Back To Chiropractic CE Seminars

Basic Differential Diagnosis for Chiropractors: The Brain ~ 6 Hours

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I'm always a phone call away... 707.972.0047 or email: marcusstrutzdc@gmail.com

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Back To Chiropractic CE Seminars

Basic Differential Diagnosis for Chiropractors: ***The Brain***

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https://www.youtube.com/watch?v=PRZg0Mw3zQY

Neuro-diagnosis For Chiropractors is usually therapy localization in the CNS

Hi, I'm Mike. Welcome, its great to have you here. This is how I talk with you on this platform.

If you really want to help restore function to people, chiropractic is great. The adjustment is amazing.

We are here today to identify the times and cases, and which structures in the brain or Central Nervous system we are targeting with our adjustment.

This allows us to document specific improvements in specific deficits from the adjustment.

Today

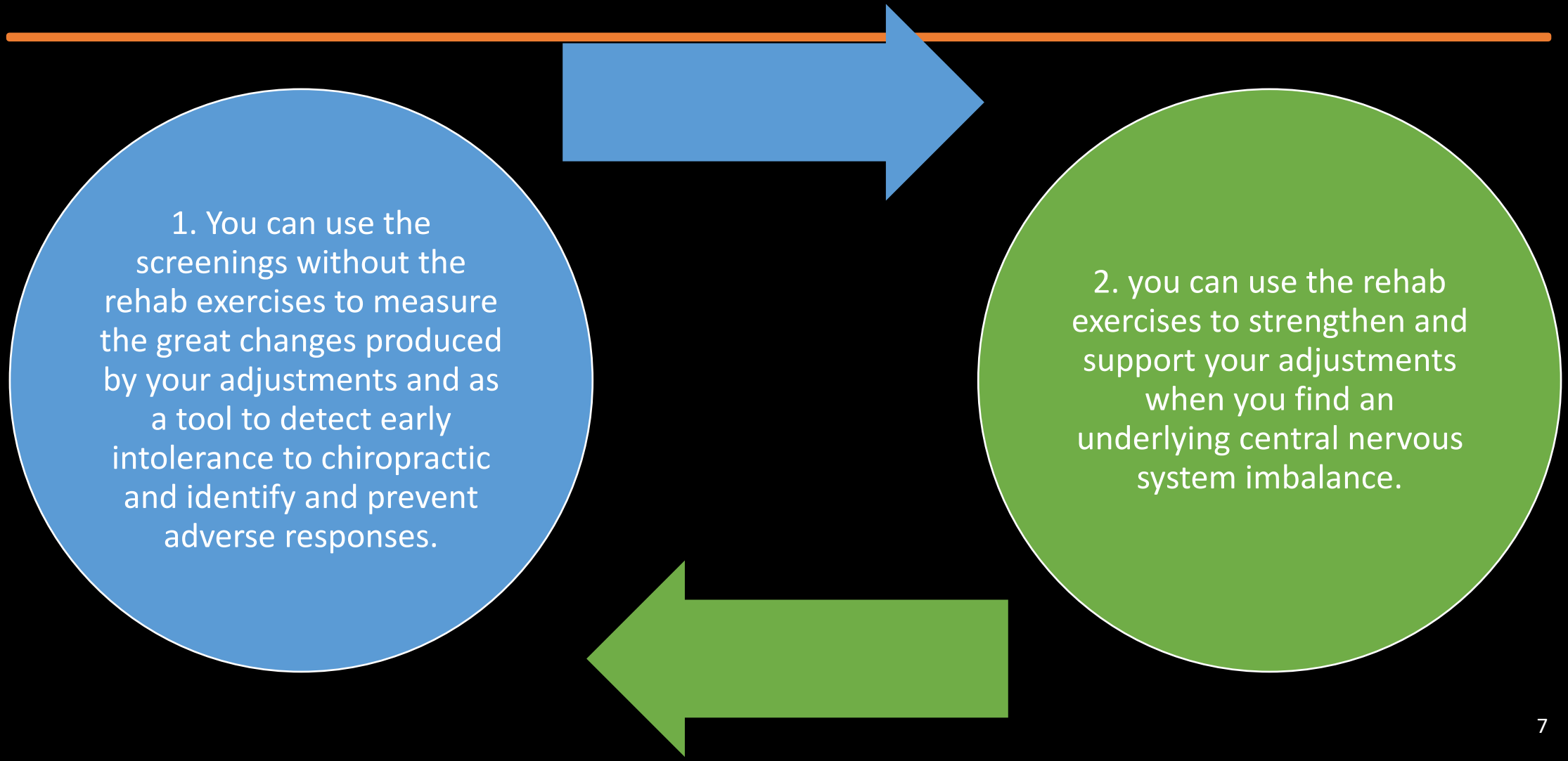
- I’m going to give you hints about 2 general principles today. You do not need to know pathways and final definitive diagnoses to screen your patients safely.
- One is how to identify normal or abnormal and refer out if you are not confident about pathology.
- The second is identifying “subtle findings” that may indicate functional imbalances that you might correct and reduce.

That’s exciting!

Doctor’s choice

- As a DC, you get to choose which tests you want to perform, and which you do not
- You can send out for concurrent care or refer out fully for a second opinion on any reported symptom even if you do not examine the complaint.
- The expectation is that the DC catch symptoms and refer out or treat or assess and refer. You have total freedom based on your clinical focus
- Just document and inform the patient when you run into a mystery complaint or finding.

The brain tests and exercises below have 2 purposes



Other brain rehab

Sometimes we use other neuro rehab in addition to the adjustment like eye or head movements, balance movements, repetitive or complex limb or even tongue movements or gargling. You get to choose how deep to go.

We watch the function improve and fine tune as the visits pass.

If we fail, we gain insight into the actual problem and can use that information to refine our assessment.

Diagnosis of pathology

Let's get this out of the way first.

Take a history, Do your screening tests, order your imaging and labs and refer for definitive diagnosis of pathology.

After a final diagnosis is made, you still may be able to help using chiropractic supportive care anyway, even if that is not “official standard of care” for their disease, it can be supportive, adjunctive or palliative care.

Even with disease, you may be able to document functional improvement caused by your therapies and adjustments if you look for it and record it.

Beware Single findings

- Whether examining for pathology or functional imbalances without pathology, never rely on a single finding to make a diagnosis or assessment
- Always combine many positive and negative findings to triangulate and eliminate some structures from your assessment

Topics by hour (6 hrs):

1. Review basic exam concepts for patients to aid and justify chiropractic adjusting and rehab
2. Common symptoms and general brain localization
3. Review neuro testing options
4. Match subtle symptoms to subtle findings even in “medically normal” patients
5. Review imaging, lab and referral options for tougher cases
6. Build comfort with treatment planning, prognosis and outcomes

1. Review basic brain exam concepts to aid and justify chiropractic adjusting and rehab

What’s the point here?

- We also have an opportunity to identify functional lesions, which are not pathologies, that are subtle asymmetries between sides during the neurological chiropractic exam.
- This can be fast and easy, or long and complex depending on your needs.

“Subtle” neurological findings

These are called subtle neurological findings by orthodox medical neurologists. These findings are generally discarded as non-pathological and non-contributory to disease.

We propose to treat these to affect quality of life and function.

Brain Diagnosis and Treatment Concepts for DCs

Localize a treatment or therapeutic target for functional rehab or adjusting even in medically normal patients

Localize a region to investigate further or refer out

Track progress of care over short time spans

Improvement of symptoms is recorded

Functional Treatment

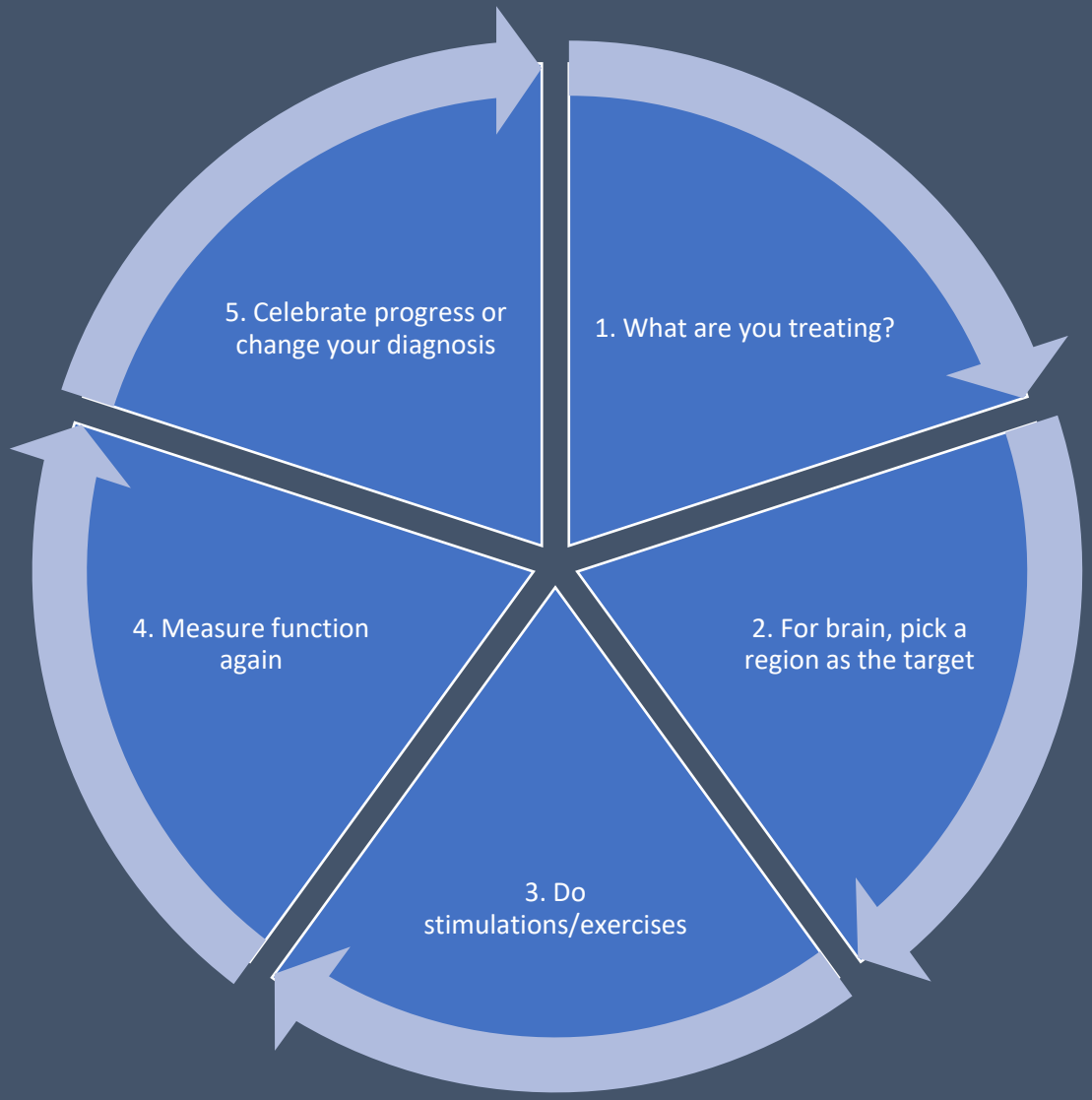
If the adjustment or brain exercise is specific enough to the brain tissue we are targeting, and the frequency of firing (the stimulus) is just right, we achieve plasticity and heal the pathway.

