

Pain and Sleep Disruption

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**How do sleep disorders cause
pain?**

**Can we fix our patients' pain by fixing their
sleep?**

Why don't we doctors know much about Sleep?

- We all do it. We spend 1/3 of each 24 hours doing it, why ?
- We all know we feel terrible the next day when we don't sleep well.
- What if we felt that way every day?
- How important is it to our patients?
- **It's the most important thing we all do every day.**

Sleep and Headache

- I became interested in sleep when one of my daily headache patients convinced me to send her for a sleep study.
- She was not fat, but she did have obstructive sleep apnea. She did **not** have significant drops in oxygen.
- Two years of trying medications to fix her headaches had failed, 3 weeks of wearing a CPAP mask cured her headaches.
- Why would that be? Could other daily headache sufferers also have sleep disorders?
- **All my patients with daily headache turned out to have an underlying sleep disorder.**

CPAP cures other kinds of pain

- Then some of my patients came back and said their back pain or knee pain was gone after using CPAP. ???That's not even in the head?
- The internists taught me that when the CPAP works the hypertension and diabetes go away. Why ?
- Could better sleep help other neurologic problems?
- What about that guy with the four back surgeries who still has back pain every day?
- His pain went away with CPAP also.
- So did the burning in the feet of the lady with “neuropathy”

Sleep and Pain

- There are many journal articles showing a link between obstructive sleep apnea and chronic pain.
- Why? How? Which comes first?
- The patient says they don't sleep well because they're in pain.
- I think it's the other way around.



What follows is my explanation of why sleep disorders are epidemic, why chronic pain grows out of that epidemic.

And how we can fix our patients!

Many Sleep Disorders

- Obstructive sleep apnea is just one many “sleep disorders”.
- There are many others:
 - Multiple unexplained awakenings
 - Absence of or reduced REM sleep
 - Absence of slow wave sleep
 - REM related apnea
 - Periodic Limb Movements of Sleep (PLMS)
 - Abnormal chewing in sleep; bruxism
 - Sleep walking, sleep talking, night terrors
 - bed wetting
- Why would my 8 year old patient have 2 sleep disorders; apnea and PLMS, let alone one?
- Where in the brain is this going wrong?

Abnormal Sleep = Pain and Disease

- According to the sleep experts it doesn't matter why your sleep is interrupted.
- If your sleep is abnormal you have an increased risk of hypertension, heart disease, diabetes, stroke and chronic pain.
- Most of the sleep study reports you get comment only on apnea. Because the readers don't know why the patient doesn't sleep or doesn't have REM sleep it's not mentioned.
- "No sleep apnea" does not mean the study is normal.
- Familiarize yourself with sleep study results. Were the percentages of REM and slow wave normal or reduced?
- Better yet, ask the patient, they'll tell you if they're tired, you won't even need a sleep study.

You have a sleep disorder if you answer “yes” to any of these

- Are you tired in the morning?
- Do you have any pain anywhere on awakening?
- Do you have trouble falling asleep?
- Do you have trouble staying asleep?
- Do you get up more than once to urinate?
- Trouble falling back to sleep?
- Do you put off going to sleep because you can't fall asleep?
- Does your mind race during the night keeping you awake?
- Do you sleep better in a chair or on the couch than in your bed?
- Are you tired or fall asleep inappropriately during the day?



“Yes ...but”

- Close to 70-80 % of Americans don't sleep normally.
- We all think it's normal to get up 3 times at night because everyone else does.
- In normal sleep Antidiuretic Hormone is made during deep sleep to prevent urine production so we don't get up to urinate.
- So patients with less, or interrupted, deep sleep make more urine at night.
- In the wild we did not get up at night.
- What is “normal” sleep really like?
- Compare your patients to normal, not what is common today.

