



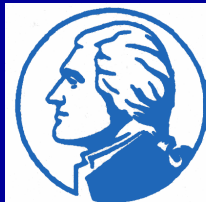
# Migraine Management in Otolaryngology

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John Carey M.D.

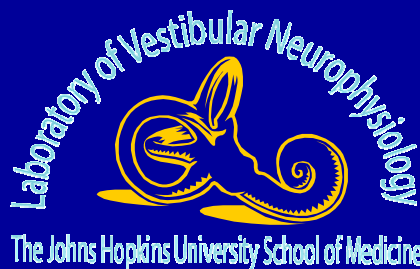
AAO-HNS Annual Meeting, Washington, DC September 2007



**CHRISTIANA CARE**  
HEALTH SYSTEM



Thomas Jefferson University | Jefferson Medical College

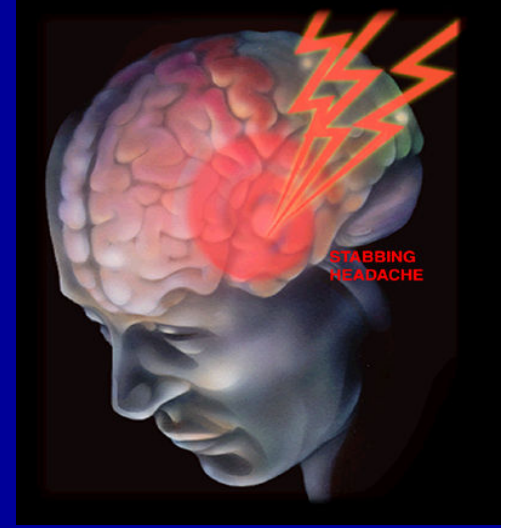


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Wilmington Delaware and Baltimore Maryland, USA



# The Migraine Patient in Otolaryngology Otalgia



- 55 y.o. Female with otalgic pains “as if an ice pick were in my ear”
- History of classic migraine- disappeared after first child born
- More than 10 episodes per day/frequent chronic ache
- Cannot tolerate cold air in ears
- Full otologic/head and neck exam normal
- Audiometry, tympanometry, MRI head/neck nl.
- Occasional headaches now but mild compared to “old days”

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# Migraine Management in Otolaryngology Goals

- Become familiar with migraine in its “classic” and atypical forms
- Review the currently accepted pathophysiologic model of migraine
- Establish familiarity and comfort with sound migraine therapies
- Understand how migraine management in your practice will improve patient care

