Sleep & Fatigue Management

Fatigue in the aviation industry has been on the NTSB's Top 10 Most-Wanted list for two decades defined by the FAA as:

"Fatigue refers to a physiological state in which there is a decreased capacity to perform cognitive tasks and an increased variability in performance as a function of time on task. Fatigue is also associated with tiredness, weakness, lack of energy, lethargy, depression, lack of motivation, and sleepiness."

Falling asleep at the stick is not the biggest concern. Fatigued pilots have demonstrated as much as a 20- to 50 percent loss of decision-making skills, memory, judgment, reaction time and situational awareness, none of which is normally apparent to the pilots themselves. It's not like you can't make decisions, when you're fatigued you make bad decisions.

We are one of the few animals that take their sleep in one shot. The rest are polyphasic sleepers where they alternate sleep & wake during the 24 hour period.

Sleep

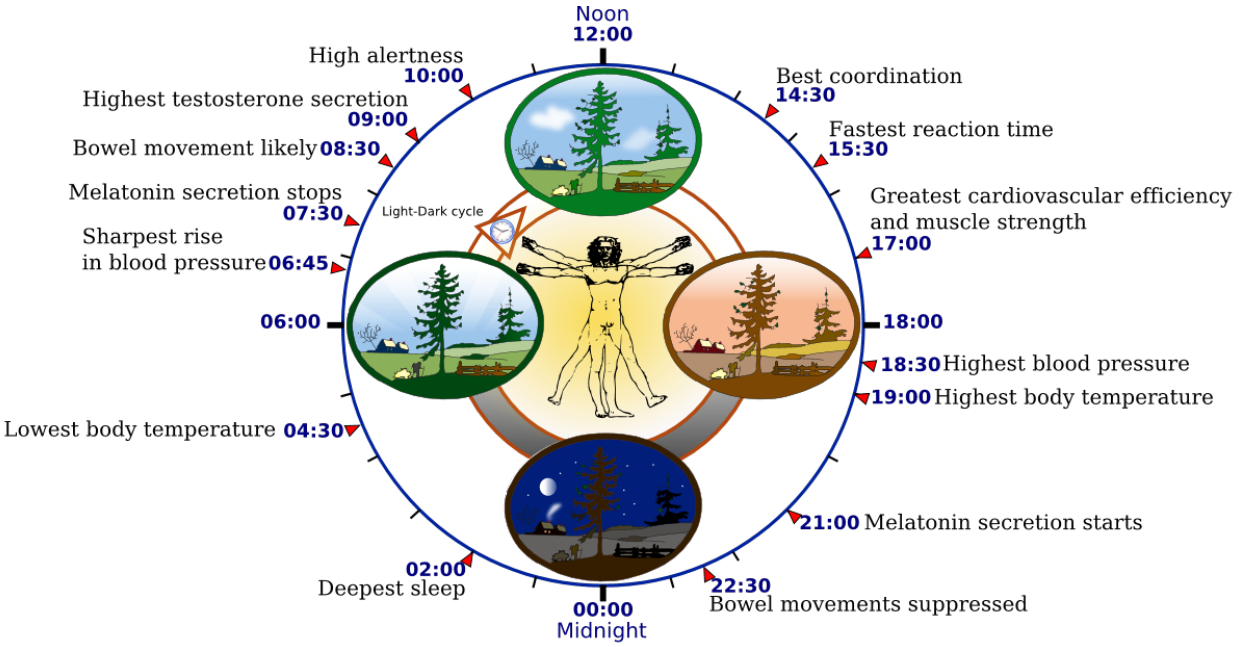
Sleep is the state of being both physically and mentally relaxed. Bell curve is 8 hours per night, and accumulated sleep deprivation of about 7-9 hours has the same effect as being legally drunk

Recovery from accumulated sleep debt requires that the person take deliberate steps to sleep more than the usual nominal 8 hours per day. It may take the average person several days of 9 hours of sleep or more to recover from a serious sleep debt.