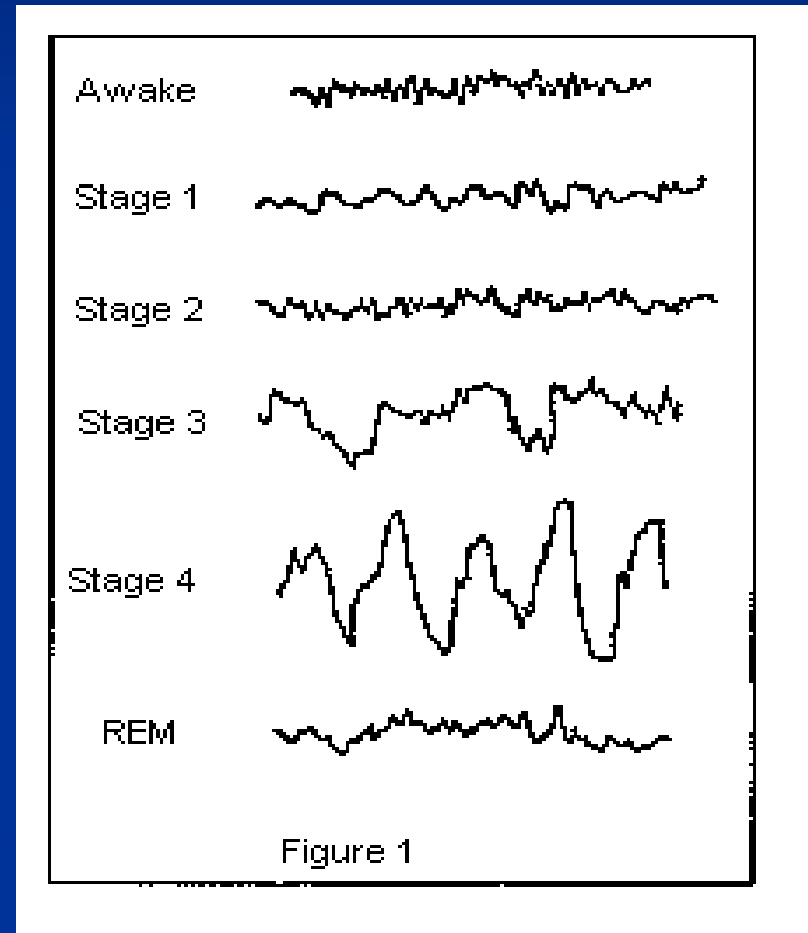


Sleep Basics



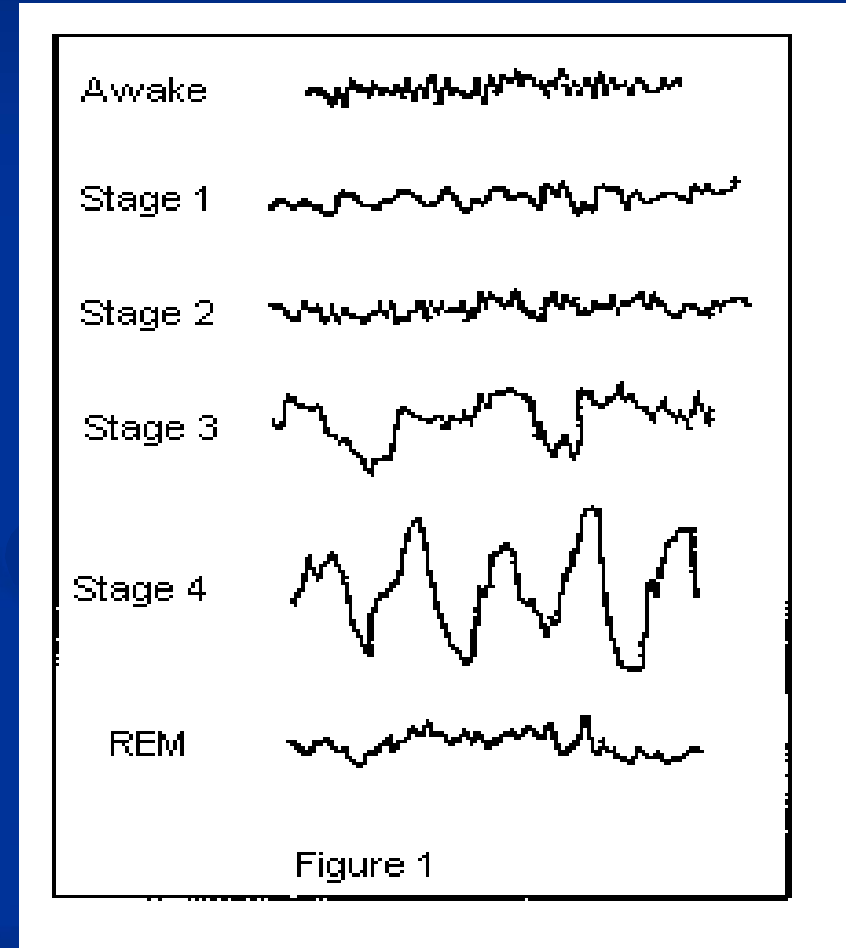
What is Light Sleep?

- Light Sleep: We begin Stage I move to Stage II. We are asleep but are easily awakened.
- I think we are waiting to be sure we're in a safe place to get paralyzed.
- I believe that in light sleep we are asleep but **not doing the work of sleep.**



1st phase of deep sleep: Slow Wave Sleep

- When our brain is sure that we're in a safe place to get paralyzed we enter Stage III sleep. (Stage III and Stage IV are now called Stage III)
- Stage III is called "Slow Wave Sleep" (SWS) because the brain wave pattern becomes slow and synchronized.
- During Stage III sleep our **body becomes paralyzed.**
- In SWS Growth hormone (GH) is released in rhythmic pulses, if you don't get and stay in SWS you don't get this GH.



Growth Hormone in slow wave sleep makes kids grow

- Kids have sustained GH release in SWS
- They get paralyzed in order to grow
- GH calls out all the muscle, bone, tendon, artery, nerve growth factors that must all be present at once to grow.
- Pulsatile GH in adults may act analogously, as a repair hormone.



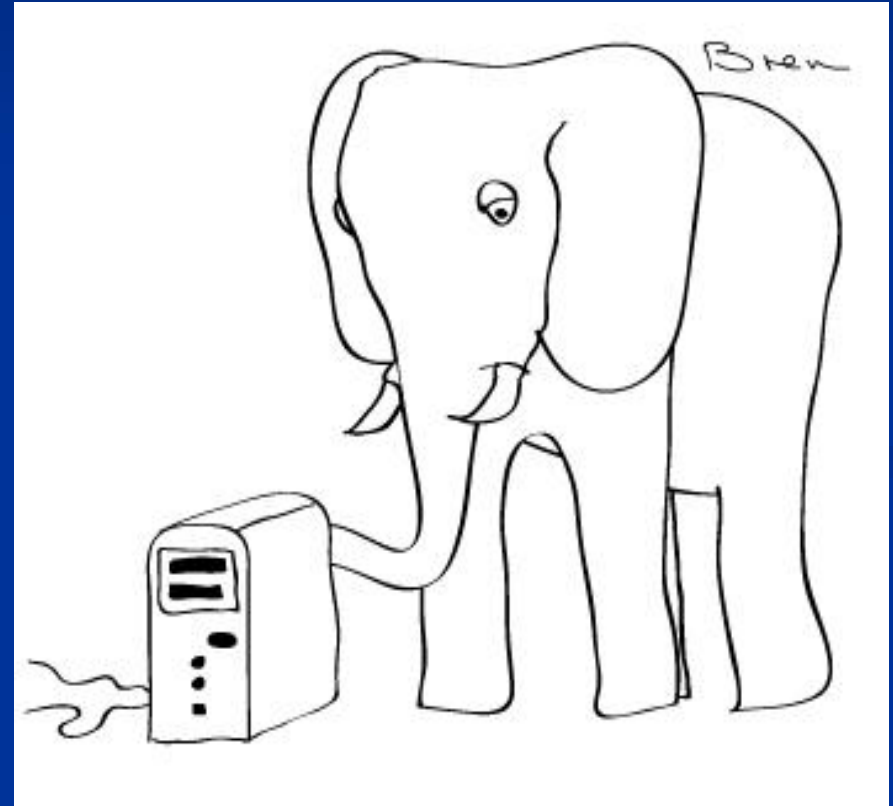
Growth Hormone in Slow Wave Sleep may help us heal

- GH calls out all of the individual muscle, bone, tendon, artery, nerve, growth factors.
- **Adults get paralyzed in order to repair.**
- People with PLMS often wake in the morning with leg or back pain.
- If SWS is frequently interrupted or shortened by apnea or PLMS, your repair phase doesn't happen correctly and you wake up with pain in the morning.



Deep Sleep: REM Sleep

- After SWS we enter REM (Rapid Eye Movement) sleep.
- In REM sleep we're **the most paralyzed of all** (so we don't act out our dreams).
- Milder sleep apnea may present with just "REM related apnea".
- **Most of my young, healthy headache sufferers have REM related apnea.**
- They also have mood and memory problems, REM is where we do memory and mood.



Normal Sleep - Basic Concepts

- All humans with normal brain chemistry find a hiding place when the sun goes down and sleep while it's dark. We are not night hunters and we were hunted by the animals that were.
- There are two important reasons why we get paralyzed in sleep.
 - In Slow Wave Sleep every moving part gets paralyzed to repair.
 - In REM sleep we get paralyzed so we won't "act out our dreams" and be discovered while we are vulnerable.
- All normal humans fall asleep about 9-10 p.m. and wake up at 6-7 a.m. We all do the same sleep phases about the same time, enter SWS at the same time, enter REM at the same time every night.

What's gone wrong and why?

- We all sleep at the same time, why?
- We all do the same thing at the same time every night also.
- The dinosaurs slept like this, and way before the dinosaurs.
- The dinosaurs had to learn, remember, teach their children, and survive getting paralyzed at night.
- Squirrels don't wear CPAP masks why do I have to?

When and Why did this occur?