Certainly, nutrition, genetics, stress, psychology, autoimmunity, sleep and toxins contribute.

These pathways are well preserved in most people and easy to work with. Results should be evident each session if we have not missed anything.

Once we find a subtle finding, we guess and then apply a fitting therapy and retest the finding for task improvement. This often correlates with symptom improvement. Then we repeat over visits.

Tissue recovery over time=plasticity



Basic concepts of Neuro assessment

- The general practice Doctor of Chiropractic is not expected to be a neurology expert in everything.

- Reasonable expectation is for you the DC to
  - investigate symptoms told to you
  - Investigate signs observed
  - Ask reasonable questions of the patient based on their history
  - Describe what abnormalities you see in clear language if you do not have neurology jargon

Neuro Screening is Not Final Differential Diagnosis

- First look, listen and ask to guide your exam
- Then pick types of tests to rule out serious issues
- Just identify “normal or abnormal”; “typical or non-typical”

- In functional neurology, “subtle changes” are acceptable if the findings are not frankly pathological

How to tell the difference between pathological and functional/subtle findings?

Pathological:

- the patient cannot perform the test on one side or both
- The first try is a positive finding, and it continues to be positive with repetitions
- Any MD or DC would say the test is positive for pathology

Functional/subtle findings:

- The finding seems to be variable with repeated attempts or rest.
- The patient performs OK at first, then get worse the more reps they do
- Or they start poorly and improve with reps of the neuro test.

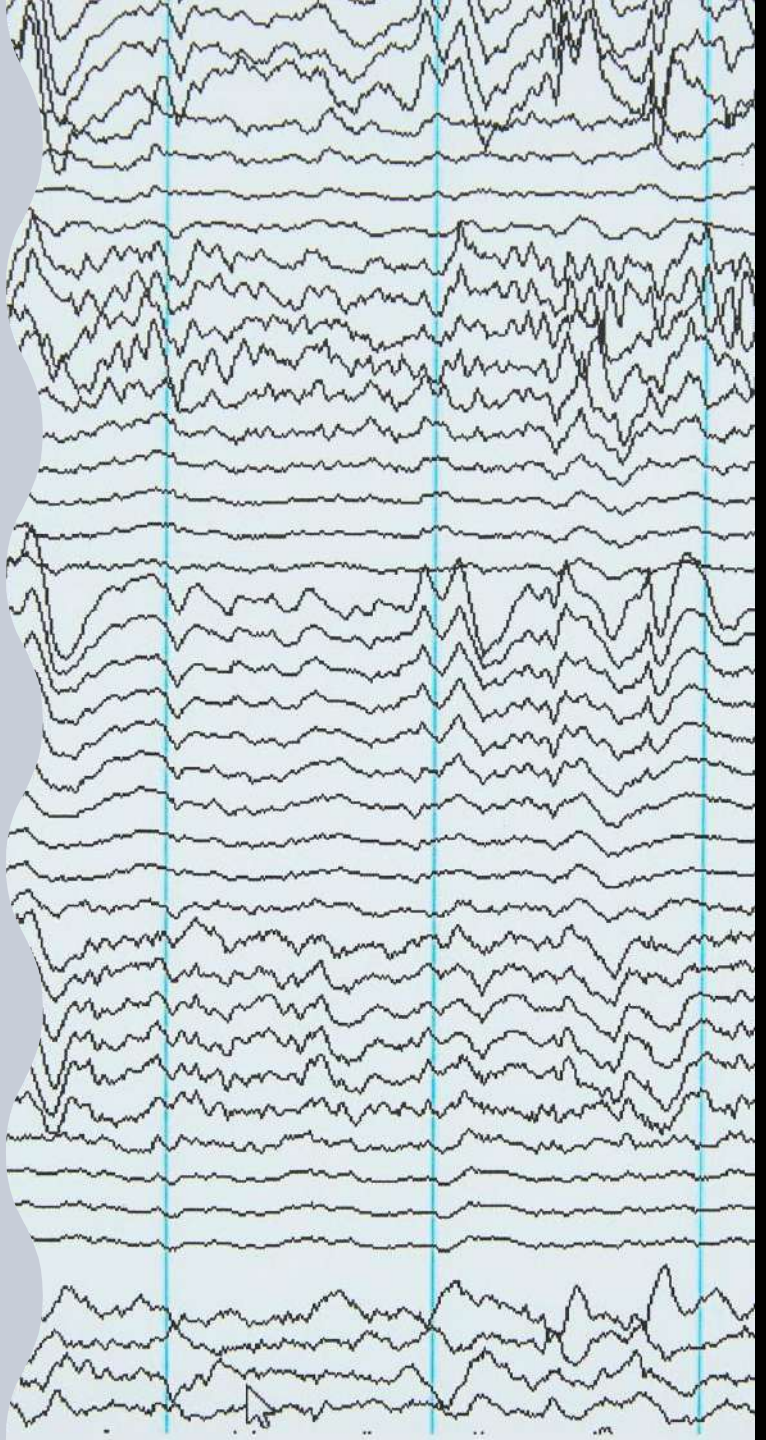
Fall risk

YOU MAY BE HELD LIABLE IF YOU DO A TEST AND THE PATIENT FALLS AND HARMS THEMSELVES

ALWAYS BE READY TO CATCH THEM IN CASE OF SUDDEN FALLS OR FAILURES AS THEY WILL NOT KNOW IT IS COMING

Example: DDK dysdiadochokinesia in pathology vs. dysfunction (medically normal)

- This is a common example
- Patient is tested for rapid alternating hands where they flip both of their hands over multiple times.
- PATHOLOGY=the patient cannot perform with one side. The affected hand flops around and the normal hand flips easily. This does not improve with repetitions.
- Functional finding=the patient performs the flipping normally at first, and with reps then one hand gradually starts to flop and lose control.
- After a few seconds of rest, we try again and they start out ok on both sides, and with reps the same hand gradually loses coordination during flipping. This is usually a cerebellar functional weakness on the same side of the uncoordinated hand.



How to think about neuro diagnosis simply

- The first inkling that something is a problem comes from the history or observation before we touch the patient.
- Our first job is to screen for pathology, and hopefully we can move on to our important work of relieving interference and restoring function
- Diagnosis is just a series of sorting “is it more this or more that” over and over until we reach the final diagnosis.

The secret to screening in early diagnosis

The secret of nurses and general practice doctors, and even in cases where a specialist sees something outside their specialty, is the concept of NORMAL OR ABNORMAL first.

When you observe something or see a response to your testing in the exam you will sometimes say this is abnormal.

Don’t worry about explaining or knowing what you are seeing, where it came from, what its called, what the diagnosis or treatment is.

Simply identify it as an abnormal finding, and inform the patient, and refer.

Or you can pursue more if you like as testing, labs, imaging, coordinated care, or a therapeutic trial, and then decide to refer if you can’t find an answer.

Even if you are wrong and it is a normal variant, let the specialists sort it out.

What to think first with symptoms

When someone presents with complaints or symptoms, you will want to think of possible diagnoses right away. This will reveal your bias of experience or understanding and can lead to error.

Try to discipline your mind to first eliminate categories of illness first, not to think of diagnoses. Consider **ruling out many of** these categories first based on their story:

Infectious	Degenerative	Cancerous	Traumatic	Inherited-genetic-developmental	Autoimmune	Toxic/metabolic

Severity

Your first thoughts should be to ask questions or do simple tests that eliminate serious pathology from the field of possibilities.

This is usually going to lead to comfort of both doctor and patient that a serious pathology is eliminated, or not.

For example, the patient has terrible low back pain but denies pain radiation, radiculopathy, bowel or bladder incontinence, or weakness.

The probability of serious disease is reduced significantly.

Reasonable treatment is expected if risk is low and informed consent is given.

Over time, if there is not improvement, we can look deeper and may find pathology.