# ○ How Common is Migraine?

American Migraine Study II  
29,727 survey responses

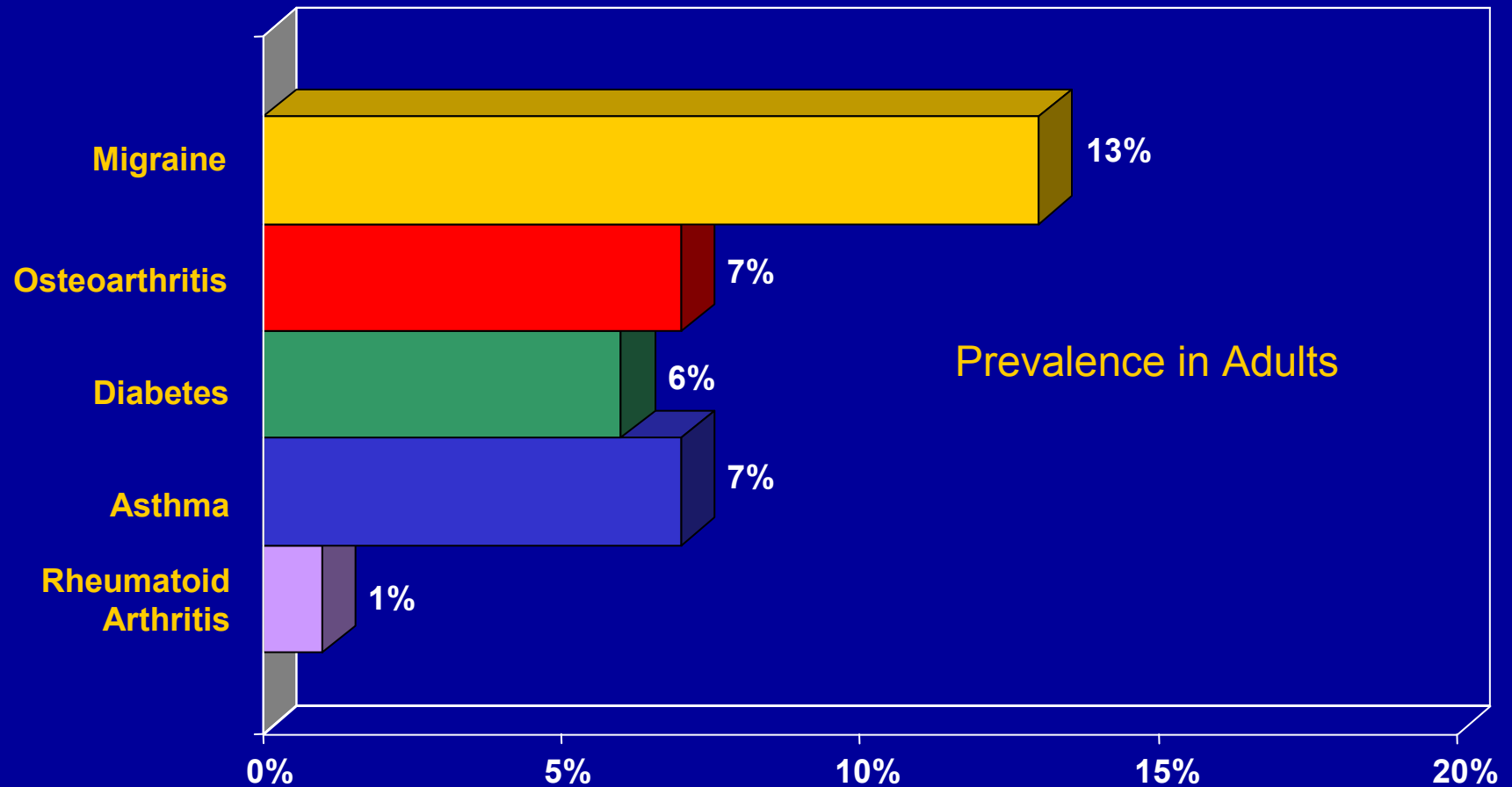
- There are currently 28 million migraine sufferers age 12+ in the United States
  - 21 million female
  - 7 million male
  - Overall prevalence 13%