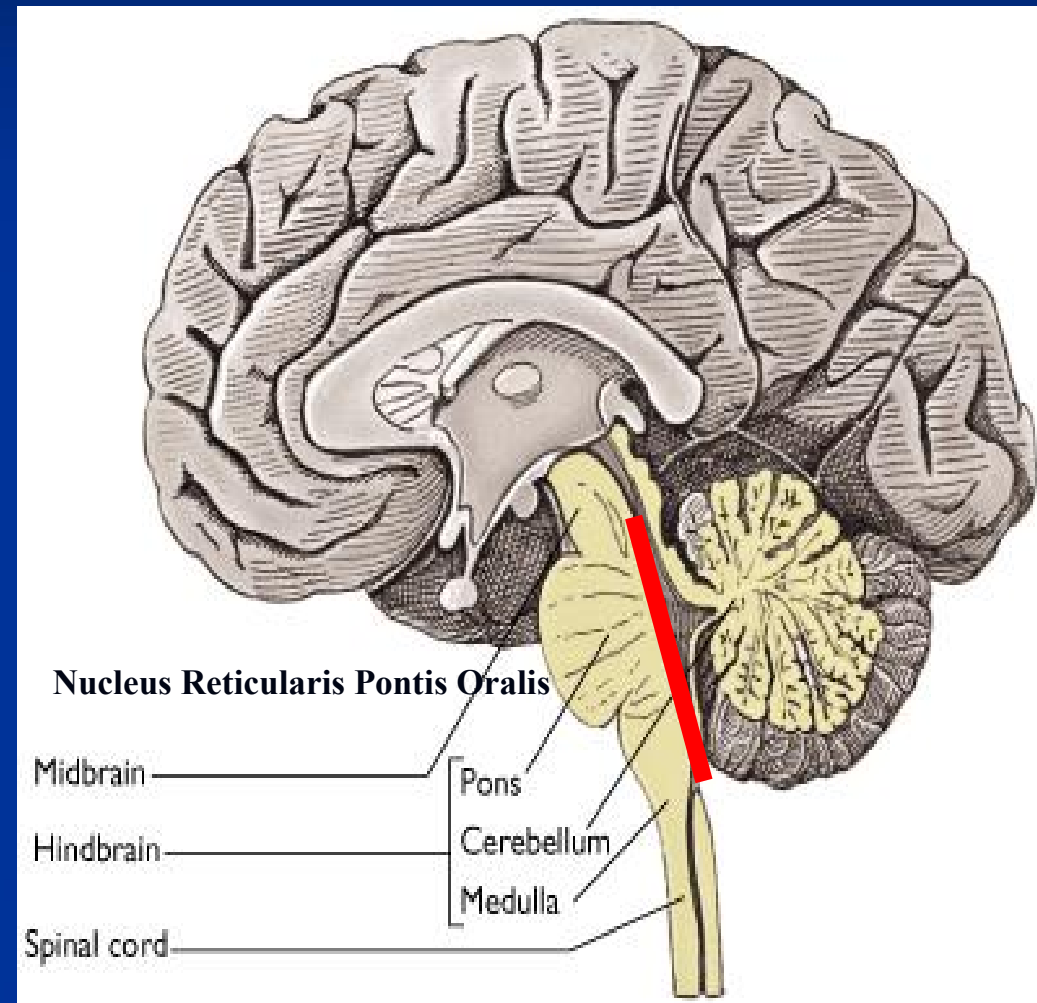
- 1983 when I graduated medical school there was no:
 - Sleep apnea epidemic
 - Fibromyalgia
 - Chronic fatigue
 - Subspecialists in pain medicine
- These are recent epidemics in “developed” countries and not in “undeveloped” countries.

Many Sleep Disorders

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9/10 chronic pain sufferers in my practice have abnormal sleep

- Are these many different disorders or are they several ways of manifesting a malfunction of a certain area?
- Where does this happen? Why does it happen?
- The Nucleus Reticularis Pontis Oralis makes us paralyzed while we are in deep sleep, could this part be malfunctioning?

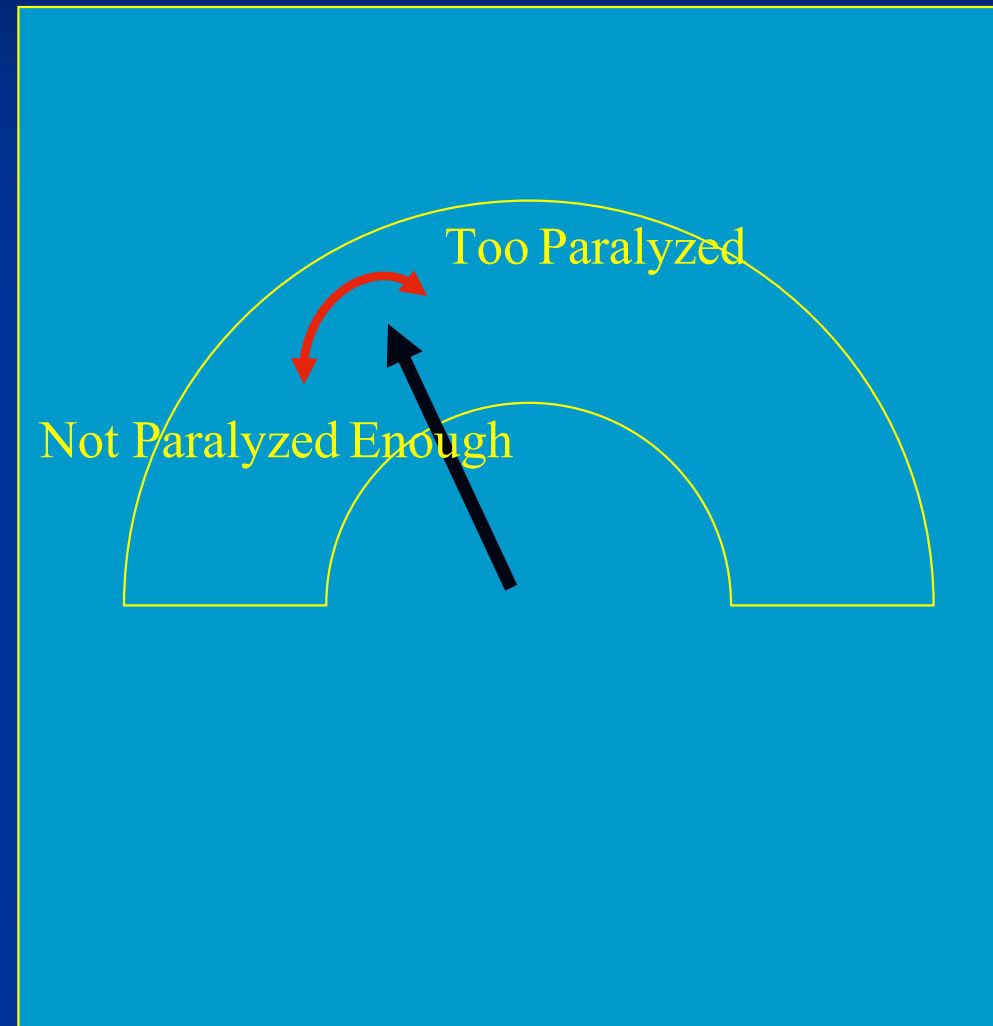


My patients' sleep disorders

- Some of my patients get **too paralyzed**; **apnea** results. Some are **not paralyzed enough**; their legs or arms or jaw moves.
- **Usually both features are present** to some degree.
- Do they have two separate sleep disorders?
- **Why would young, healthy people have not one, but two sleep disorders? Could it be one problem producing both features?**
- How could we model a paralysis switch that when it malfunctions causes both findings?