After ruling out based on probability, think by categories

- Chiropractors see traumatic, degenerative, infectious, and toxic metabolic mostly.
- Certainly, we see all the other types, but more rarely do these walk in to us.
- “When you hear hoofbeats, think horses, not zebras”

Diagnosis Textbooks say diagnosis comes from:

90% of diagnosis comes from medical history taking

Not exam, imaging, labs, referral, other.

Spend time on the written history

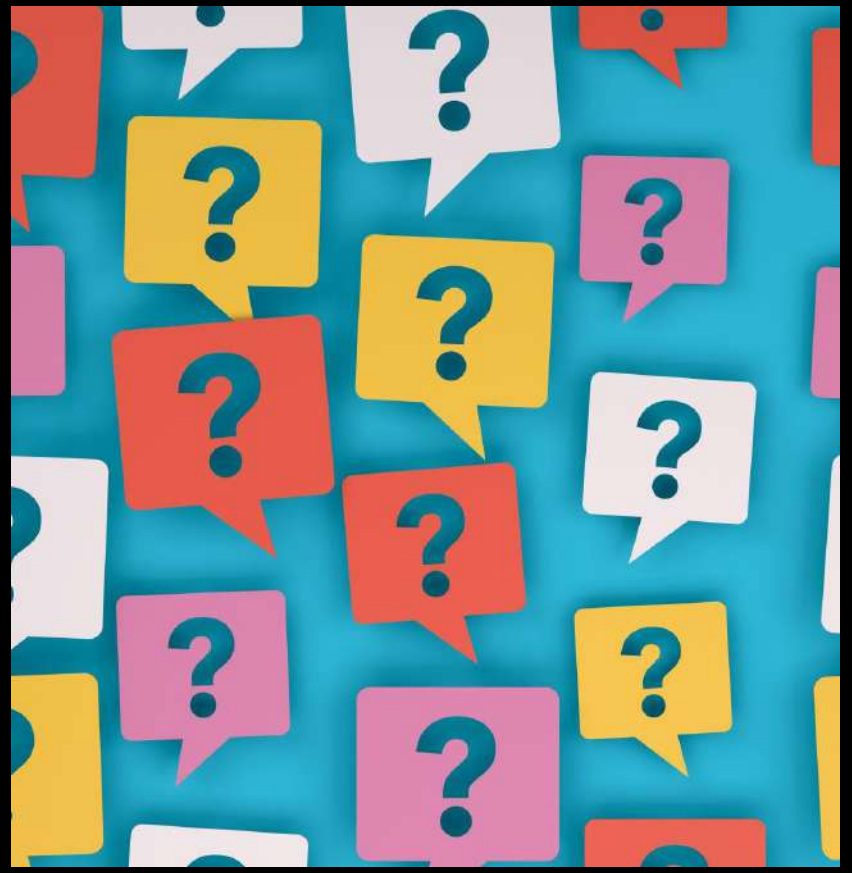
- Be sure the patient has time to fill out your forms completely or get help completing them.
- Go over written history with the patient
- Then do a mini verbal review after that

These do not need to take a long time, just long enough!

Use both types of question

- **Open ended questions** will allow for them to expand outside your question and may reveal new directions. These are worded to give room for unexpected answers. “what does your pain feel like?”

- **Direct questions** should be more precise and are asking them to answer among suggested answers. “Does your pain feel more like ants crawling on your skin or fire on your skin?”-or “does your pain feel deep or near the surface?”



Which body system lesion could explain the symptom?

- Just asking yourself these questions will help develop your diagnostic possibilities. Is the ultimate root cause of the symptom a failure of:
  - Cardiovascular, lung supply or internal bleeding?
  - Nerve cells?
  - Immune reaction or infection?
  - Endocrine, glandular or hormone problem?
  - Skin?
  - Musculoskeletal origin?
  - Digestive organ origin?
  - Reproductive organ origin?
  - Blood based or bone marrow disorder?
  - Psychiatric or psychological event or syndrome?

Remember To Use the 4-limb Question:

- How many limbs do you feel this symptom?
  - One limb-cause is more likely to be focal peripheral in nature
  - Both limbs (both arms or both legs)-could be cord or large disc
  - 3 of 4 limbs-not common, hard to explain
  - 4 of 4 limbs-often metabolic or systemic, or possibly cervical cord or above

OPQRST reminder-ask these:

- O → Onset- what triggered the symptom?
- P → Provocation what makes it worse?
- Q → Quality does it feel hot, deep, burning, achy, stabbing or other?
- R → Radiation does the sensation travel somewhere else?
- S → Severity how bad is it?
- T → Timing when does it come and go?

What have they done to treat it?

Ask if they attempted to treat it themselves and how it worked

Ask if they saw anyone else for help, what was tried, and how did it work?

- It is very important to document when orthodox medicine was tried and failed.

Different Types of Exam Structure

Top to bottom

- Organized, fast, rigid, less likely to miss performing a test
- Less creative for the advanced clinician

Problem based

- The provider tests based on the most urgent questions to answer in the order of importance. For example-a radicular pain pattern presents: is there a pathological reflex or not?
- This is harder and requires experience
- More freedom for the experienced clinician

Regional Neuro Localization

- Localizing the general CNS or PNS area you are suspicious of as a symptom driver can be helpful. Consider these levels of the lesion:
  - Central vs peripheral
  - Nerve entrapment
  - Radiculopathy-nerve root-disc
  - Myelopathy-cord lesion
  - Brainstem
  - Cerebellum
  - Basal ganglia
  - Cerebral cortex-lobes of the brain

White-boarding like Dr. House

Write on the left side of the board all the findings you can explain

Write on the right side of the board all the findings that don’t make sense to you, or you cannot explain what causes them.

When the patient has seen their MD prior to DC

They are often told they have no cause for alarm or have a normal imaging study.

Ask for the written reports-never go on verbal reporting alone because patients forget or never saw the official results.

They are not offered informed consent regarding alternative options, the harms of medical care, or just doing nothing.

Medicine is good at acute presentations but the are poor at chronic medical management. Chiropractic care offers identification and support for chronic lifestyle issues that often have no accurate diagnosis code.

Many patients have already had a normal MRI of brain and seen the ER or Urgent Care

A history is still needed and helpful

An exam is still needed and useful

Other imaging and labs may help identify chronic issues.

Take those findings you do not understand, and inform and document to the patient that these are not yet explained

1

Tell patient to get a second opinion from another DC or DC specialist

2

Tell patient to see their GP if you are not sure.

3

If you suspect a clinical mechanism, write down your theory and track it for a few visits to see if you are right-if your treatment works

4

Being wrong is not a problem if you identify it in a timely fashion. Keep checking with the patient.

How to use the scientific method in clinic:

Karl Popper-Null hypothesis

- "I believe that muscle entrapment caused this paresthesia"
- Then you flip it, and state is as "there is no relationship between this muscle tension and this paresthesia"
- Now do something that challenges the null hypothesis:
  - when you treat the muscle tension and reduce it, if the paresthesia goes away you disproved the null hypothesis-your theory works

Clinical Errors are part of normal practice

Doctors are not expected to be correct all the time, especially on the first visit.

Multiple visits should refine your assessment with new evidence

Recording what you think and why you think it in the assessment section is the best defense, even if you are ultimately incorrect.

Prioritizing patient issues

- The patient should be asked what is their priority.
- The doctor may have a list of priorities that differs based on their training. Record both in the chart.
- Sometimes it takes weeks, months or years or more to get every issue diagnosed
- Even once the diagnoses are sound, the treatment responses may vary.

Most of your diagnoses will be similar

- Chiropractors diagnose spinal conditions and the vertebral subluxation complex.
- We also assess lifestyle, brain and organ imbalances that may not fit medical codes but that contribute to symptoms.

Just measure

When you do a neuro screen exam, you may find all kinds of subtle functional findings

They will usually go away after a chiropractic type treatment course of visits

Recheck periodically to see if they improve or new different findings appear. You could be chasing nutritional or toxic metabolic symptoms. This is best revealed over time.

2. Common symptoms and general brain localization

Localization

When we identify where the problem is, we call this “finding the longitudinal level of the lesion” or LLL.

In medicine, this is the level of the tumor, infarct, stroke/clot, or infection.

In functional neurology, this is the level of dysfunction, often without pathology.

(note: psychiatry confounds this terminology by using “functional brain disorder” to mean conversion disorder, or there is nothing really wrong with the brain and it is psychological. This may disempower patients with real local cellular dysfunction that will not show up on MRI but will be revealed with specific neurological testing and EEG or ERP testing.)

Common improvements

Chiropractic improves subtle finding throughout the nervous system

We expect to see improvement in

- Cranial nerves
- Peripheral nerves
- Lobs of the brain
- Cerebellum
- spinal joints
- Mental, mood and emotional regulation
- Sleep and stress tolerance
- Immune and endocrine function

Let’s look at several levels of findings and how to separate them:

Central is brain and spinal cord and cerebellum

Peripheral is the cranial and spinal nerves, and the autonomic ganglia outside the spine

These have several divisions explained in the slides below. Let's look at ways to differentiate them:

Central vs peripheral lesions

Central	Peripheral
• Heightened reflexes • Increased tone-spasticity or cog-wheel rigidity • Palsied position of arms or legs on one side or both • Weakness with disuse general atrophy	• Reduced reflexes • Reduced tone-flaccidity • Focal muscle wasting atrophy preceded by muscle fasciculations-intense twitching • Weakness from a peripheral nerve pattern

Falling-peripheral?

- When people fall, it is often the inner ear, but not always.
- Peripheral ear lesions like BPPV (ear stone becomes dislodged) may create episodes of:
  - throw patient to the ground, (lateropulsion)
  - Generate violent nausea and vomiting
  - cause massive nystagmus, (a slow phase and then fast phase eye movement in opposite direction) that can be seen by others

falling- Central?