- Nearly 1 in 4 households has at least 1 migraine sufferer

- Migraine prevalence peaks in the 25–55 age range

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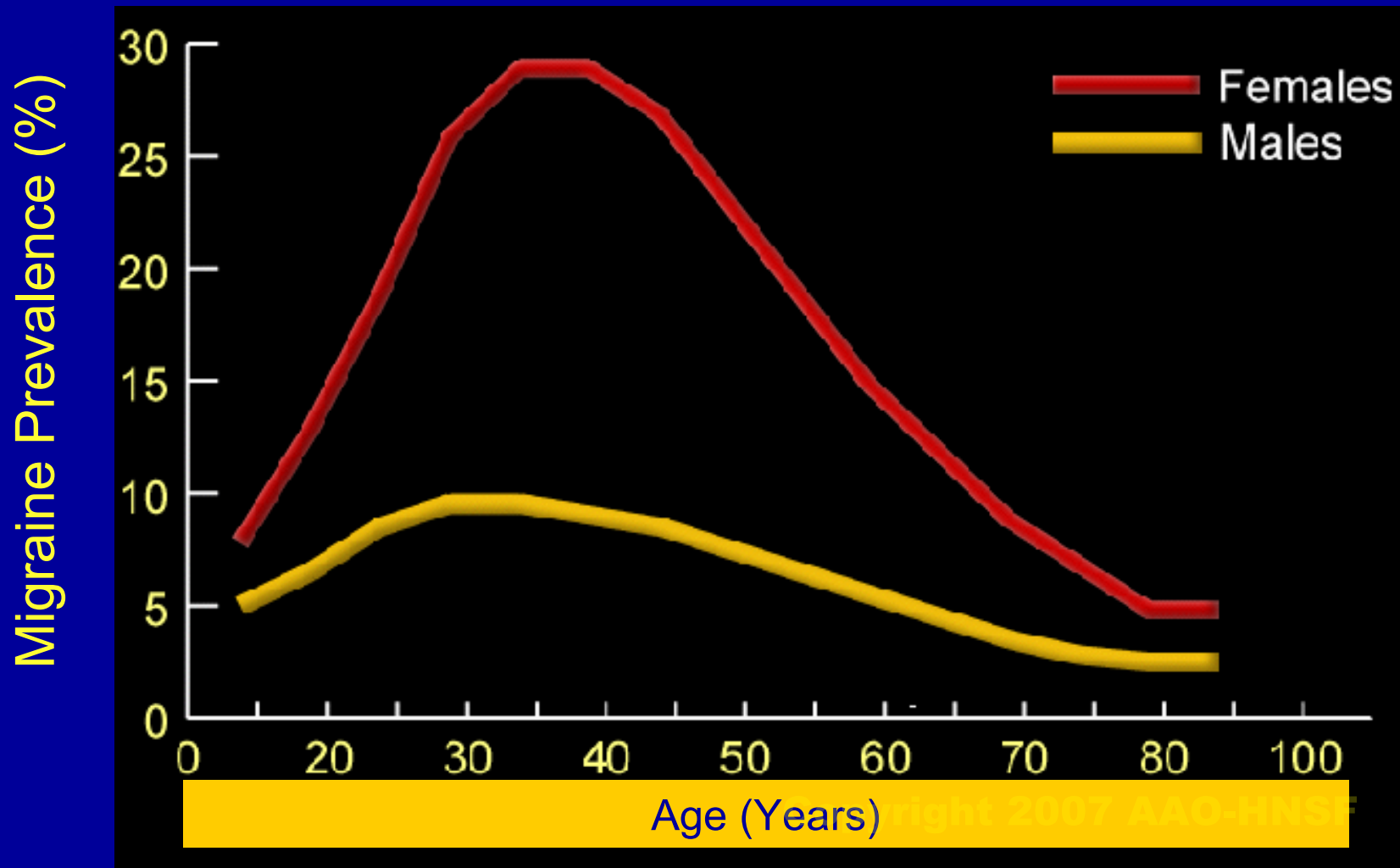
# MIGRAINE IS MORE COMMON THAN ASTHMA AND DIABETES COMBINED