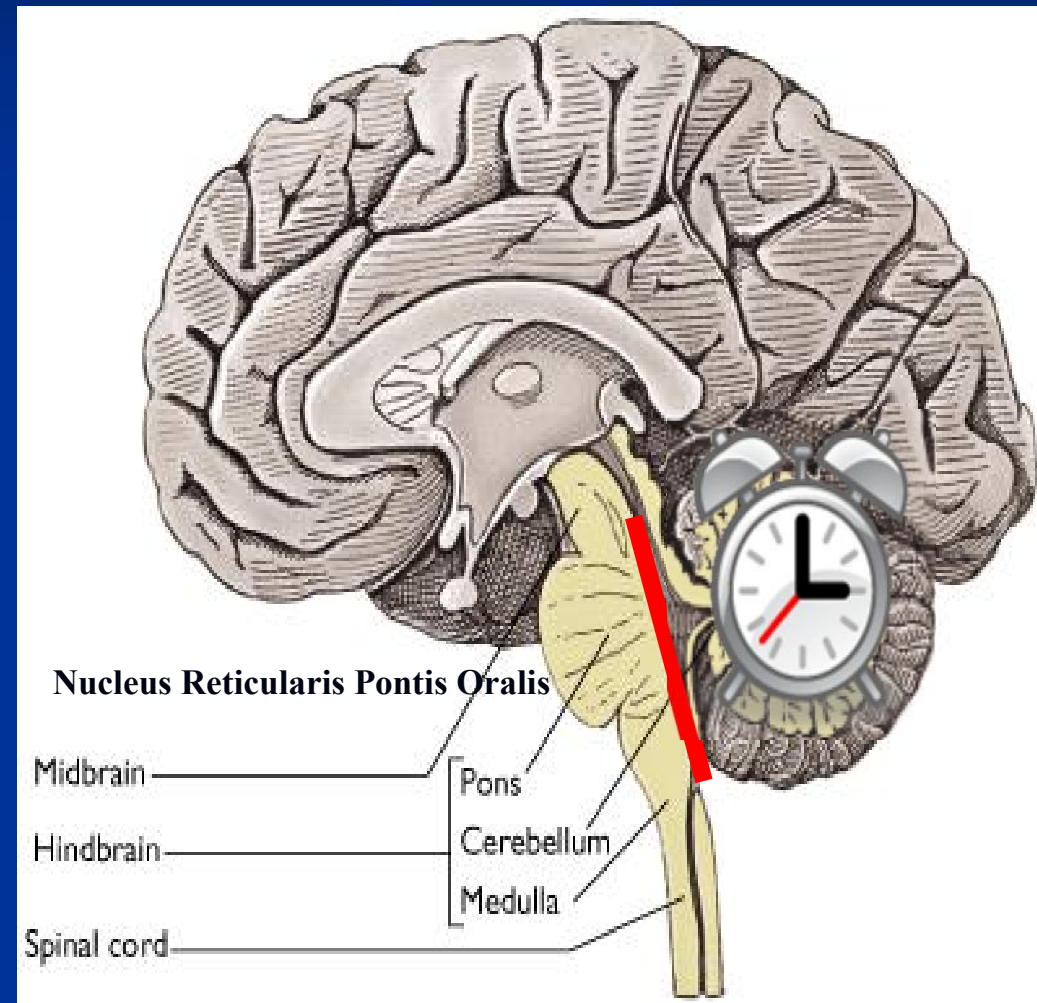
The Wobbly Paralysis Switch

- The bulbar muscles have to be perfectly paralyzed: Can't swallow you'll drown, too paralyzed; apnea results, not paralyzed enough; talking or chewing result.
- What if we model the brainstem paralysis switch like speedometer on cruise control that starts to wobble.
- It wobbles back and forth between “too paralyzed” causing apnea, to “not paralyzed enough” causing leg kicks, talking, chewing.



Periaquiductal Gray runs the timing and paralysis of sleep

- There are dopaminergic **pacemakers** in the periaquiductal grey that beat all day all night.
- They are the **brain clock**.
- **They always know what time it is.**
- The paralysis switch is here also, Nucleus Reticularis Pontis Oralis.
- The two are heavily intertwined to be sure that we only get paralyzed while we are deeply asleep.



Simplifying abnormal sleep studies :

The timer or the paralysis switch

- We could view all of the abnormal sleep studies as having one or both of :
 - Abnormal **timing of sleep**, (entering appropriate stages)
 - Abnormal **paralysis of sleep**.
- Both of these features are controlled by the posterior brainstem nuclei and are heavily intertwined.
- All of the sleep disorders can be viewed as different facets of these two “switches” not operating correctly.
- It's not really as complicated as it looks, this is the part you need to understand to help your patients.

Why does everyone and his brother seem to have Sleep Apnea?

Did we make it up?

Has it always been there or is it new?

What's causing it?

Why is it more in “developed countries”?

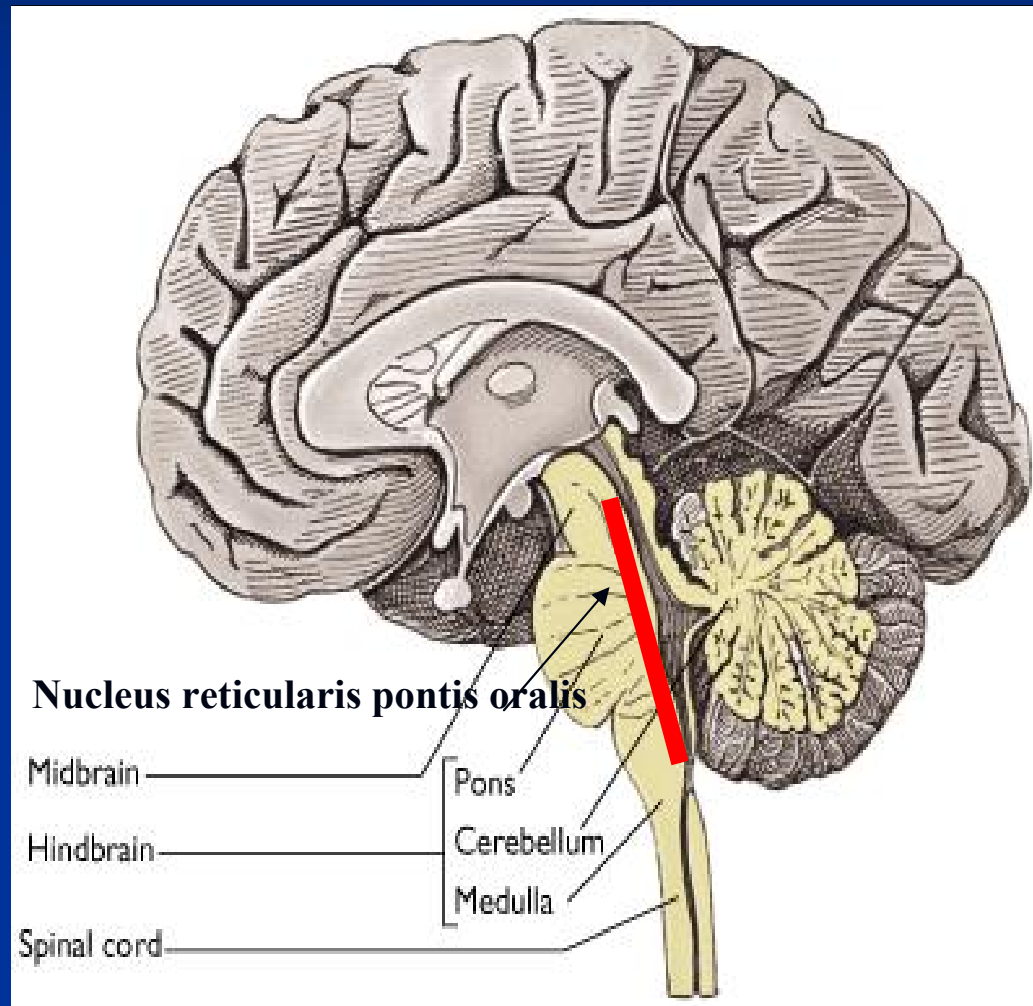
**I thought Sleep Apnea
only happened to fat
people**

