and Priest, and the authors of the 1981 edition of the *British Herbal Pharmacopoeia*, a period covering more than 120 years of medical herbalism

Passiflora and scullcap	Cook, Clymer
Passiflora and hops	Cook
Passiflora and valerian	Priest, BHP
Valerian and hops	Priest
Passiflora, valerian, hops	BHP

Hops (*Humulus lupulus*) has perhaps the strongest hypnotic effect of the herbs discussed here. It sometimes can exacerbate depression and might be avoided in depressed patients. It is effective all forms, but is so bitter that many patients will not take the infusion.

Formulas

A bedtime formula for sleep support might be structured in the following way.

- 1-3 hypnotic herbs in combination
- 1-2 relaxants or antispasmodics
- 1-2 herbs specifically for pain if indicated
- 1 mild hepatic

Relaxants such as lobelia, asclepias, boneset, or pedicularis can gently nudge both the nervous system and the muscles toward relaxation. This effect supports the other herbs being used. Valerian and scullcap combine both relaxant and hypnotic properties. Small doses of mild hepatics may reduce tension in the body, and those that affect the liver detoxification system, such as St. Johnswort (*Hypericum perforatum*), may support liver clearance of stress hormones and promote deeper sleep.

Case Study: Sleep restoration and vitalist medicine

From the teaching clinic at Rocky Mountain Center for Botanical Studies

Patient: 47 yo female, 5'4", 145 lbs

Chief complaint: Severe insomnia; four hours of restless sleep per night, three years duration.

Other complaints: Depression, "problems with letting go," bladder incontinence increasing for last two years, night sweats for one year. Excess uterine bleeding causing anemia, scheduled for hysterectomy and bladder "tacking." Post Traumatic Stress Disorder from spousal abuse (previous marriage, twenty years prior).

Medications: Paxil 30 mg per day for six months for depression.

Constitution: Dry, deficient, restless.

Diet: Deficient. No breakfast, small lunch, may skip dinner.

Treatment plan

- High protein breakfast and increase protein at lunch.
- High quality multivitamin and essential fatty acids.
- Herbal formula: Equal parts of milky oats tincture, scullcap, passiflora, and lemon balm. White Chestnut flower essence (worried thought patterns); Olive flower essence (exhaustion), two drops each in tincture bottle.
- Bedtime routine for eight hours of sleep (for 5:30 wake-up time). Put away all household work projects by 7 PM. All lights out but candles in bedroom and bathroom at 8 PM, and one dropper of the sleep formula. In bed at 9 PM with light reading and a reading light, and another dropper of the sleep tincture. Lights out at 9:30 PM.

First follow-up, seven days later

Compliance: Slight increase in breakfast and protein; multivitamin and fish oil capsules; followed sleep routine and took sleep formula as instructed.

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Results: First two nights fell asleep promptly, woke once during night, slept eight hours. Next five nights, same results with only one dropperful of the tincture instead of two.

Recommendations: Same

Second follow up, six weeks since initial visit

Compliance: Increasing daily protein intake, and eating breakfast most days. Taking the multivitamin and fish oils.

Results: Recovered from surgery well, 30 days prior to visit. Returned to work at four weeks instead of the scheduled six weeks. Sleeping well, except when not taking her tincture dose. Night sweats have completely disappeared. Weaning from Paxil prescription. Psychologically beginning to deal with dysfunctional family background issues.

Recommendations: Same, plus flower essence formula:

Agrimony: Smiling on the outside and tormented on the inside.

Crab Apple: For people who feel impure or poisoned.

Pine: For guilt associated with shame.

Larch: For self-confidence.

Star of Bethlehem: For shock and trauma.

Third visit: 17 weeks after initial visit

Compliance: Same. Only requires sleep tincture three nights per week.

Results: Vitality is visibly higher. Still sleeping eight hours per night, has reduced Paxil prescription by half. Celiac disease has recently been diagnosed, and she has begun a gluten withdrawal. She is also making arrangements to return to school to further her education in a medical field, and is interested in lifestyle changes to reduce her cardiovascular risk.

Comments: The emergence first of psychological symptoms relating to her family background, and then physical symptoms related to a food intolerance, and ultimately making plans to further her education to fulfill life dreams, is consistent with the gradually increasing vital force as her sleep is restored.