- When people feel propelled to fall to one side there could be a central lesion
  - These have less severity of imbalance, nausea and nystagmus
  - The lesion may be on the direction of the fall, below the tentorium
  - The lesion may be on the side opposite the direction of fall, above the tentorium

Radiculopathy- nerve root lesion

Probably will have an imaging finding at the nerve root like a disc or bone spur

Nerve conduction velocity or EMG test should be positive. It helps to include the paraspinals and both limbs on this order.

Follows a dermatomal chart pattern

Reflex changes may not be obvious

Myelopathy-cord lesion

- These can be difficult to spot in some cases, especially when caused by disc bulges and central stenosis. Symptoms occur in clusters of:
  - Clumsiness
  - Loss of fine motor control
  - Changes may be positional-nausea or appetite loss
  - Walking instability
  - Pain in strange patterns; may even rise superior to the lesion with headaches
  - Weakness and muscle cramping that are not dermatomal
  - Abnormal reflexes
  - Sexual dysfunction or bowel or bladder incontinence
  - MRI report may show “effacement” of disc-to cord-disc bulge touching cord margin but not cord compression

Midbrain-mesencephalon

- Cluster of symptoms often occurs
  - Light sensitivity one or both sides
  - Sound sensitivity one or both sides
  - Cannot locate (recall) objects in space with eyes closed visually by memory or by sound
  - Convergence of eyes is weak or causes eyestrain or headache
  - Fear reaction with convergence or looming images close to face
  - Panic attacks from small triggers or startling

Pons

- Symptoms of sensory or motor face and hearing together
- Paralyses of face and or one side of body
- Sleep apneas
- Speech slurring

Medulla Oblongota

Tongue paralysis, body paralysis

Blood pressure, breathing, pulse uncontrolled

Basal Ganglia-
The symptoms are often on the side opposite the BG lesion (contralateral)

Resting slow tremors, *not as likely to have intention tremors as with the cerebellum*	Repetitive thoughts (OCD like)	Uncontrolled cursing, grunts, chirps (Tourette's like)	Slowing, frozen face, pill-rolling tremor, drooling, shuffling gait (Parkinson's like)
Cog-wheel rigidity (passively extend elbow-ratchety release)	Increased tone and stiffness	Hallucinations in advanced cases	Heavy metal and aluminum sensitive tissues

Cerebellum -usually same side (ipsilateral)

- Speed
- Balance
- Timing
- Coordination
- Gait (wide with failure)
- Pursuit eye movements (with parietal lobe)
- Stopping most eye movements
- Learning new tasks
- Resting muscle tone (not flexor dominance)

Cerebellum signs

- Most cerebellar findings on screening are problems of repeated alternating movement coordination limited to one limb or one side of the body.
- Such alternating movement problems are generally called dysdiadochokinesias.
- The problem is usually without pathological reflexes
- Most of the time the problem is on the same side cerebellum

Hemisphericity

One side of the cerebral cortex is less powerful than the other

It can cause subtle soft distal extensor weakness called soft pyramidal paresis. It shows up in the fingers and toe extensors on the same side of the brain weakness.

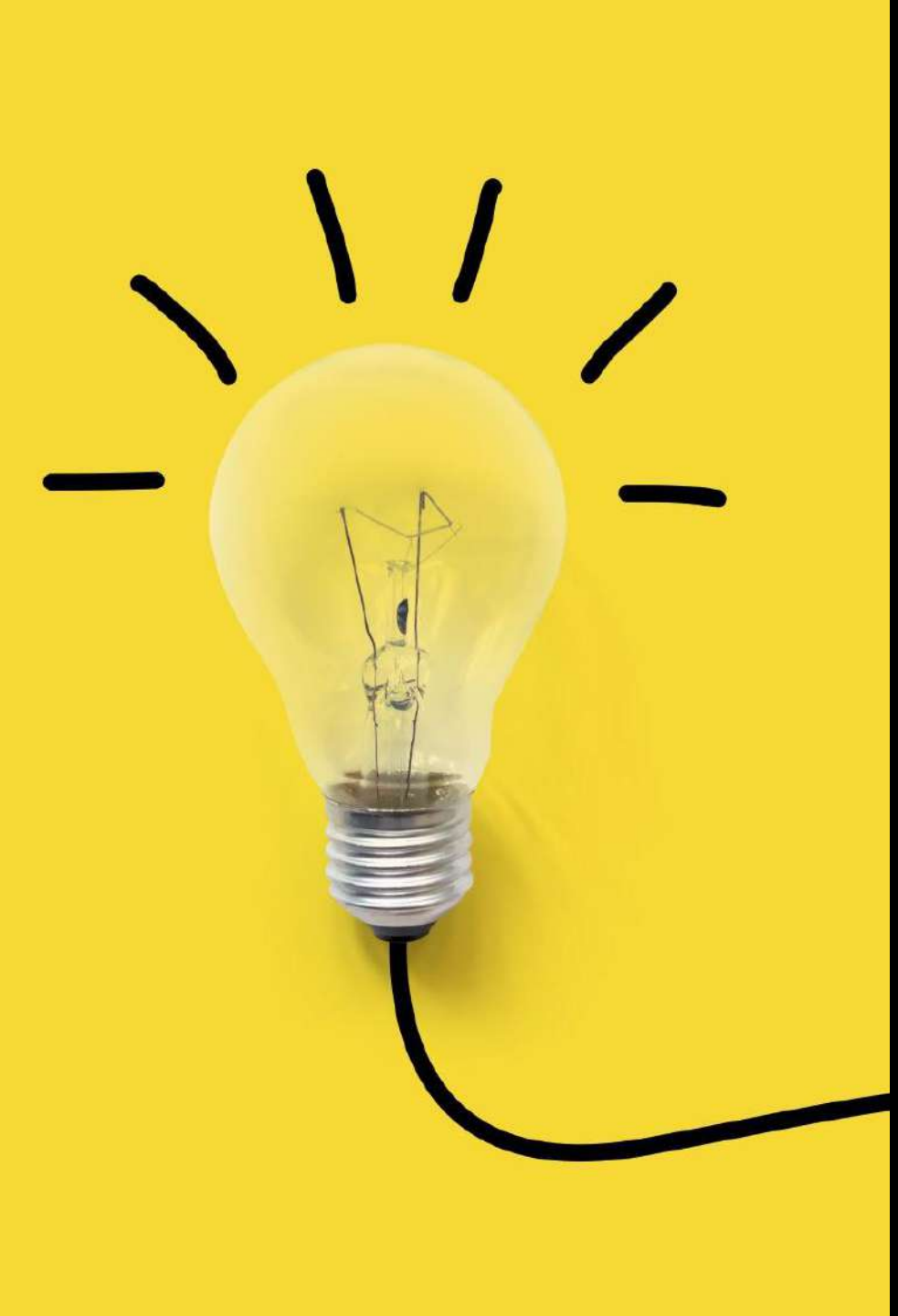
This can generate autonomic symptoms on the same side of brain weakness

For Example

- Left hemisphericity is the condition where the left hemisphere is weaker in output, amplitude or frequency of firing compared to the right.
- The weak side is named, not the strong side.
- Motor and sensory changes can show up on the side opposite the weakness
- Some findings are on the same side of the weakness

Medical term- brain lateralization

- Hemispheric lateralization is a medical and psychiatric term that is the opposite of hemisphericity.
- Lateralization refers to the dominant or overfiring hemisphere. This is implicated in normal handedness and language dominance, and also refers to pathological overfiring of the named side.
- Some may have flexor posturing at the elbow or shoulder roll*
- For example-Right lateralization would mean the right hemisphere is the dominant one or over-firing one, and the left side is the weaker.



Never rely on a single finding

- Diagnosis and localization depend on corroboration of multiple findings-some positive and some negative.
- We need more than one finding to make a diagnosis or to localize a functional lesion.

* Postural changes from subtle cortical changes

- Some signs that may indicate Hemisphericity (these are not certain by themselves-never use one single finding):
  - Anterior shoulder posturing (rolled shoulder with palm facing backward)
  - Flexor posturing at an elbow or during finger-to nose, arm raise and rebound testing

Parietal drift

When performing a finger-to-nose test, one must return the hand to the original outstretched position.

Often the hand will rotate with the palm turning more inward and even upward, and the hand drifts away from midline on one side.

This often indicates the opposite parietal lobe has a subtle lack of locational awareness. This can be related to the cerebellum on the same side of the arm drift.

Parietal drift training

- One way to approach parietal drift is to adjust or stimulate the arm that drifts to target the opposite side parietal lobe.
- We could use acupuncture, e-stim, ultrasound, laser, active movements, vibration, temperature and other stim to see what works.
- We must start with gentle stimulus or adjustment and recheck.
- It is possible we could overstimulate the parietal lobe and the drift would get worse.
- If we are correct in our functional target, and our intensity of adjustment, the parietal drift should reduce.

Hemisphericity phenomenon-one side of the brain fires less than the other

Side of weakness may have autonomic escape (excess unnecessary firing of autonomics-often both sympathetic and parasympathetic)

Side of weakness (ipsilateral) may have SOFT subtle pyramidal paresis-this means no spasticity, just hemi-weakness or paresis of extensor weakness, especially distal-cortico-spinal fingers and toes

Hemisphericity-the autonomics *(see my autonomics course)*

With intact CNS the autonomics are equally activated bilaterally

The autonomics are divided down the middle of the CNS and sometimes are not activated equally on both sides.