**Does obesity cause sleep
apnea or does sleep apnea
cause obesity?**

Obesity and Sleep Apnea

- In patients with sleep apnea orexin (hypocretin) ghrelin and leptin levels are deranged causing increased appetite and increase in fat deposition per calorie consumed.
- Obesity comes with the Sleep Apnea and not the reverse.
- Losing weight is not the whole story of making Sleep Apnea go away.
- Lap band or gastric bypass may help temporarily but it does not fix the original cause of sleep apnea. They may snore less but still not have restorative sleep.

What's happening here that's goofing up my patients' sleep and making them fat?



Why don't we fix the sleep instead of blowing air up the nose?

- In July 2009 one of my 18 y/o daily headaches patients, with a sleep study showing **35 unexplained awakenings/hour** (slept for 10 hours, no apnea no PLMS), had severe B12 deficiency.
- Adding back a **vitamin** to fix the sleep?
- The brain still remembers what to do, but it is lacking an essential element that it needs?
- Lets do B12's on all the sleep disordered patients.
- The next month one of my patients mentioned that her doctor gave her vitamin D and it made her wrist pain go away.
- All of a sudden everyone in my practice gets a B12 and a D level drawn. (They all have abnormal sleep studies.)

Vitamins and Sleep

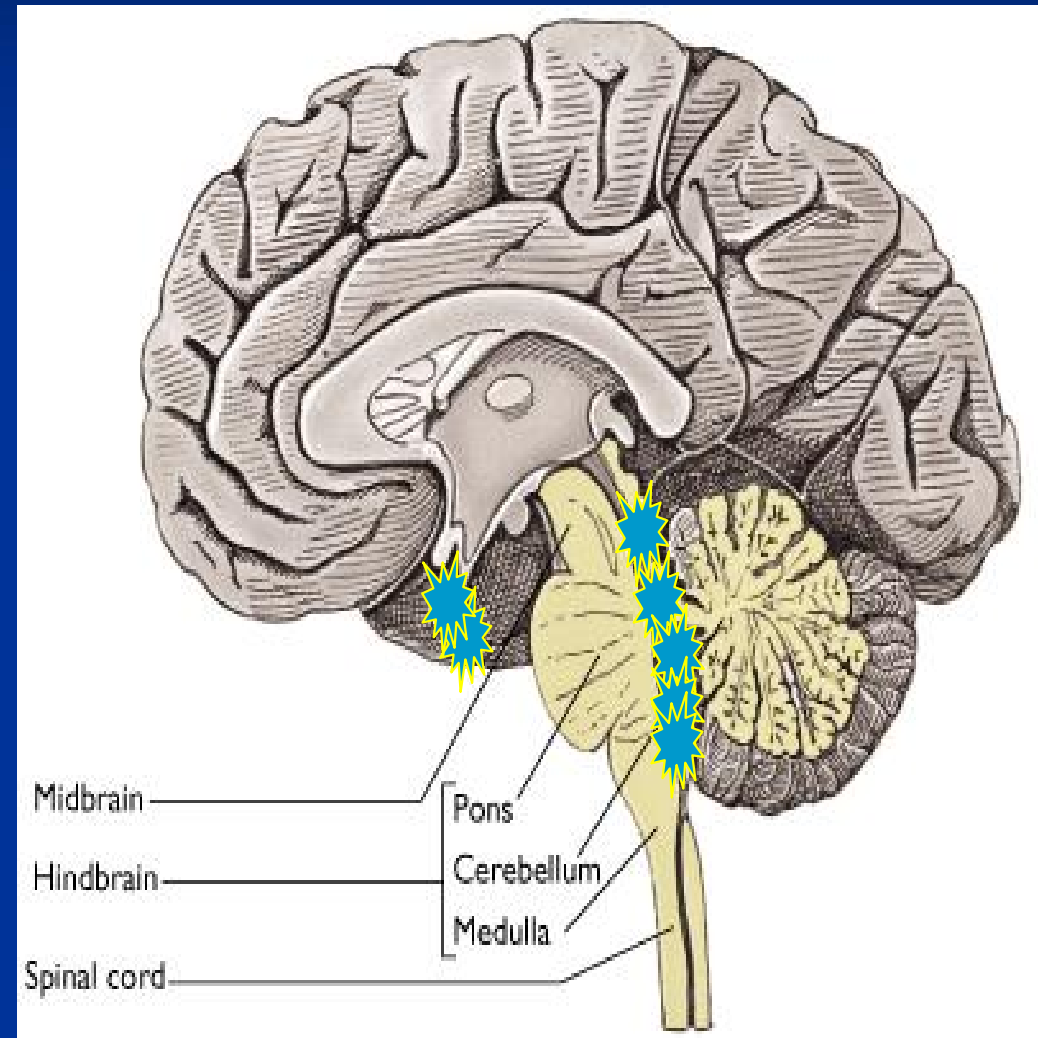
- From 8/09 to 12/09 I measured B12 and Vitamin D levels on every single patient who had a bad sleep study.
- A few of the sickest ones, with the worst sleep, had B12 deficiency but every single D was low. (<30 ng/ml)
- They all said the B12 shot gave them 2 good nights of sleep then 28 bad ones, it didn't last, they all started giving the shots once a week.
- In December 2009 two of my headache patients, who had been wearing CPAP without improvement, came back and said “after three weeks that vitamin D made my sleep better and my headaches went away.”
- **What?**

Vitamin D and Sleep

- What is vitamin D and what could it have to do with sleep?
- I thought D was all about bones and calcium.
- Are there vitamin D receptors in the brain?
Why would there be vitamin D receptors in the brain?
- It turns out that there are vitamin D receptors in the brain and they're concentrated in that posterior brainstem stripe I've been looking at for the last 6 years.