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Traditional Medicine

Oxymel: the forgotten preparation for coughs

by Paul Bergner

Vinegar and honey, has been used in medicine since the time of the ancient Egyptians. The combination alone, or with herbs infused in it, was used by the Greeks for cough

Hippocrates recommended oxymel as a drink to increase expectoration. In the Four Humors system of medicine, vinegar is considered cool and dry in the first degree, and honey warm and moist in the second degree, so the constitutional energetics of the pair is close to neutral. Hippocrates suggested taking oxymel preparations cold during hot weather and hot during cold weather.

Vinegar

Vinegar has traditionall been used by North American herbalists for the following purposes:

- To increase secretions of the throat and respiratory tract membranes
- For sore throat (gargle, or inhalation of the vapor)
- To promote the secretions of the kidneys
- Mixed with sweetened water for febrile and inflammatory conditions
- To promote swaating, taken hot in a well-covered patient

Honey and sugar

Honey is a moderately stimulating expectorant to the respiratory mucous membranes. The composition of honey is about 20% water, a small amount of sucrose, with the rest of the material being mainly fructose and glucose. It contains negligible amounts of vitamins, minerals, or other known nutrients.

When sugar became a readily available commodity during the later 1800s, it replaced honey in the pharmacopoeias and formularies of North America and Europe for making cough syrups.

“You will find the drink called oxymel . . . promotes expectoration and freedom of breathing. the following are the proper occasions for administering it. When strongly acid it has no mean operation in rendering the expectoration more easy, for by bringing up the sputa, which occasion troublesome hawking, and rendering them more slippery, and, as it were, clearing the wind-pipe with a feather, it relieves the lungs and proves emollient to them; . . .

Recipes

A standard oxymel recipe is five parts of honey to one part of vinegar. The oxymel can also be made from decoctions in water, vinegar, or combinations of them, or from tinctures added to the warm oxymel.

Various recipes for Oxymel of Squill (*Urginea maritima*), a very strong emetic-expectorant, and been used since medieval times, and Syrup of Squill, with sugar substituted for the honey, was official in the U.S. Pharmacopoeia 100 years ago. The Eclectic classic King’s American Dispensatory describes various recipes for Oxymel of Squill as described in the pharmacopoeias and formularies of Britain, Germany, and France in the late nineteenth century. The German preparation is the simplest:

Honey (2 parts)

Vinegar of squill (1 part)

Evaporate to 2 parts and strain

Squill is not much used in contemporary medicine, but the recipe may be modified to use any other expectorants which retain their properties in vinegar preparations. The physiomedicalist William Cook suggests that herbs such as lobelia, sanguinaria, hydrastis, capsicum, or zanthoxylum make good preparations in vinegar.

Cook offers a recipe for oxymel of lobelia in his 1869 classic Physiomedical Dispensatory, although he called the product “Honey of Lobelia.”

Tincture bruised green lobelia herb in enough good cider vinegar to cover it thoroughly. Express after a week. Mix with honey at a rate of

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Ginkgo and memory in normal elders

Ginkgo extracts are widely promoted by the herbal supplement industry as memory enhancers, and are among the leading herbal products sold in North America. Researchers tested a concentrated herbal extract (Ginkoba, Boehringer Pharmaceuticals) against placebo in a group of 219 patients. One group received 120 mg per day of the extract, the dose recommended on the label, for six weeks, while the other received placebo. At the end of the period, there were no significant differences in cognitive function between the two groups (Solomon et al). Researchers had used fourteen different measurements of cognitive function, and the placebo group scored slightly higher on seven of them, and the ginkgo group also slightly higher on seven. On one of the most clinically significant tests – assessment by caregiver companions – the placebo group scored slightly higher. The researchers concluded “These data suggest that when taken following the manufacturer’s instructions, ginkgo provides no measurable benefit in memory or related cognitive function to adults with healthy cognitive function.”