The side of weakness tends to have same side sympathetic escape (ipsilateral finding)

Most findings will be sympathetic-temp, sweat, edema,

Some can be para-sympathetic-gut noises and motility, lung sounds, secretions, but these are not usually one-sided except in Vagus swallowing weakness which may be one-sided

Hours 3 and 4 will be mixed

- Localization and therapy are not combined in medicine or orthodox neurology.
- Localization/diagnosis and therapies or brain training are often intimately applied together in chiropractic.
- The DC readily uses therapeutic trials during an exam to test pathways for integrity
- The DC likewise readily shifts back to testing mode during treatment, testing pathways in the middle of treatment even though it is not a full “re-examination visit”

3. Review neuro testing options

4. Match subtle symptoms to subtle findings even in “medically normal” patients

Rules of Thumb

- We are going to go over many tests and functional brain training options below.
- Diagnosis and assessment is about probability-odds. Total diagnostic accuracy is impossible even after autopsy.
- These are all clinical rules of thumb, also called a heuristic.
- They are about probability of helping and are not exact or 100% reliable. You may need an expert when they do not work. They will not work for everyone.

When training brain exercises or adjusting

If they do not tolerate an exercise or adjustment, make it easier for them.

If it is an exercise, change the distance or slow it down, or do fewer reps.

If it is an adjustment, move your adjusting to vertebra further distal (inferior) from the atlas, or ribs or extremity bones.

Brain Therapy Options

When a subtle change is found, we can use the adjustment and trivial stimuli to modify brain firing.

Whatever intervention you try, retest the finding and see if it got better, worse or the same.

Some people will respond to almost anything, and others will require precise targeting of location and frequency of firing rate for rehab.

Neuro rehab exercises-general concepts

- Just a few reps per set, then rest for a minute
- Do not overdo the first session with them until you know how they tolerate that night and the next day
- Look carefully for failure of the task or autonomic changes like respiration, sweating, tears, stomach sounds increase, or pains in the face or abdomen, tingly face or extremities or other odd responses
- These are trivial actions that should not be taxing to the brain, so any stress from these tests is significant.

How plasticity works in clinic

Overall, during rehab we want to find a speed and distance that they can perform nearly normal, less than the speed and distance during testing/screening

This goldilocks zone is just right for building plasticity, but it will fatigue if pushed too hard.

It will improve function with reps if the exercise is slow enough or the right distance is found. These will change each session and may revert some visits and advance (improve) during some visits.

If only one side fails, you only need to rehab that side! (except convergence-just stop when one eye fails and train the weak eye)

Choosing training exercises

1. Any exam procedure can be converted into a rehab exercise
2. Just identify the side of involvement
3. Then have them perform the exercise slower and smaller than the exam procedure
4. Keep their activity below the threshold of failure if possible
5. Stop reps as soon as they begin to falter
6. Let them rest for a few breaths and try another set.

Testing and failure types

- *When rehab is going on, watch for failure of the task, but also watch for the task to be normal but autonomic escape occurs. Such as tearing of the eyes or redness.*
- *You may need to address a separate autonomic issue.*
- *This topic is for another course, see Backtochiropractic.com*
- *See my brief video explaining this problem:*
  https://www.youtube.com/watch?v=PRZg0Mw3zQY

Pathologic reflex screening

- Clonus
- Babinski sign heel scrape
- Withdrawal reflex
- Hoffmans test
- Resting nystagmus
- Resting pupils
- You may be surprised to find that some pathologic reflexes can resolve over time as people heal or reverse their disease. This inconvenient truth is a secret of chiropractic that is often suppressed in medicine.

Pathologic reflexes

These are reflexes that indicate a pathology in a motor pathway in the central nervous system white matter tracts, or upper motor neuron signs.

These generally all show lack of central inhibition and show excess motor signal outputs that are not typical in normal presentations.

When seen on one limb, the lesion should be expected to be on the same side spinal cord, or the opposite side brain

Clonus

- When the ankle is passively flexed and held, it should not move.
- With motor nerve pathology of the CNS-the foot may repeatedly flex and extend, wiggling back and forth forcibly and rapidly.
- Clonus on one side means either damage to the spinal cord on the same side, or to the brain on the side opposite or both.
- Sometimes this reduces over time, and can be variable with different diseases and treatments.
- Brief 2 beat clonus of both feet is common with magnesium deficit

Heel scrape-Plantar reflex

- The heel is scraped toward the big toe firmly with a hard, blunt object-not too sharp.
- We look for the toes to flex downward in the normal adult and child
- Newborns will have a normal upgoing toes with fanning spread toes response till around 3 months age or so until the nerves mature enough to go down
- If the toes go up after 3months on one side, we have a lesion likely on the same side spinal cord or the opposite side brain or both.
- Both toes can indicate a larger lesion or metabolic or immune disorder.

Withdrawal reflex

- The flexor reflex afferent is the pulling away of the foot from a painful stimulus.
- Heel scrape is often noxious enough to stmulate this
- The reflex is the triple flexion of the ankle, knee and hip
- It can be diminished or exaggerated
- It should be symmetric side to side-small variations can indicate subtle functional neurological imbalances, and should improve as you treat.

Hoffman’s test

- Flicking the fingers should not drive a motor response in the normal patient. No reaction is normal
- Pathology of the CNS makes the fingers flex and thumb flex when the fingernail is flicked or pulled
- If only one hand has this sign positive, the lesion is on the same side of the spinal cord or opposite side of the brain.

Resting nystagmus

- At rest eyes open the eyes should be still while gazing at a target and then jump to other targets. That jump is called a saccade.

- Nystagmus is defined as both a fast and then a slow alternating eye movement usually of both eyes together.
- At rest, nystagmus is usually abnormal.
- During head or body turns or visual moving stimulus, nystagmus is normal
- When people look and hold their gaze to one side, they often have a small normal nystagmus.

Resting pupils

- Pupils at rest should be equal, round and the pupils stable.
- Response to light is different than at rest.
- Have them fixate their eyes on a target on a wall-not on you
- You are too close to them, and they will accommodate, converge and their pupils will constrict.

Resting pupils-what is hippus?

- In normal unchanging light, the pupils should be equal to each other and round and appropriate to the conditions of light.
- Pupils should not alternate open and closed at rest in ambient light. This is likely pathological or abnormal hippus.

- When shining a light at the eyes, we often see changing pupils in response to the sustained light held at the eye. This is common and functional hippus, and is not the same as resting hippus.

Easy Exam choices for the brain and spine through the eyes

- We will go through several visual tests that may be related to spinal subluxation and brain that you can perform easily:
  - Pursuits and saccades and anti-saccades
  - Convergence
  - VOR Vestibulo ocular reflex
  - COR cervical ocular reflex
  - Post-rotatory nystagmus or vertigo
  - Cycloversion
  - Quadrant testing-Finger-nose-finger visual and recall testing
  - Finger nose finger sound localization
  - Halmagyi's head thrust modified

Basic neuro exam

- Screen through the motor testing of the muscles of the face, upper extremity and lower extremity and record weakness
- Screen sensory testing with cold metal (room temperature) and light touch of upper and lower extremity and face-record changes
- Look for subtle loss of cold or light touch below the wrist and ankle in all 4 extremities compared to the forearm and calf. This occurs without pathological reflexes.
- This is common and may be called stocking-and-glove sensory reduction of one sensory modality.
- It often can indicate heavy metal toxicity or deficit of trace minerals/electrolytes or B complex vitamins in the peripheral nerves.

Chiropractic neurological screening

This is visual-spinal and brain visuo-motor screening related to the CNS and PNS

It is not ophthalmology, optometry or behavioral optometry

You may refer for these specialists.

Pursuits screening

- When the head is still, and the eyes track a moving object this is called pursuit. Use a + and x pattern at arm's length fast moving. The target should move around 2 feet in excursion.
- *It is largely a cerebellar function, although there is a parietal lobe component to it, and other areas as usual.*
- Normal pursuits are smooth and linear.
- Abnormal pursuits have skipping or jumpy jerky eye movements
- Some people recruit head movements to compensate, and you may have to hold or have them hold their head still in some cases. This indicates functional weakness.

Using pursuits as rehab

- Move your finger slower and cover less distance. Try to make the task easier for the patient to perform without jerky eye movements.
- Do not get closer to them, if anything, put the target farther away.
- Do fewer reps and let them rest between sets. They should gradually improve and get a bit faster and longer excursion with smooth eye tracking.
- Lie them down on their back and try again to take out gravity effects on the brain
- They will suddenly fail when fatigued. If they get better after rest, you can keep training.
- If they stay worse even after a rest, you may be done for an hour or so before you can make more progress.

Saccades screening

- Specialists will tend to use machines to generate targets and measure eye movements. This is the frontal eye fields-lateral to top aspect of frontal lobes.
- “Bedside examination” is simply giving them your 2 thumbs about ear-distance apart in + and X patterns and ask them to hold their head still and use their eyes to jump from one thumb to the other and back again.
- You can have the go as fat as they can,
- And you can also call out when they should jump to the next target.
- Normally people can do this fast and accurately for many reps before fatiguing.
- Abnormally, they may slow and miss a target or get stuck on one target and not the other.

Saccade brain training

- To make this task easier, move the 2 targets closer to each other in central vision.
- Do fewer saccades per second-go slower.
- Lie them down on their back and present the same eye movements to take out gravity effects on the brain.
- They should get mildly better at the task.
- When they fatigue, they will get worse and need a short or long rest.

Anti-saccades screening

- Anti-saccades are challenging to the frontal lobes.
- Present your 2 thumbs as targets to them in front of your face with your nose between
- Instruct them that when you wiggle one thumb, they look at THE OTHER thumb and back to your nose. Alternate your thumb wiggle randomly.
- If slow enough, there should be very few errors.
- If impaired, they may have lots of errors repeatedly even when slow.