Vitamin D Receptors concentrated 2 areas of the brain

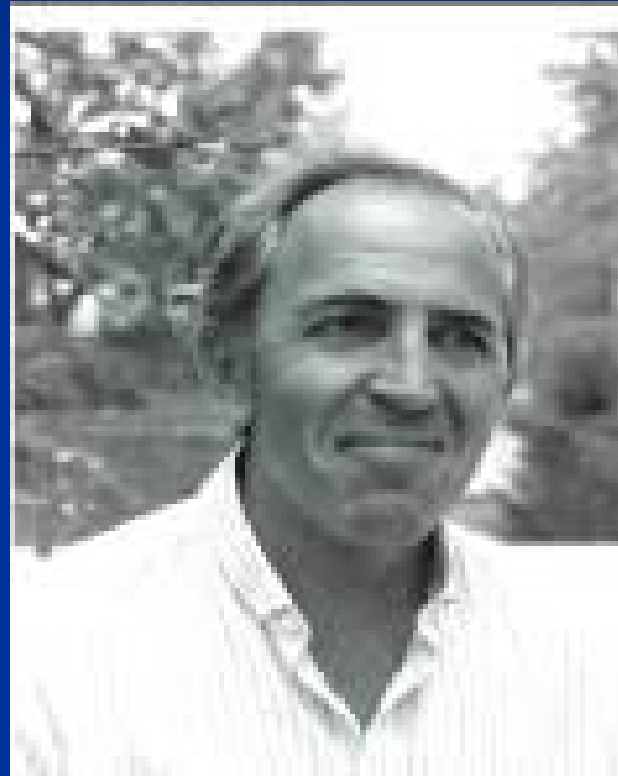
- Periaquiductal grey, especially the Nucleus reticularis pontis oralis
- Pituitary and hypothalamus (the central command of all of our hormones)



What is Vitamin D anyway?

- **IT'S NOT A VITAMIN!!! It never was a vitamin.**
- **It's a HORMONE** that we make, like thyroid, cortisol, estrogen, testosterone.
- **We make it on our skin from cholesterol.**
- UVB light hits the skin and changes 7 dehydrocholesterol to D hormone; cholecalciferol.
- Every animal on the planet; hamsters, birds, reptiles, fish and insects make this chemical, on their skin, from UVB light.
- This implies that it is very, very old.
- Probably the dinosaurs made Hormone D. If it's found in fish it's there from way before we all crawled out of the water.
- What's it for?
- Would it have anything to do with sleep?

In the 1970's- 80's Dr. Walter Stumpf “explained” what D hormone does



Dr. Walter Stumpf and D hormone

- Stumpf WE, Sar M, Reid FA, Tanaka Y, DeLuca HF. Target cells for 1,25-dihydroxyvitamin D3 in intestinal tract, stomach, kidney, skin, pituitary, and parathyroid. Science. 1979 Dec 7;206(4423):1188-90.
- Stumpf, WE and O'Brien, LP. 1,25 (OH)₂ Vitamin D3 sites of action in the brain: an autoradiographic study. Histochem.87:393-406, 1987.
- Stumpf, WE, Clark, SA, O'Brien, LP and Reid, FA. 1,25 (OH)₂ vitamin D3 sites of action in spinal cord and sensory ganglion. Anat. Embriol. 177:307-310, 1988.
- Stumpf WE, Denny ME. Vitamin D (solatriol), light, and reproduction. Am J Obstet Gynecol. 1989 Nov;161(5):1375-84.
- Stumpf WE, Privette TH. Light, vitamin D and psychiatry. Role of 1,25 dihydroxyvitamin D3 (solatriol) in etiology and therapy of seasonal affective disorder and other mental processes. Psychopharmacology (Berl). 1989;97(3):285-94
- Bidmon HJ, Gutkowska J, Murakami R, Stumpf WE. Vitamin D receptors in heart: effects on atrial natriuretic factor. Experientia. 1991 Sep 15;47(9):958-62.

(This is a small sample of many, many articles.)

Why would we have a hormone made by UVB that bosses the pituitary and hypothalamus?

- UVB is the only wavelength **present in summer not in winter.**
- D hormone adjusts metabolism to the two, very different, states of weather and food availability.
- In the summer we eat lots of perishable food, plow the soil, gather food, build things, sleep little.
- **In the winter there is no food.**
- We hibernate, we sleep more, channel more of the calories we eat into fat.
- Any animal that can eat very little and still put on a little fat in the winter has a survival advantage.

Summer: High D message (70-80)

- Eat 10,000 calories per day, digest it all easily.
- Put all of those calories into building the body.
- Sleep fewer hours (deep, paralyzed, work sleep done in 6-8 hours).
- There are D receptors in ovaries, fallopian tubes, testes;
- The estrogen and testosterone follow the D.
- September is harvest time, the D is at its highest, it's time to mate and make a baby.
- Make a baby in Sept. it's born in June, baby's in the sun to make D hormone on his skin.
- Thyroid follows the D also. All cellular energy increases.

Winter: Lower D message (40-60)

- Because there is only UVB in the summer, after September we start to depend on our D hormone stores.
- Sleep longer, paralyzed phases much less consolidated.
- Eat less, but put half of everything we eat into fat. Remember those hormones that make you hungry and tell your body to store more fat? (Orexin, ghrelin, leptin.)
- Very low D may lead to very goofed up sleep. Could this be the cause of sleep apnea?

D Hormone and Sleep

- This implies there may be a natural reason and cure for the recent epidemic of obstructive sleep apnea
- There is no proof of this yet, it is only my hypothesis, but the timing and the populations affected make it very likely.
- Early 1980's: Begin the epidemics of OSA, fibromyalgia, chronic fatigue and pain specialists.
- Late 70's early 80's; sunscreen, air conditioning, television, and computers.
- Sleep apnea and associated disorders are epidemic in "developed" countries.
- Once the electricity arrives so does the air conditioning. Humans aren't stupid, now when it's hot we go inside or buy an air conditioned tractor.

D Hormone not Vitamin D

- The sleep connection is the only new observation, everything else was described 30 years ago but you didn't learn about it in medical school. **Why is that?**
- When the word “vitamin” was applied to this chemical it became overlooked by Medicine and has not been taught to those of us who should be conveying this to our patients.
- Over the last 30 years all of the basic science observations to support Dr. Stumpf's theories have been published. Why don't we know about these articles?
- They're in the Nutrition Journals, the European Endocrine Journals, and just the last 5 years, our medical journals.