The study was criticized in several letters to the editor of the Journal of the American Medical Association, which published the study. It was also criticized in a press release from the American Botanical Council. Several letters, and the ABC release, cited a similar trial by Mix and Crews published in August 2002. That trial, which had similar number of participants and identical entry criteria, but used 180 mg of ginkgo extract rather than 120, was the first large well-designed trial of ginkgo in elderly subjects with normal cognitive function. It reported a significant improvement of memory in several tests after six weeks. Solomon and DeVeaux, authors of the JAMA trial, replied that the Mix and Crews trial used thirteen different measurements of memory, and only found significant improvement in three of the tests, and that the researchers did not perform a global assessment for clinical significance. Mix and Crews themselves warned against drawing conclusions from one of the three measurements that had shown improvement from their study, because of significant differences in the baseline measurements of the ginkgo and the placebo group.

Comment

It is not surprising that ginkgo extract would not improve memory in normal adults. It appears to improve cerebral circulation when it is deficient, and may also act through other mechanisms in diagnosed cognitive

deficit. It is an approved pharmaceutical for these purposes in Europe. An individual with normal cerebral circulation should not expect to benefit from it. The Mix and Crews trial showed only slight, even if significant, response, and it required a higher dose than the manufacturer’s recommendations. According to the American Botanical Council, ginkgo preparations have been the leading dietary supplements in the U.S. for the last five years. Herbal companies have widely marketed ginkgo to the healthy general public as a memory enhancer, and it appears that if taken as advertised and sold, it does no good. Also of concern is that cognitive deficit has a complicated differential diagnosis, and is probably not an appropriate condition for self-medication with a pharmaceutical preparation like those sold over-the-counter in the U.S. that can mask the original cause of the deficit. Also, lifestyle factors such as nutritional deficiencies, chronic sleep debt, lack of exercise and metabolic insulin resistance may contribute to cognitive deficit. Addressing these issues rather than taking a supplement could have broad beneficial effects on the health. -- Paul Bergner

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Solomon P. and DeVeaux R Ginkgo and Memory *JAMA* 2003 289: 547-b-548-b

Panax and eleutherococcus in athletes

Australian researchers tested the effects of alcohol preparations of Asian and Siberian ginseng on cortisol and testosterone in athletes. Participants were trained competitive athletes engaged in normal in-season training. They were divided into three groups. One group received 8 mL per day of a 33% ethanolic extract of *Panax ginseng*, equivalent to 2 grams per day of the root. A second group received a similar extract of *Eleutherococcus senticosus* equivalent to 4 grams of the root. A third group received a placebo. Measurements of cortisol, testosterone, and the ratio between them were taken at baseline and at the end of six weeks. There were no differences in the placebo or the panax group, but the eleutherococcus group showed a 31% increase in cortisol and a slight decrease in testosterone. The change in their ratio reached statistical

significance. An increase in the ratio of cortisol to testosterone indicates a metabolic shift of the energy reserves toward activity and away from regeneration. Immune parameters were also measured but showed no change in any of the groups.

Comment

Various previous studies have demonstrated slightly increased athletic performance with various panax and eleutherococcus products. This study did not test performance, but rather effects on the endocrine system. That panax had no effect is not surprising, considering the dose. Taken in alcohol form, the dose in traditional Chinese medicine is one ounce once or twice a day (Flaws), and the dose in this trial was one-seventh to one-fourteenth of that. The dose for eleutherococcus alcohol preparation is a half-ounce, twice per day, of a high-ethanol extract (Flaws), and for the Russian Pharmacopoeia preparation of a 1:1 extract in 30% ethanol is 2-15 mL per day. In this study a preparation and dose similar to the Russian product had a significant endocrine effect.

The increase in cortisol is not necessarily a beneficial effect. The same effect, for instance, would worsen the status of patients with insulin resistance or Type II diabetes. It may also explain the frequent side effect of insomnia in individuals who take strong preparations of eleutherococcus. An increase in cortisol gives a feeling of strength, but over an extended period of time can cause or aggravate chronic disease. I have seen a number of patients and students who took preparations of eleutherococcus similar to the one in the trial discontinue them after long term use and experience a "crash" similar to that seen after stimulant abuse.

Tinctures of panax are offered by most herbal companies in the U.S., and their use, in dropper doses, must be questioned. Standard tinctures of eleutherococcus (1:5 extracts in 60% or more ethanol) are also generally available, but clinical effects at normal tincture doses are often absent. The results of this trial, which used a much lower amount of alcohol as a solvent, and concentrated the product cannot be extrapolated to these products.