Symptoms of Sleep Deprivation & Fatigue

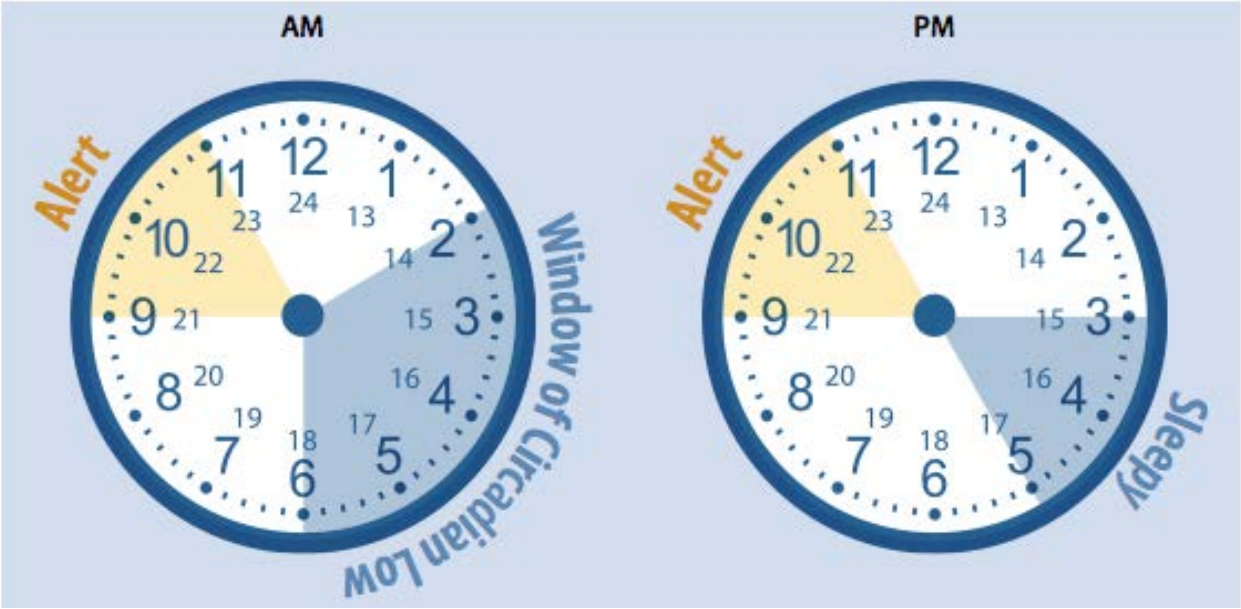
a) Accuracy and timing degrade
b) Lower standards of performance become acceptable
c) Attentional resources are difficult to divide
d) A tendency toward preservation develops
e) The ability to integrate information is lost
f) Everything becomes more difficult to perform
g) Social interactions decline
h) The ability to logically reason is impaired
i) Attention wanes
j) Attitude and mood deteriorates

Circadian Rhythm



There is a 24-hour biological "clock" in the human brain, as in other organisms that regulates 24-hour patterns of body functions. This clock controls not only sleep and wakefulness alternating in parallel with the environmental light/dark cycle, but also the oscillatory nature of most physiological, psychological and behavioral functions. The wide range of body functions controlled by the clock includes body temperature, hormone secretion, digestion, physical and mental performance, mood and many others. On a 24-hour basis, these functions fluctuate in a regular pattern with a high level at one time of day and a low level at another time.

The clocks circadian (circa meaning "around," dies meaning "day") pattern of wakefulness and sleep programs the human body for wakefulness during the day and sleep at night. This circadian system repeats this pattern on a daily basis. Certain hours of the 24-hour cycle — that is, roughly 0200 to 0600 (for individuals adapted to a usual day-wake/night-sleep schedule), called the window of circadian low (WOCL) — are identified as a time when the body is programmed to sleep, and during which alertness and performance are degraded. There is a second, less pronounced, period of reduced alertness between 1500 and 1700. The body is also programmed for two periods of enhanced alertness and performance, and these periods are estimated to occur roughly between 0900 and 1100 and again between 2100 and 2300.



5 Stages of Sleep

There are five different stages of sleep, 1,2,3,4, and REM (Rapid Eye Movement). You cycle through them repeatedly as you sleep or nap: 1,2,3,4, 2, REM, 2,3,4,2, REM and so on. Each cycle lasts 90-100 minutes.

Stage 1: Lasting 2-5 minutes, this stage transitions you into sleep. Your thoughts and mental associations loosen up. This state of sort of wakeful dreaming has been used by artists and thinkers to cultivate rich ideas. We'll cover this in-depth in a future post.

Stage 2: Motor skills and complex tasks you've been working on are solidified. Your energy and stamina are strengthened and senses sharpened. You spend about 50% of your sleep time in Stage 2.

Stages 3 and 4: In these stages you slide into Slow Wave Sleep. Your body stops releasing cortisol and extra growth hormone goes to work restoring your body, repairing tissues, lowering stress, metabolizing fats and moving carbs out of your body. And your mind is cleared; Information that you've recently and consciously learned such as the dates for a history test are solidified. You spend about 30% of your sleep time in Stages 3 and 4.