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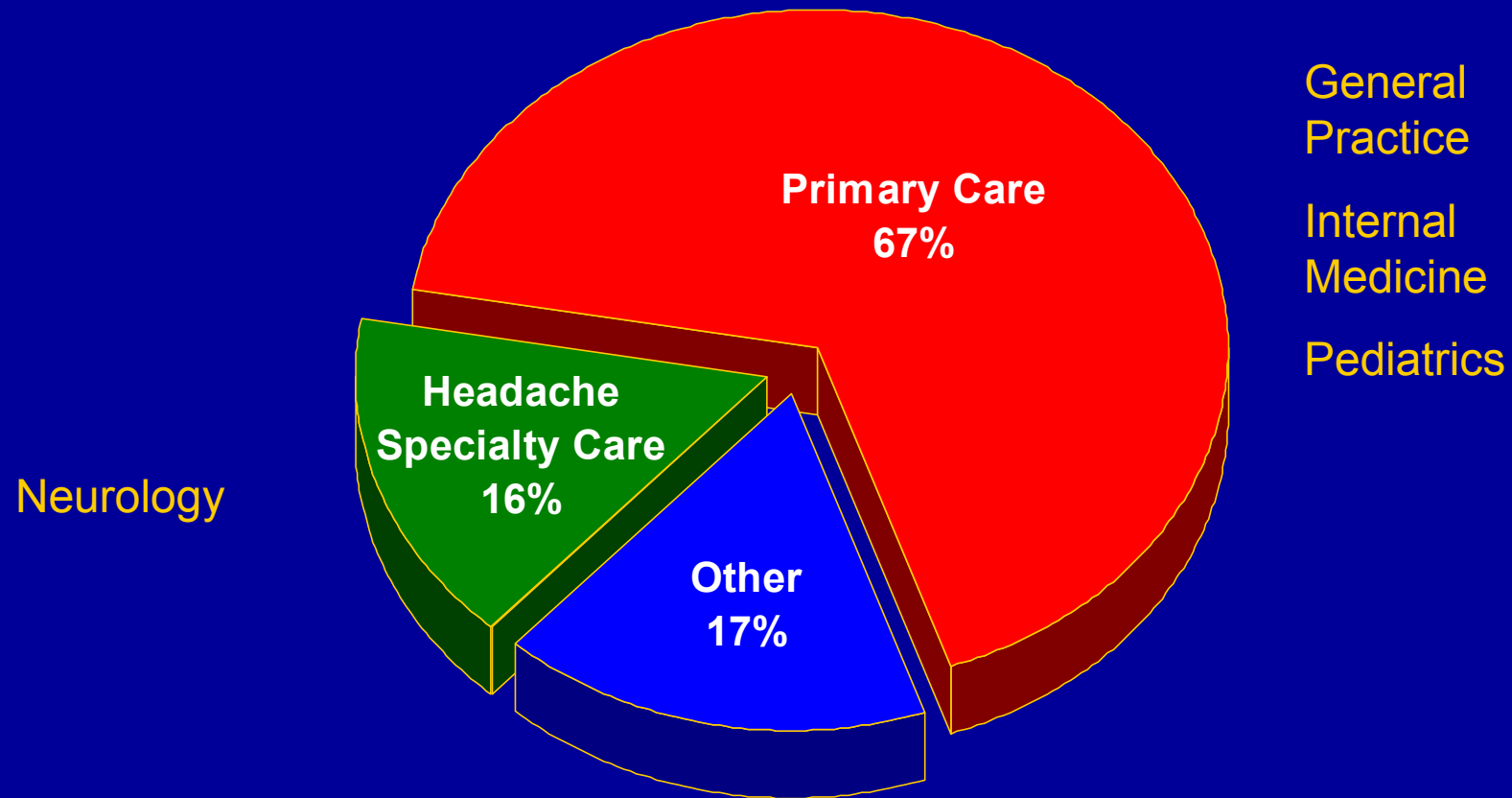
Data from the Centers for Disease Control & Prevention, US Census Bureau,  
and the Arthritis Foundation.

# AGE- AND GENDER-SPECIFIC PREVALENCE OF MIGRAINE



Lipton RB et al. *Headache*. 2001.