Anti-saccade training

- Move the targets closer to each other
- Slow down your commands to saccade
- Allow them to lie on their back to perform these to take gravity out (you will have to stand above them and hold up your fingers)
- Allow them to wait a beat after your thumb wiggle to hit their target

High convergence

- For high convergence: Bring your finger to the glabella (above the nose between eyebrows) slowly asking them to focus on the finger until they see double. Move in a high arc so they have to look up at the finger. Keep the head level.
- You will see one or both eyes fail to hold in most cases as the eyes cross.

- High convergence is CN3-midbrain/mesencephalon

Low convergence

- For low convergence: bring your finger in a low, slow arc to the tip of their nose so they must look down.
- Not how far away from their nose they fail. Most people can normally go to about a fists distance from their nose before failing.

- Low convergence is CN4 midbrain/mesencephalon

Convergence training

- Often people will have one worse than the other-high or low, and one eye worse.
- Train them slowly to the very point of failure, then back off slowly but immediately and ask them to tell you where their vision fuses into one image again.
- They should improve with reps and rest if you keep the rehab in the range of normal convergence.
- They will suddenly fail with fatigue when they cannot learn any more for that session. They may need rest, food or sleep before they can train again although most people can train again in 30-60 minutes easily.
- Repeat to tolerance.

VOR vestibulo-ocular reflexes (dolls-eye)

- The patient is seated in a rotating chair or stool and asked to keep their eyes on a fixed target. I like a business card at arm's length with words on it they can read. They can wear their glasses.
- Their head should not turn, just the chair and their whole body.
- Turn the chair in both directions and watch their eyes.
- Their eyes should be able to track a business card and read the words without it getting blurry, and without falling off the target.
- One direction may be worse than the other.

VOR rehab

- Do the turns slower
- Do the turns only in the direction of failure
- Do the turns much less of an arc-turn them less distance from midline.

- They should gradually improve with short rests and small sets until sudden fatigue.

Failure to perform task=fatigue means they are done for that session.

COR cervico-ocular reflex

- This is turning the neck joints while watching a fixed target. I like a business card they can read at arm’s length.
- The patient looks at a fixed target and keeps focused on it
- They turn their head side to side while staying on target
- They should lock on and not see blurry words either direction
- You watch for eyes to slip off target
- Ask them to tell you if it gets blurry
- One side turn may be worse than the other

COR rehab

- Ask them to turn their head slower
- Ask them to move their head a shorter turn from midline
- Turn their head for them passively
- Repeat until fatigue

Post rotatory nystagmus, vertigo or persistence

- Place patient in a rotating chair with eyes closed
- Turn them one full turn and stop them (tell them to keep their eyes closed even after you stop turning)
- Tell them you stopped them and ask if they still feel like they are turning
- Ask them which way and for how long
- Watch their closed eyes for possible nystagmus (fast and slow movements) that will usually stop in a few seconds or when the eyes open.
- Do the other side too
- Normal should report no post-rotatory false sense of movement or nystagmus observed.

Post-rotatory vertigo rehab

- Seat them in chair and turn them slower than testing speed
- Turn them less degrees from start before you stop. With reps, this sensation of false movement after a turn should stop. It only works with eyes closed.
- Ask them to open their eyes if the post rotatory vertigo is severe or if it lasts longer than a few seconds. This should stop it.
- Do the other side if it is also affected.

Cycloversion testing

- Have them read a business card at arm’s length with the head helod level
- Then tilt the head as far to one side as possible comfortably and ask if the words get blurry when bending away and back to midline.
- Look for ratchet eyeball rotations in both eyes as they roll their head to the side, and back to upright.
- Check the other side bending too

Cycloversion rehab

- Have them look at a card and bend the head less degrees to the side of symptoms, and more slowly. Find an optimal speed and distance that they can perform properly.
- Repeat reps to tolerance with improvement
- Stop with fatigue

- This is a midline cerebellar function

Quadrant testing-sensory aspect concepts

- For the next few screening tests, we divide the space in front of the patient into 4 equal quadrants-upper left, upper right, lower left and lower right. The upper and lower are divided at eye level and the left and right are divided at the midline.
- The left and right fields in space are processed and localized in the parietal lobe opposite the side of presentation

Quadrant testing-motor aspect concepts

- For the next few tests, the patient will reach out and touch the stimulus in space using vision, memory, or sound localization.
- The motor part of using an arm, hand and finger to touch is controlled by the opposite frontal lobe.

- Sometimes the patient fails more on one side of stimulus presentation, without hand difference. That is more a sensory failure in the opposite parietal lobe.
- Other times the patient tends to fail with one hand more whether the stimulus is right or left side. This is more a motor lesion of the opposite frontal lobe.

Quadrant testing
Finger-nose-finger eyes open screening

- Stand in front of patient and seat patient in front of you and ask them to look at a button on your shirt at eye level for this test.
- Have them keep their eyes on your button and present your fingertip to each of their 4 visual quadrants one at a time.
- For each finger, they will take their L hand and touch your finger with theirs and return their finger tot heir nose and do it again until you are satisfied.
- Do the same with their R hand-they will reach out and touch your finger in each quadrant.
- Record normals and misses. They should be able to touch your finger on all 4 quadrants with each hand.

Quadrant F-N-F visual target rehab

- In one side of their body is the most errors with either hand, the problem is likely on the opposite parietal lobe
- If the problem is only with one hand, the problem is likely on the frontal lobe opposite the failing hand.
- Rehab any poor placements with either hand or either side until they improve. Stop if they fatigue.

Quadrant testing
Finger localization-eyes closed visual recall screen

- For this one they see your finger you show them (eyes open) in one of each quadrant seated in front of you, one at a time. Keep your finger in each quadrant spot until they close their eyes.
- Then they close their eyes and reach out to where they remember the target to be.
- Do both arms all 4 quadrants and see if they can touch your finger waiting there for them.

- *This sensory component is the opposite side occipital and parietal lobe and superior colliculus of the tectum, also called corpora quadrigemina of the midbrain*

Quadrant visual-recall rehab

- Have them seated in front of you, let them see where you place your finger in each of the 4 quadrants-
- Keep your finger in the same spot while they close their eyes and try to touch your finger with each hand.
- Do all 4 quadrants with each of their hands. Repeat with the problem spots or hand. Let them look at the hand directly before they close their eyes.
- Normal should be able to find and touch each point with each hand in 4 quadrants one at a time. Record fails and see if repetition makes it better or worse.

Quadrant testing
eyes closed auditory localization screening

- Sit patient in front of you, have the close their eyes. Put your hand in one quadrant and make a finger rub sound (or jangle keys ir crinkle a small piece of paper) so they can hear where it is.
- Hold your hand in the same spot while they try to touch your hand with their finger, on each hand in all 4 quadrants.
- They should be able to find the target based on sound localization.

- *This sensory processing is the opposite side temporal lobe and inferior colliculus of the tectum-posterior midbrain.*

Quadrant sound rehab

- Give them more time to listen,
- Use keys or crinkle paper or a plastic water bottle instead of finger rub
- let them turn their head side to side and tilt forward and back as they listen. The goal is to find the sound location.
- Let them find the same spot several times with reps. Do not move the target. This may help teach them to localize better with reps
- Make sure the room is quiet and not too much echo
- Check the ear canals for wax

Halmagyi's head thrust modified

- This test is a great test for peripheral vertigo. The head is held by the doc and the upright head is turned rapidly a short distance to each side by the doctor while the patient looks steadily at the doctor's nose.
- Normal should be the eyes stay directly on the nose for both sides turning.
- We DCs modify it by turning the head to one side first, and then we do the rapid head turn (head thrust) back toward the midline.
- Record which side direction of thrust the eyes lose target
- Record which direction the eyes fall off the target
- All notations are made to patient reference (the patient head thrust left to right, the eyes fall off the target to the patients left of the target)

Halmagyi's follow up

- If this test is positive, we know one or both inner ears are highly likely to be involved. We need to refer for inner ear evaluation which is usually a VNG video-nystagmography.

VNG video-nystagmography.

- VNG is a neurological referral where they test warm and cold air in the ears, spinning chair, moving lines, and other vestibular testing.

Cerebellar screening

- Rhomberg
- Arm raise and rebound
- Finger tapping, tall tapping
- Rapid alternating hands
- Hand flipping
- Finger to nose
- Heel to shin
- Foot tapping-single, alternating and together
- Fukuda marching
- Single leg standing eyes open and closed on firm floor
- Single leg standing eyes open and closed on foam surface or mini-tramp

**These are generally cerebellar tests, but not exclusively*

Rhomberg

- Patient stands on firm floor with shoes off, eyes closed
- Arms can be at side or outstretched
- Feet should be touching but can be spread for elderly or unstable, or for valgus knees.
- Diabetes or sensory loss in the legs will affect this test
- It is generally a cerebellar test, but not exclusively
- They should not fall for 30 seconds

Rhomberg on FOAM

- Same test performed on FOAM no shoes
- 10-30 seconds assessment of fall
- Moving a foot off its mark is a fall technically

Arm raise

- Patient stands eyes closed arms at sides.
- They are instructed to raise both hands out in front of them level
- Check to see if the arms are not level
- The lower arm side is named as the problem –same side of the cerebellum

Rebound testing

- After arm raise, the doc pushes down on each arm looking for soft, spongy weakness on one side more than the other,
- Patient is instructed keep the arms stiff and resist the doc pushing downward
- Weak side is named as the same side of cerebellar weakness

Finger tapping

- Patient holds up fingers and taps finger to thumb on both sides
- Compare sides
- Slow, clumsy side is the lesion-this is same side lateral cerebellum
- Try different fingers and fast tapping

Tall tapping screen

- This is a movement disorder screen; the patient points the index and thumb and folds in the other fingers
- They put arms to side, elbows bent, and point the index fingers up to ceiling in a Roo's test posture
- 10 times they tap closing fully and then opening fully before the next rep as fast as possible
- Look for slowing, or incomplete opening of the finger and thumb between taps
- Look for asymmetry and name the poor side

Tall tapping next steps

- Tall tapping failures require more work up for basal ganglia or movement disorder, detoxing, or other rehab.
- It can be an indicator for Parkinson’s progression or oxidative phosphorylation impairment of energy production

Rapid alternating hands screening

- The patient reaches their arms and hands forward with straight elbows, keeping their fingers and thumb together, not spread
- Do not let the arms or hands touch each other
- Ask patient to flip their palms all the way up to all the way down as fast as possible
- Watch for flapping, wrist or elbow bend, slowing, finger spreading especially on one side more (this is DDK or dysdiadochokinesia-decomposition of repetitive movement-a cerebellar sign)
- The action should be at the shoulder-yes shoulder injuries may confound this test,

Rapid hands rehab

- The side of slowing may be used for rehab-slow down the action until it looks normal, and just do that side
- This should improve with reps and gradually get faster.