REM: During REM your brain shuttles your recently-made memories from their short term holding tank in the hippocampus to long term storage. The information is thus made permanent; if you don't sleep soon after a learning session, you'll lose much of what you studied. Creativity is given a boost as spatial orientation and perceptual skills are sharpened and the different

insights and complex ideas you have swirling around in your nogggin are fused together. You spend about 20% of your sleep time in REM.

The Benefits of Napping

Increases alertness. A NASA study on 747 pilots conducted by Dr. Rosekind, (AL Study), revealed that a 20 to 40 minute nap gives 34% increase in reaction time, increases alertness by 54%, and boosts your stamina more than sleeping an extra 20 minutes in the morning.

Improves learning and working memory. During sleep, recent memories are transferred to the neocortex, where long-term memories are solidified and stored.

Prevents burnout and reverses information overload. Taking a 30 minute returns you to your work refreshed

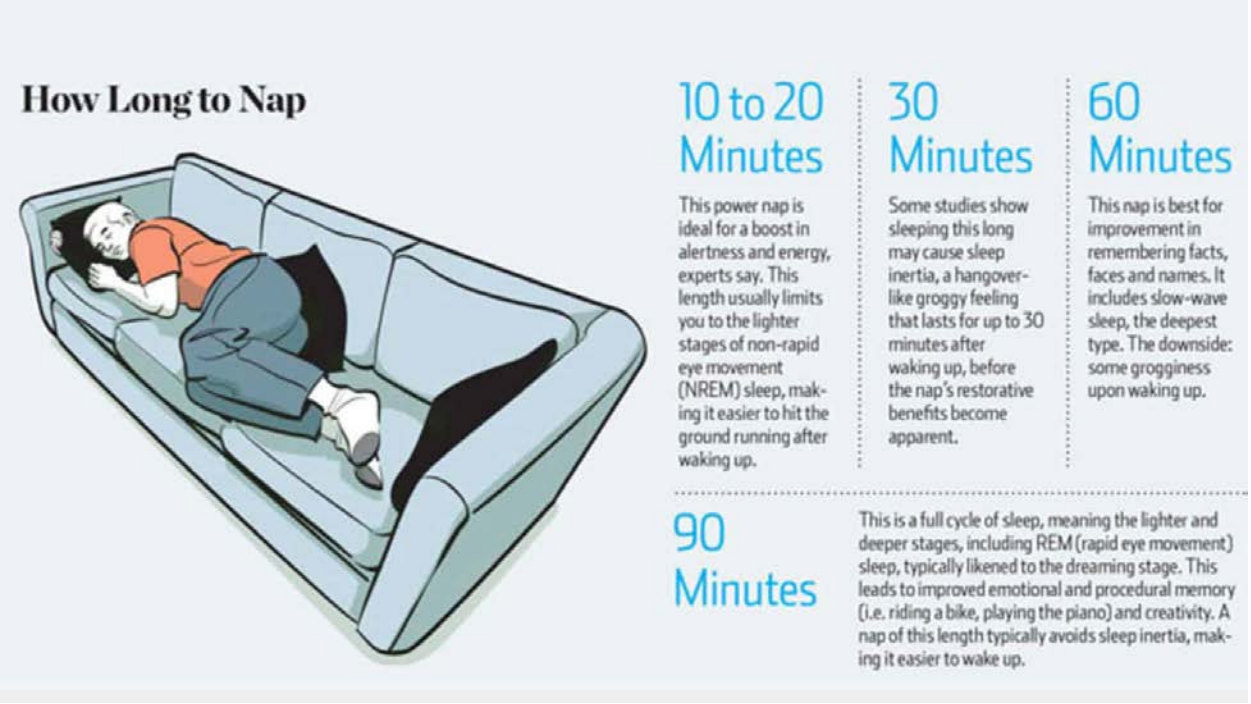
Heightens your senses and creativity. Improves your sensory perception

Improves health. Sleep deprivation leads to an excess of the hormone cortisol in the body. Cortisol, known as the stress hormone

Improves mood. Sleep releases serotonin which regulates our mood, sleep, and appetites

Saves money. No more Five Hour Energy or Starbucks,

Naps & Sleep Cycles



20 Minute Nap – It enhances memory, mental alertness, and motor learning skills.

20 To 30 Minute Nap – It boosts creativity and boosts memory.

30 To 60 Minute Nap – It enhances decision-making skills and memory

60 To 90 Minute Nap – It ensures REM (Rapid Eye Movement) sleep, so it is the most beneficial nap type. It helps you reset the brain, and has a dramatic effect on the problem-solving skills.

What WE need, we need a "caffeine nap", basically get to Stage 2 sleep.