Epidemiologically related to D deficiency- (same list as sleep apnea)

- High blood pressure
- High cholesterol
- Heart attack, atherosclerosis
- Heart arrhythmia (Atrial fibrillation)
- Stroke
- Obesity
- Memory problems
- Depression
- Daily headache
- Unexplained body pain (“Fibromyalgia”)
- Chronic joint, back pain

Vitamin D inflammatory connection

- There are D receptors on the WBC's.
- Low D appears to cause a “proinflammatory state” with increased C reactive protein, leading to joint inflammation that in combination with lack of repair in sleep leads to
 - Knee replacement
 - Hip arthritis, replacement
 - Rotator cuff surgeries
 - Vertebral disk disease
- D is needed not only for bone health but also for healthy fibroblasts, healthy vertebral disk cells, healthy nucleus pulposus cells.
- Lack of D leads to the white blood cells eating away at the joint lining leading to “bone on bone” .
- The body remembers how to make that joint lining, it just needs to be asleep and properly paralyzed in order to do that.
- The time that we do maintenance using this hormone is only during sleep, so the effect of it's absence is doubled or tripled by the disrupted sleep.

Autoimmune Diseases Epidemiologically linked to D deficiency

- Rheumatoid arthritis
- Lupus
- Ulcerative Colitis
- Psoriasis
- Celiac Disease
- Asthma
- Allergies
- Multiple Sclerosis
- Inflammatory aspects of cardiovascular disease

Disorders of GI tract epidemiologically related to D deficiency

- Gastric reflux
- B 12 deficiency is usually a secondary deficiency caused by D deficiency. (Not enough stomach acid, can't break the B12 off the meat. Iron deficiency the same.)
- Poor stomach motility
- Gallstones, (D and cholesterol are the liquid component of bile they emulsify the bile salts)
- Diabetes (islet cells have D receptors)
- Decreased “good” colonic bacteria with bloating etc.
- Constipation, “irritable bowel”

**The odd history of Vitamin D and
why you don't know about it**

Why did they call it a vitamin if it's not one?

Why the “D2” and “D3” numbers ?

- The original rickets model was established by narrowing down a rat's diet until their bones got osteoporotic.
- Oops, rats are nocturnal animals, they don't go out in the sun. In order to become nocturnal they had to evolve a D receptor that could use the D found in food. (Vampires apparently use our D.)
- The first chemicals found that corrected the rat's bone disorder were from fungus on grain, they named them **vitamin D1 and D2**. They were, in fact, in the food.
- Unfortunately what we make on our skin is D3, a different chemical. That chemical may have different effects at different D receptor subtypes within the body.

D2 is NOT the same as D3

- **Every non nocturnal animal on this planet including man makes and uses D3, and it's not in the food anywhere.**
- **It is not a vitamin.**
- **D2 may have variable effects in different species and different individuals. In my patients it seems to worsen the sleep. It may act as a partial agonist at some sites, partial antagonist at others.**

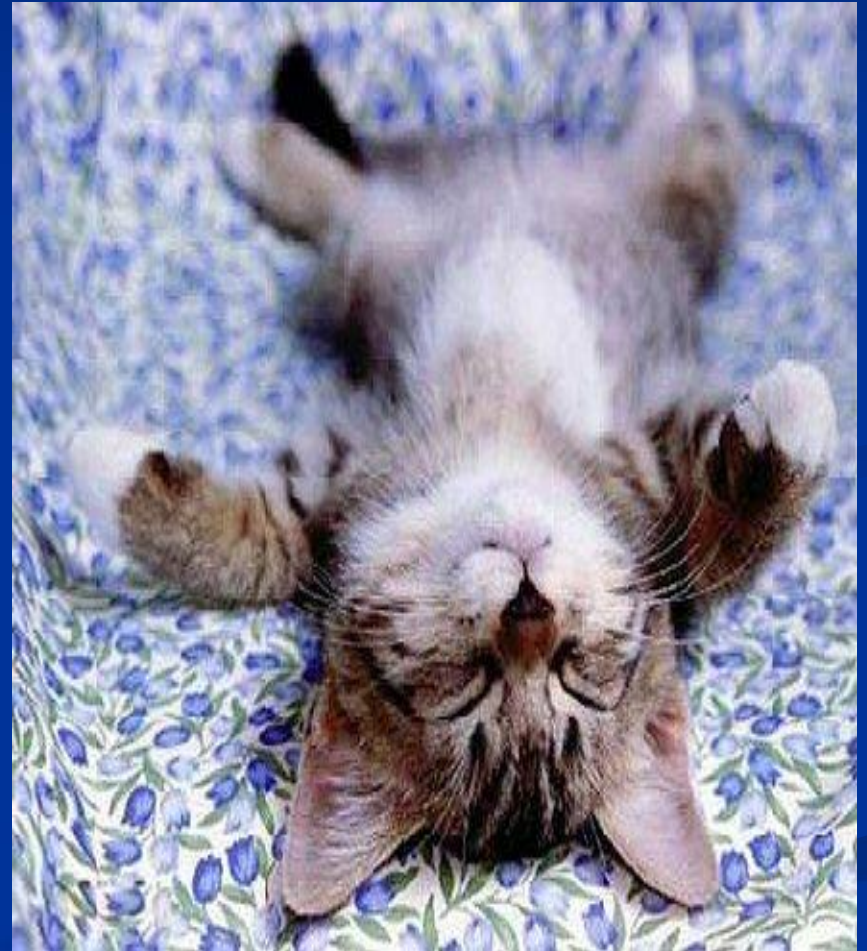
**What does this D have to do
with my practice?**

Can vitamin D cure my patients pain?

No, but normal sleep can.

Restorative sleep is the cure for chronic pain

- The cure is the sleep, not the D.
- CPAP is one way, D another.
- If it's a deficiency state why not try to treat that first?
- The curative effect is not D, it's a perfect D level.



D too high makes the sleep abnormal too!

- 60-80 ng/ml appears to be the D blood level for no pills, no pain, and normal, restorative sleep.
- **Normal sleep, night after night, is what cures the body.**
- Presumably people who live outside get to 80 in November and fall by 10 pts every 2 months during the winter to 50 in March or April.
- **Year after year of lower than 50 appears to bring on the sleep disorder.**

Vitamin D Toxicity and why the FDA's not crazy

- All of the “toxicity” refers to hyper calcemia but most of my patients had “toxicity” symptoms way before the calcium went up.
- Symptoms of fatigue, pain and poor sleep start to return at a level of 80-95.
- The abnormal movements in sleep come back leading to pain on awakening again.
- **THE SLEEP DISORDER COMES BACK with a too high D just like too low D.**
- As with every hormone: go too high things go wrong, go too low things go wrong.

How to replace the D to fix the sleep and why all the controversy about dosing?

- 8/2010 - 12/2010 I gave FDA recommended 1000 IU of vitamin D3 .
- The two guys wearing the CPAP were the only ones who got better. (their D levels were higher, in the 40's)
- But none of my headache patients were better. so I checked their levels again.
- **On 1000 IU/day their D levels were all 10 points lower.** They were 28 in August, 18 in January.
- FDA dose 1000 IU per day is just fine if you're 80 in August, but it won't get you normal sleep in the winter if you're starting below 30.
- By February I was giving 2,000 IU/day. "Call me back about your sleep."

What is the right level ?