Hand flipping screening

- Ask patient to place one hand on the other with elbows bent in front of their chest/belly both palms up
- Asl them to hold the bottom one still and flip the top hand fast
- Do not let them roll the hand on the blade (pinky) edge of the top hand-make them pick up the hand and place it each time like flipping a burger or flapjack.
- Look for slowing on double tapping on one side more than the other

Hand flipping rehab

- The weak side be rehabbed by going slower until the movement is normal
- Gradually speed it up with short sets of a few reps with rest between
- They should improve with reps

Finger-to-nose

- Patient closes their eyes and with outstretched arms/hands, they are instructed to touch their finger to their nose and put it back,
- We DCs start with the pinky first, to detect more subtle changes as the pinky has less cortical representation than the other fingers and thumb.
- They may miss their nose, or overshoot and hit themselves with surprise. This is hypermetria
- They may not go far enough and cannot find their nose for a bit, this is hypometria
- Both are cerebellar findings generally, relating to surface and deep parts of the cerebellar circuits

Finger to nose

- Rehab with finger to nose works well.
- Take the bad side and ask them to do the exercise repeatedly and slowly.
- You can help by touching or brushing their face or hand between runs to activate sensory pathways

Heel to shin

- Seated, the patient will be shown how to run the heel down their other shin to the foot in a straight line along the shin bone on both sides
- They will do this with their eyes closed

Heel shin rehab

- Work the weak side repeatedly but slow enough to do it correctly before you speed it up.

Foot tapping

- 3 parts-seated one foot
- Then both feet together
- Then both feet alternating
- Be sure to have their heel a bit in front of their knee, not behind or it is difficult to tap the foot
- Keep the heel on the floor and try to make sound of tapping fast
- They will lose rhythm and movement will be irregular or slow on one side

Foot tap rehab

- Work the poor side with slower, rhythmic tapping before speeding up
- Going too fast and having irregular taps is not therapeutic.

Fukuda marching

- Stand up eyes closed and high-step march in place for 30 seconds
- See if they turn or slide to one side or front or back as they march
- Greater than 90 degree turn can be significant
- No shift or rotation is ideal while marching
- This is a vestibular test.

General concepts of balance rehab

- The following tests measure balance in different conditions, especially eyes closed. All tests should be able to be performed for 10 seconds without falling. A fall simply means shifting the support foot or touching the lifted foot to the ground.
- Be sure to be able to catch the patient so they are not injured.
- We cannot really train people standing with their eyes closed, so when we go into training brain and cerebellum rehab mode we have to do it eyes open.
- This may use a soft ball or rolled sock to play catch on each side while balancing to tolerance.
- Don’t push them too hard-rehab is best for plasticity when it is slow enough to be performed normally and with good stability.

Single leg standing on firm surface, eyes open

- Like Rhomberg, 10 seconds on each leg
- A fall is when the foot touches the floor or the support foot shifts its position
- Ankle wobble is normal
- Hip or shoulder wobble is not ideal

Single leg standing on firm surface, eyes closed

- Do each leg, shoes off
- Do not let them fall or get hurt

Single leg standing on FOAM surface, eyes open

- Foam is more unstable- as with all unstable exercises be ready to support them in case of a sudden fall without warning
- Shoes off

Single leg standing on FOAM surface, eyes closed

- Shoes off
- Falling and twisted ankles are possible-be careful

Regional brainstem Cranial nerve localization

Base of brain	Directly out of the brain and chiasm=CN 1 and 2: olfactory and optic nerves
midbrain	Out of the midbrain, mesencephalon=CN 3 and 4: oculomotor and trochlear nerves
pons	Out of the pons=CN 5, 6, 7, 8: trigeminal, abducens, facial, vestibulocochlear nerves
medulla	Out of the medulla=CN 9, 10, 11, 12: glossopharyngeal, vagus, spinal accessory and hypoglossal nerves

Other easy rapid tests for cranial nerves and spinal nerves:

Cranial nerves

1. Olfaction
2. Fields of vision

3,4,6 Planes of gaze

5 chewing

7 face expressions

8 finger rub screen of hearing

9-10 gag

11 shrug shoulders

12 tongue thrust

Motor testing

- Test all the actions you can think of in the UE and LE from distal to proximal
- Record what you test on your template and do it the same every time
- This can be done rapidly and recorded by the muscle or the action. You don’t have to list nerve roots.
- Compare subtle right to left findings for your functional workup. Orthodox medical providers will consider this trivial and insignificant, but it affects function

Sensory screening

- I like to screen with light touch (tissue or cotton wisp-not fingers or fabric)
- And cold metal room temperature
- Compare subtle functional differences side to side and proximal to distal in each limb and compare face to arms to legs.

- You can always add crude touch, vibration, pinwheel and 2-point discrimination later

CN I-olfaction

- Have them hold each nostril and compare both sides of smell eyes closed
- Use coffee or scented lip balm or some common smelling agent
- Ask them to identify the scent
- Then ask them if one side is less than the other
- Ask if they have been congested lately
- Olfaction tests the same side of the brain-no cross-over pathways

CNII-fields of vision

- Cover one eye at a time
- Bring your wiggling fingers into their view from behind their head in 4 quadrants
- Be sure they keep their eyes focused on a target in front of them

CN III,IV,VI-planes of gaze and conjoined gaze

- Both eyes should be teaming together in all planes
- Have them look in an X and + pattern from the midline
- Some advanced docs use and H pattern for differential diagnosis

CN V-chewing

- Muscles of chewing are CN 5 trigeminal
- Muscles: Temporalis above the ears and masseter at the cheeks can be palpated with clenching

CN VII-facial nerve expression

- Have them raise eyebrows
- Make fish lips (purse lips)
- Smile and frown
- Wrinkle their nose

CN VIII-hearing screen finger rub

- Rub fingers together near each ear and ask if it sounds the same on both sides
- Refer for hearing tests-audiology is everywhere, and hearing is involved in early brain degeneration and in vestibular problems

CN IX,X gag

- DCs do this on each side of the tongue gently looking for subtle differences side to side
- Start distal at tip of tongue, ask them to stick out tongue and check the palate first
- Then take tongue depressor or clean disposable spoon and touch the tongue gently but firmly on one side, working your way to the back
- Tell them to tell you when they first feel the gag like sensation, do not choke them at first like in the medical offices.
- Compare where on the tongue on each side the gag reflex is produced
- It is often asymmetric functional imbalance, or bilateral loss of gag, or bilateral exaggerated gag reflex.
- Ask about history and correlate this reflex with their history

CN XI-shoulder shrug

- Ask them to raise each shoulder against resistance
- Record asymmetry

CN XII-tongue thrust

- Have them stick their tongue straight out at you
- Record if there is tongue deviation
- Hypoglossal nerve damage or medulla XII nucleus imbalance is on the same side as the deviation of the tongue

Basal ganglia screenings

- Hand clapping 3x
- Striatal hand posturing
- Resting vs. intention tremor observation
- Cog-wheel rigidity vs flexor rigidity during passive extension
- Dance-like movements-involuntary twitches
- Timed up and go test TUG

Hand clapping 3x

- Ask patient to clap their hands together 3 times fast and stop
- Normal will be able to stop
- Abnormal finding is continued clapping past 3

Striatal hand posturing

- When the arms are held out to the side, under the chin, or outstretched for cerebellar tests there may be flexion of the wrist with the fingers extended normally
- This wrist flexion is often one sided
- It may indicate a striatal hand that points to the basal ganglia/ striatum on the side opposite the hand
- This can sometimes indicate emotional volatility and other basal ganglia involvement or even heavy metal exposure, as the BG is sensitive to heavy metals and aluminum

Resting vs. intention tremor observation rules of thumb

- Resting tremor must be tested at rest, not holding the arms up.
- Resting tremor tends to originate in the basal ganglia opposite the limb tremor
- Not all tremors are Parkinsonian

- Intention tremors are activated by movement. The hand or head may shake worse as the hand moves closer to the target (grasping a cup or moving a fork to the mouth)
- Intention tremors tend to originate in the same side cerebellum

Dance-like movements-involuntary

- There are several types of similar resting movements that are involuntary. Some are smoother and some are jerky and sudden.
- They are chorea, ballismus, tremor, myotonia, tardive dyskinesia, flapping, asterixis, dystonia, athetosis and they are usually caused by lesions of different sites in the basal ganglia and lower brain.
- They can be poisoning and medication reaction too.