-- Paul Bergner

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Adverse Effects

Mixed media: A review of Kava safety reports

By Jill Hoppe, C.C.H.

Kava (*Piper methysticum*) received negative press in 2001 when a German regulatory review suggested a link between kava extract supplement usage and liver damage. The studies led to kava product bans in Germany and other European countries; in the U.S., the Federal Drug Administration warned against kava use.

Recent media coverage has claimed that researchers' from the University of Hawaii (UH) at Manoa have solved the "mystery" of kava extract toxicity associated with liver-related injuries, and explained why Europeans taking pharmaceutical preparations of the plant may develop liver disease when traditional South Sea Islanders apparently do not. The media reported the liver cell damaging culprit to be the alkaloid pipermethystine, found in tests of stem bark peelings and kava leaves, but not in the root itself. The researchers' found evidence that supplement manufacturers commonly purchased leaves and stems — parts typically discarded. Island cultures use only the root to make the traditional drink. When the demand for kava extract soared, stem peelings were a readily available and cheap waste product that also contained kavalactones, the constituent associated with promoting relaxation. The stem peelings were apparently used to create the extract for the kava supplements.

Michael McGuffin, the president of America Herbal Product Association, criticized the media reports, claiming that they distort the actual research findings at UH. McGuffin cautions that the researchers' do not claim they have solved the kava toxicity "mystery," and that the absence of pipermethystine in the root, even if confirmed, does not mean the root will not injure the liver through other mechanisms. The researchers' state, according to McGuffin, in regard to the effect of pipermethystine on liver cells, "...their possible toxicity on the liver remains to be investigated." "The researchers did not analyze the effect of pipermethystine (or any other compound) on liver cells," said McGuffin. Instead, they referenced another 1983 journal article that reported pipermethystine is absent from the roots and none of the piperidine alkaloids (including pipermethystine)

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Classifieds

Herbal Therapy and Supplements: a Scientific and Traditional Approach by Merrily A. Kuhn, RN, PhD; ND, PhD student, and David Winston, AHG An authoritative, well-researched guide to herbal therapies. Over 200 herbs presented in clinically relevant monographs. This book combines the scientific and traditional approach to herbal medicine. A must for practitioners. \$33.00 - Available from Educational Services, Dept 200, 6748 Boston State Road, Hamburg, NY 14075

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Oxymel from page fifteen

three pounds honey to a quart of the tincture. Evaporate on a water bath to the consistency of thin molasses. Dose 10-30 drops. Main use: dry and irritable coughs.

A generic **vinegar-based preparation** might be made in the following way, in use in Western herbalism since the Medieval era:

Vinegar decoction base: Take 8 ounces of assorted herbs in a cough formula. Place in 2 quarts of vinegar. Boil to 2 ½ pints. Toward the end, add herbs such as thyme, anise, or cloves. Strain. Add 1 ½ pints of honey and simmer to the consistency of syrup.

Many herbs do not retain their properties in vinegar, and preparations might be made as follows. The first two are classical Medieval preparations:

Mixed water and vinegar decoction: Take 6 ounces of assorted herbs in a cough formula. Add to 2 ½ pints of water and ½ pint vinegar. Simmer to 1 quart. Strain. Add any aromatic herbs or tinctures at this point. Add 1 pint of honey and simmer briefly to the consistency of a syrup.

Water decoction: Place one ounce of an herb in one quart of water. Reduce to a pint and a half.

Strain. Add 4 ounces of vinegar and 4 ounces of honey.

The following formula might be used to make an oxymel out of a previous prepared cough **tincture**

1 pint of apple cider vinegar

2 1/4 lbs of honey

Combine in a pot and simmer to the consistency of syrup.

Tinctures can be delivered in a ratio of 1 part tincture to 3 parts of oxymel.

Kava news from page seventeen

were found in their routine analysis of commercial root powders. McGuffin discerns that no further information is provided regarding the 1983 study so the source of the root material is not identified, and it is unknown whether the root samples are from the same plants that the stems were obtained.

McGuffin points out that even if further research confirms that pipermethystine can cause liver disease, and that it is absent from kava root, the root will not be proven to be safe: "It would not, however, have confirmed that the other constituents in the root—which do include other methystines—are not a problem," he states.

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