- And what is a “normal D”? (30-100) If all of my patients with a level of 28 have lousy sleep and a headache, is 30-35 really “normal”?
- www.vitamindcouncil.org believes the level should be 80 ng/ml in September and no lower than 50 at the end of winter and it takes 10,000 IU/day to STAY THE SAME.
- What is the right level to achieve normal sleep?
- 60-80 ng/ml

What's the right dose?

- We make 20,000 IU on our skin in 1-6 hours in the sun, middle of the summer, middle of the day based on skin color. 1,000 IU/day is probably not going to replace this.
- 1) Repleting dose and 2) Maintenance Dose
- The **one time dose to go from 18 to 60** is much higher than the **maintenance dose**.
- Repleting dose is 10-20K/day for 4-6 weeks depending on the first measured level and what month it's measured in.

Daily dose different for each of us healthy level same for everyone

- Usually in winter 10,000 IU is the maintenance dose to stay the same once the level is 60-80.
- Summer dose is zero to 10,000 and different for each person based on where they live how much they go outside and how fast they make it.
- Dark skinned people make it slower, they are made for very high sun environment and block it so they don't get toxic.
- Each person needs to learn their own winter dose and summer dose.
- Also for normal sleep, dosing once a week, or a month, does not appear to be the same as daily dosing.
- Your patient needs to keep a record of their own level and the doses that got them there in relation to the time of year.

Other supporting factors

- D hormone has other cofactors that are necessary for its action so I usually give a multivitamin also.
- B12 helps the sleep and should be >500 . If it's below 500 I supplement with 1000 mcg per day as well for 6-12 months.
- Iron is a cofactor to make dopamine and should be supplemented if low also. B12 and iron often go low together for the same reason, they both come from meat.
- With higher D doses if leg cramps occur or headaches worsen magnesium is low, give sunflower or pumpkin seeds as a magnesium source daily.
- If D causes diarrhea (1/50 of my patients) put the D on the skin instead of orally.

Now what do I do?

- The right test is D25OH. Don't test D1, 25 OH .
- Medicare pays for it 4 times per year (ICD 9: 268.9).
- Don't use the 50,000IU prescription D2.
- Start yourself and your patients on whatever dose you feel comfortable with daily, then measure a level again in 1-2 months.
- Get the level to 60-80 ng/ml. Sleep does not get better until then.
- To cure pain you have to keep it there for months on end so every night they have time to heal.

Are there other medicines that interrupt my patient's sleep?

- Clonidine prevents REM sleep.
- Beta blockers prevent REM sleep.
- Long acting narcotics prevent REM sleep.
- Serotonin reuptake inhibitors prevent REM sleep.
- Dopaminergic blockers prevent normal sleep because dopamine helps run the paralysis and timing of sleep.

What should I do for my patients?

- The sleep is always the most important thing.
- Try to get the D right, but while you're doing that:
- Whatever helps them sleep will make them better faster. Crummy, abnormal, drug induced sleep is better than no sleep. Don't be afraid of sleep medications.
- If they have sleep apnea and they can wear the CPAP mask they'll get better faster.
- Change all SSRI's to morning. Use SNRI's if possible.
- Move the beta blockers or clonidine to morning.
- Try not to use anti psychotics, even Seroquel at bedtime.

Listen to your patient

- Anything that makes their sleep worse is going in the wrong direction.
- If it makes the sleep worse try something else.
- The patient should sleep and not wake drugged.
- The muscle relaxants seem to help, not hinder sleep.
- Benzodiazepines help at night.
- Don't try to change the pain meds until they sleep.

Long acting narcotics prolong the pain

- Once the patient gets on fentanyl patch or oxycontin or methadone they often get **central apnea and no REM**.
- Once the D gets between 60-80 try to get them sleeping through the night, then take away the night time long acting narcotic, decrease the patch dose and change to short acting.
- Be sure the B12 is good too (>500).
- Trazadone is the only medication that might increase slow wave sleep.
- There's no good or bad sleep medication, just the one that works for that patient.

Try to take away long acting narcotics

- Don't go too fast.
- When their pain is gone on awakening they're starting to have normal sleep.
- Don't start taking away the pain meds until then.
- If they don't get better when the D is normal remember D of 60 is **day one** of starting to sleep normally.
- Every night we do all the homework for today plus all the left over from the last 10 years. That means we repair slowly.
- First they're pain free on awakening then the joints begin to do better during the day and slowly repair.
- If the legs are still moving inappropriately in sleep the knees ankles, feet, back will still hurt on awakening.

Case Report

- 32 y/o mom of 8 year old twins who has had daily headache since the birth of the twins
- Original D level 8, now 58 (a year to get there requiring 20,000 IU per day to stay the same)
- Taking 8 Percocet per day, Fentanyl patch 50, almost daily shots of demerol for headache.
- Increasing, daily body pain despite using CPAP nightly being on D and B12 and sleeping through.
- Hospitalized taken off all narcotics, kept on sleep medications, discharged with no body pain and mild headache on vicodin 2/day prn, now headache 1-2/week and no body pain.

Be Patient, Keep D 60-80

- This is something you can easily add to your current practice.
- Every patient who wakes with pain; joint, headache, neuropathic, unexplained (fibromyalgia) has a sleep disorder in the background **causing** their pain to continue inappropriately.
- If the pain meds had cured them in the first place they wouldn't have gotten to you.
- Fix their sleep, cure their pain and be a hero.
- Never assume you know what the D level is, measure it.

Our healthy vitamin D future



Vitamin D Toxicity and why the FDA's not crazy

- This is not only a hormone, it is a hormone with a narrow band of normal and it changes in each person from month to month and year to year based on sun exposure and skin type.
- **How could the FDA possibly recommend a single dose for all Americans living from Florida to Alaska with very divergent skin colors and lifestyles without screwing everyone up?**
- They wisely chose to recommend a tiny, tiny dose, i.e., not enough to screw anyone up.
- This chemical should never be supplemented by the government, it's as odd as putting testosterone or estrogen in the milk.
- It should never have been over the counter so that we're not sure how much is in the non regulated pills we're taking.
- **And THE FDA RECOMMENDED DOSE HAS ABSOLUTELY NOTHING TO DO WITH THE LEVEL THAT NEEDS TO BE ACHIEVED IN A CLINICAL TRIAL** to produce normal sleep and normal physiologic effect.

D Hormone and D receptors: multilayered complexity

- “Vitamin D” will turn out to be a multi layered endocrine system with at least 3, maybe more, separate, active forms. In certain situations D25OH and D1,25OH may both bind to D receptors and produce a heterodimer of 2 D receptors that has a different effect than D 1,25 OH by itself. D 24, 25 OH may have other responsibilities.
- There are different receptor subtypes in different organs of the body and species differences in receptor subtypes as well. Observations in nocturnal animals such as rats (or vampires) cannot always be generalized to humans.
- Different organs in the body make their active D at the rate they need it and D 1,25 OH does not penetrate into the brain. (Which is after all the only important organ in the body.)
- D 1,25 OH is **not** the only active chemical and D25 OH is **not** just a storage chemical. In higher “summer” doses D25OH is probably active on mood and sleep the day it is given.