You need Stage 2 sleep which you can get in a 20 minute power nap. Don't go down for any longer than 20 minutes though. We've all experienced naps that leave us groggy when we wake up. This is called *sleep inertia* and happens when you awaken during Slow Wave Sleep. So you need to wake up before you slip into Stage 3.

Studies have found that a 20 minute will boost your stamina more than sleeping an extra 20 minutes in the morning.

Down coffee or soda, set alarm 30 minutes, get to sleep position. The caffeine clears your body of adenosine which makes you sleepy, but takes a while to kick in. Do not go longer than 30 minutes or you awaken during Slow Wave Sleep, (stage 3), and you wake up with sleep inertia, a physiological state of impaired cognitive and sensory-motor performance, it is the transition of sleep to wakefulness, where you experience drowsiness, disorientation and a decline in motor dexterity

How To Get To Sleep

Electronic devices that emit blue light can delay the onset of sleep, turn off electronics one hour earlier.

Melatonin will help you get to sleep as it is naturally produced after 9pm and once you are "light deprived". One of the most common side effects of melatonin is drowsiness. Some people may notice that they feel sleepy or groggy the morning after taking melatonin.

The 478 Technique: A breathing exercise which consists of inhaling for 4 seconds, holding for 7, and exhaling for 8.

The Bud Winter Technique:

During WW2 the military brought in Naval Ensign Bud Winter to research, develop, and test a scientific method for teaching relaxation. He had worked with a professor of psychology on techniques to help athletes relax and perform better under the stress of competition. He developed the following narration:

"Sit back in your chairs and put your feet flat on the deck. Knees apart, your hands limp on the inside of your lap. Now, close your eyes and drop your chin until it rests on your chest.

Let's breathe slowly, deeply, and regularly. Take all the wrinkles out of your forehead. Relax your scalp. Just let go. Now let your jaw sag-g-g. Let it drop open. Now relax the rest of your face muscles. Get the brook trout look on your face. Even relax your tongue and lips. Just let them go loose. Breathe slowly.

Now, let's go after the eight muscles that control your eyes. Let them go limp in their sockets. No focus, just let them go limp. Breathe slowly.

Now drop your shoulders as low as they will go. You think that they are low, but let them go more. Did you feel the muscles in the back of your neck go limp? When you think you are really relaxed, let them go even more.

Now, let's relax your chest. Take a deep breath. Hold it. Exhale and blow out all your tensions. Just let your chest collapse. Let it sag-g-g. Imagine you are a big, heavy blob on the chair, a jellyfish. Breathe slowly. When you exhale, release more and more of your tensions.

Let's go after your arms. Talk directly to your arm muscles. First, talk to your right bicep. Tell it to relax, go limp. Do the same to your right forearm. Now to the right hand and fingers. Your arm should feel like a dead weight on your leg. Repeat the relaxation process with your left arm. Breathe slowly.

Your entire upper body has been exposed to relaxation and a warm, pleasant feeling comes over you. You feel good. A sense of well-being invades your body.

Now for your lower body. Talk to your right thigh muscles. Let them go to a dead weight on the chair. Let the meat hang on the bones. Go through the same routine for the right calf muscles. Then all the muscles of your right ankle and foot. Tell yourself that your right leg has no bones in it. It is just a flabby, heavy weight on the deck. Repeat the process with your left thigh, calf, ankle, and foot.

At present you are all relaxed physically, or think you are. For a little insurance, let's take three deep breaths and when you let them out, blow out all the remaining tensions, one . . . whoosh, two . . . whoosh, three . . . whoosh."

If you have trouble getting any of your body parts to feel sufficiently relaxed and jellyfish-like, try tensing them up first, and then letting them go loose. Winter particularly warns against having any thoughts in which you are in motion; the muscles involved in that activity can actually contract.

So, when you're looking to nod off, you just want to fill your head with the stillest, calmest of contemplations. Winter suggests three good ones to use, though you don't have to use all three; just pick one, and if it doesn't work, try another:

"First, we want you to fantasize that it is a warm spring day and you are lying in the bottom of a canoe on a very serene lake. You are looking up at a blue sky with lazy, floating clouds. Do not allow any other thought to creep in. Just concentrate on this picture and keep foreign thoughts out, particularly thoughts with any movement or motion involved. Hold this picture and enjoy it for ten seconds.

In the second sleep-producing fantasy, imagine that you are in a big, black, velvet hammock and everywhere you look is black. You must also hold this picture for ten seconds.

The third trick is to say the words 'don't think . . . don't think . . . don't think,' etc. Hold this, blanking out other thoughts for at least ten seconds."

Gordy

Life may not be the party we hoped for, but while we're here, we may as well dance.