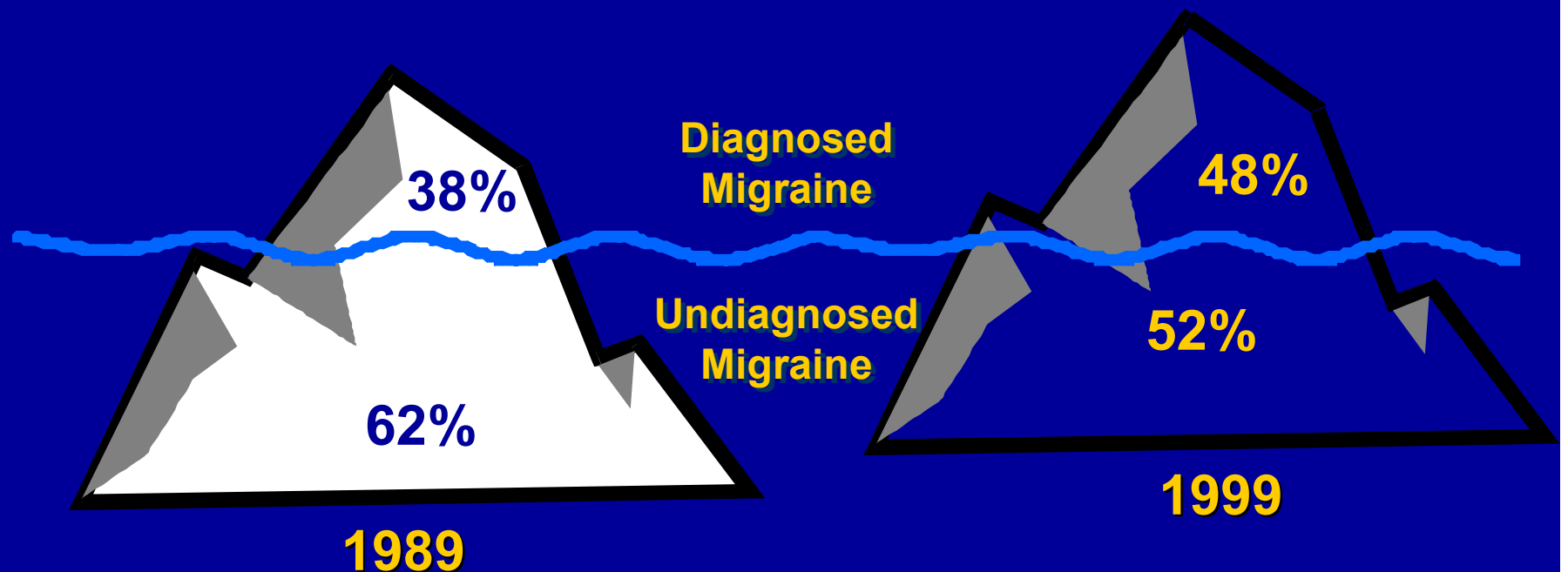
# WHERE DO MIGRAINE SUFFERERS SEEK MEDICAL CARE?



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Lipton RB et al. *Headache*. 1998.

# MEDICALLY DIAGNOSED MIGRAINE THE TIP OF THE ICEBERG



14.6 million migraine sufferers remain undiagnosed.

53.6% have headache related disability.

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Lipton et al. *Headache*. 2001;41:638-645.