Timed up and go test TUG

- Sit back in a chair
- Get up and walk 10 feet
- Turn around and come back to chair
- Sit down again in the same chair
- **>12 seconds is a high risk for falls (CDC)**

5. Imaging and testing options for chiropractic

Adjunctive spinal care- we need stiffness not flexibility sometimes

- Spinal stabilization is a problem described by Stuart McGill, Ph.D.
- His work developed from helping power lifters with blown discs recover by getting stiffer, not more flexible.
- Flexibility without stability may be overrated.
- Deep spinal muscles may be sloppy and uncoordinated in tone, so global muscles overcompensate by having higher tone.
- The DC may be fooled into thinking the patient is too stiff because of the compensatory global muscle tension that is surface and palpable,
- Yet the actual vertebrae move sloppily with poor axis of rotation and destroy and degenerate the discs and joints.

Stability training- Stuart McGill

- McGill advocates the big 3 exercises/assessments:
  - Supine roll-up-curl up
  - Side plank or side bridge
  - On hands and knees- bird dog or superman

X-Ray

- Lying down, upright, or motion (flexion-extension) x-rays tell us different information, best for bone and ligaments when range of motion is tested.

MRI

- 1.5, 3 or 7 Tesla magnets can give us increasing resolution
- Gadolinium contrast media can have serious side effects in some. This is used for pathology and less useful in general chiropractic applications
- Upright MRI can reveal weight bearing changes
- imaging centers offer surprising cash pay discounts

CT computerized tomography x-ray

- CT has thin slice for bone available in the teeth and inner ear
- SPECT brain helps show metabolism, but requires radiation
- CT heart calcium score can help with vascular risk

EEG

- EEG is electroencephalography. It measures brainwaves through the skull. The patient wears a cap with sensor electrodes in it.
- Medically the EEG is used for seizure and sleep differential diagnosis. The patient goes to a neurology department or a sleep lab for the study. A neurologist or epileptologist reads the tracing.
- Hyperventilation and strobe lights may be used to induce seizure complexes and a crash cart is present in case of dangerous seizures.

QEEG

- Quantitative electroencephalography takes raw data and analyzes it statistically. Tables, graphs, and charts are created from the raw data tracings of the waves from each sensor. The patient sits still with eyes closed and then eyes open doing nothing.
- This is not done to detect pathology; it is done to measure the resting state in medically normal brains to guide conservative care like neurofeedback. It is read by psychologists, counselors and chiropractors. There is a large body of research on this. This can measure improvement over time.
- Some clinicians use a database of many people to compare their patient to. This is not required but can be useful.

ERP

- Event related potential is an active brainwave test. The patient wears a cap of sensors like in EEG and QEEG.
- They respond to visual and sound stimuli and their responses are measured. This also has a huge body of literature behind it.
- The time of response and the electrical power and location of responses is recorded and compared to normal databases. A common metric is N100 and P300 responses.
- This can measure improvement over time.

VNG

- Video-nystagmography is a test that is the gold standard for vertigo and dizziness diagnosis.
- The patient wears goggles that have night vision. The patient cannot see during some of the testing.
- They will measure eye movement responses to
  - Spins in a chair and head tilts
  - Cold and warm air in each ear
  - Moving lines on a screen
- This tells the difference between central and peripheral lesions.

6. Treatment planning

Tolerance

Stop	If your brain exercises are not tolerated or trigger autonomic responses, stop, explain to the patient that this is a fragile pathway and refer for a chiropractic neurological eval and second opinion.
Respond	Most people will respond well to brain-based exercises and adjustments.
Detox or take	Some will need to detox or take supplements or change their macros in their diet before they can tolerate brain exercises or some adjustments.

Treatment Plans

- I tend to pick the worst findings and track them closely every visit. This is not a full re-exam every visit, but I want to know if the finding changes quickly or not.
- Even subtle findings change in quality or fatigue from visit to visit.
- I tend to plan first phase goals for the first few days and weeks.
- Then other goals set for several weeks or a few months out.
- This is a blend of their goals and mine. It is a negotiation.

Daily visit planning

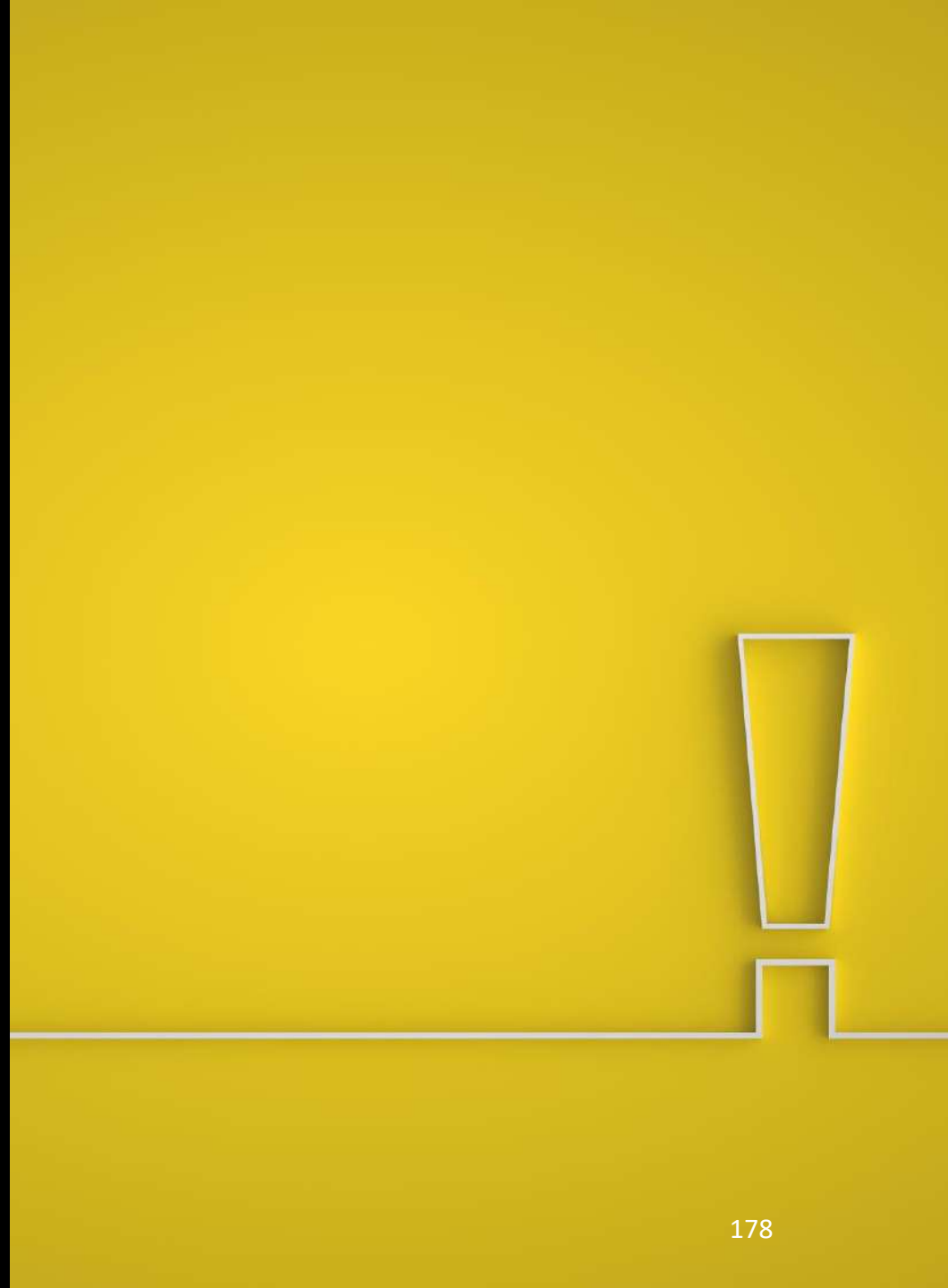
I ask for the worst thing first in every visit.

From here I can perform and record these:

- manage referrals,
- Note changes in patient priorities daily or weekly
- Rate severity/intensity, frequency and duration of symptoms (mini-OPQRST question)
- Praise them for what has improved
- Check their home care exercises
- Treat their spine and brain
- Tell them about diet or supplement changes I want to make

Expectations-prognosis how long will it take to heal?

- The doctor's expectations are important to communicate with the patient.
- This is not to dictate what must happen
- It is aimed at educating them that "if we are correct, then we should expect your symptoms to heal about this fast and in this order".
- That keeps us on track for expectation and allows us to catch more serious underlying conditions or co-morbidities that we missed at first.
- Plan on uncovering more issues as visits go by.



Protein in neurons

- Neurons are mostly fat and protein
- Don’t forget to ask about healthy intake of clean saturated fats and omega 3, EPA and DHA fats
- Ask about protein consumption
- Half life of protein is 7-14 days, so recovery should take only several weeks, not many months to years if there is no pathology or toxicity
- Most pathology and infection can have a toxic exposure component of it.

Lab tests for neurotoxins

- Hair testing for chronic heavy metals exposure
- Urine testing for glyphosate. This is not just an herbicide it is used as a drying agent for cut crops in storage
- Urine testing for commercial toxins such as dry cleaners, gasoline, nail and hair solvents, flooring and furniture chemicals, and organophosphates
- Organic acid and amino acid urine testing for brain and gut metabolism
- Dutch urine for adrenals and sex hormones and metabolites
- Great plains lab
- Genova lab
- DHA lab-Dr. William Walsh panel for mental health
- SNP testing for Dr. Amy Yasko metabolic intolerances
- Many others

Scheduling

Patients may require more supervision as their neurology changes.

Chiropractic neurological rehab should be dynamic and change rapidly. This requires modifying the brain exercises frequently.

This is the opposite of the typical programmed PT protocols they are used to where nothing changes for a long time.

Once they learn enough about their brain, the patient can reduce the visit frequency

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Timeline template