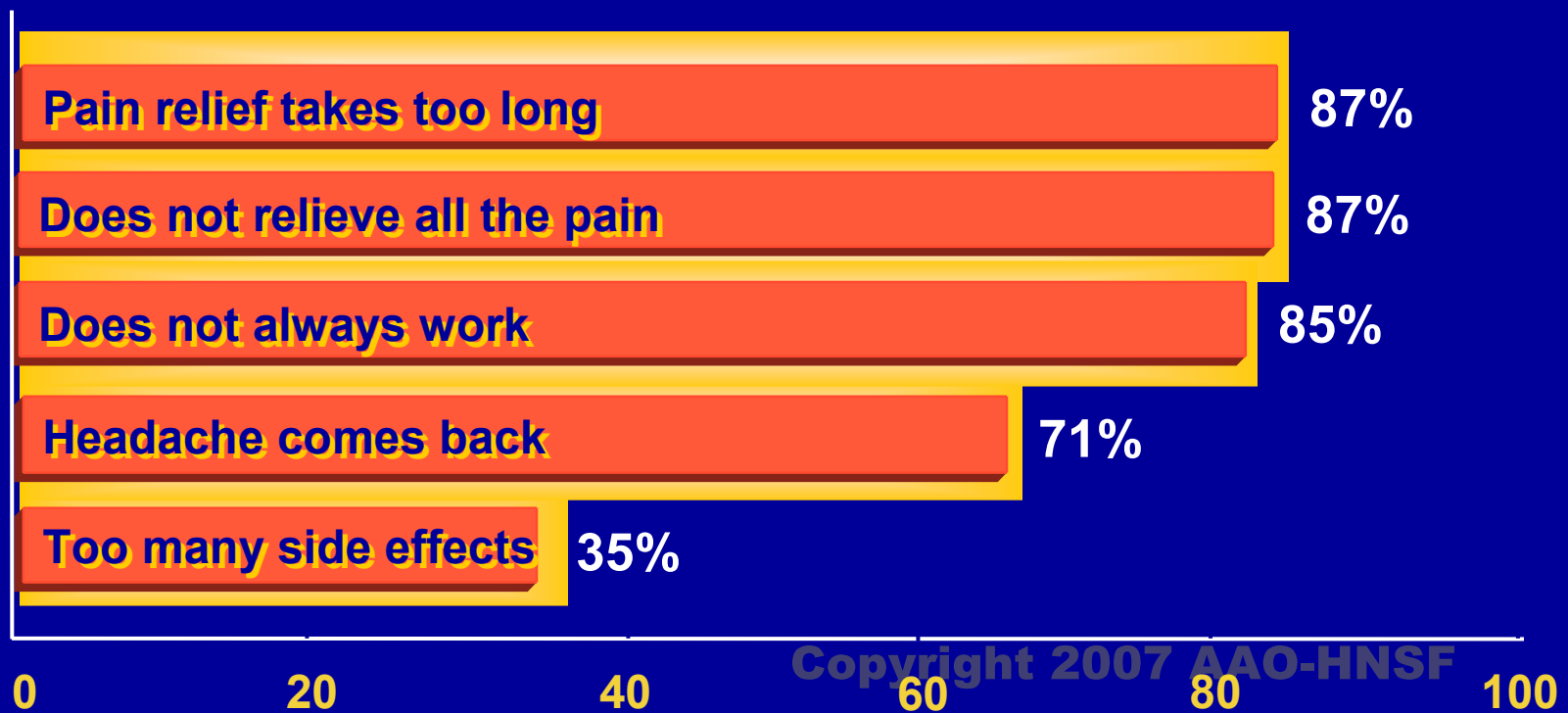




# Even Treated Patients are Unhappy

Only 29% of US migraine sufferers are very satisfied with their usual acute treatment

## Reasons for Dissatisfaction





# Undertreatment of Migraine

- International Headache Society (IHS) criteria for migraine
  - Designed as inclusion criteria for patients in drug efficacy trials and epidemiologic studies
  - Inappropriately used as exclusion criteria for migraine treatment by many clinicians
- Data presented so far considers only clinically obvious migraine that meets IHS criteria. Of these:
  - Only 50% are diagnosed
  - Only 15% are satisfactorily treated
- Most migraine patients seen in the otolaryngology office will not meet IHS criteria but will respond to migraine treatment



# WHAT IS MIGRAINE?

- ❑ Disorder characterized by episodic attacks of head pain and associated symptoms, such as nausea, sensitivity to light, sound, or head movement
- ❑ Inherited tendency
- ❑ Neurobiologically based, common clinical problem





# GENETIC BASIS



Twin studies: MZ > DZ



Migraine as an ion channelopathy  
Familial hemiplegic migraine

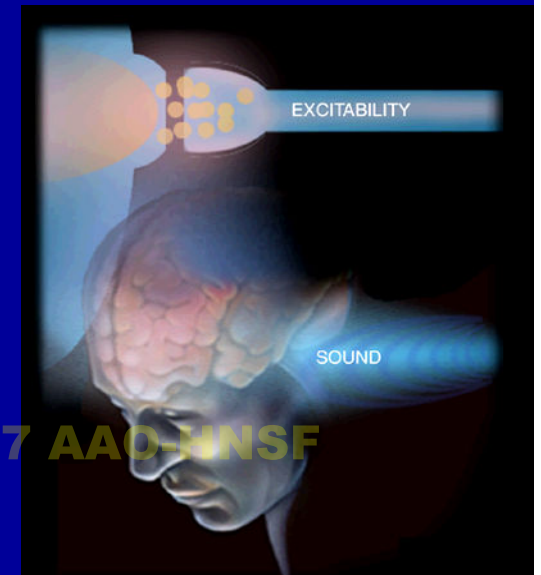
- Mutations in the  $\alpha$  P/Q type voltage-gated  $\text{Ca}^{2+}$  channel causes increased calcium currents in ~50% of cases.
- At least 2 other genes lead to same disease, perhaps by affecting other ion pumps.
- Final common theme is increased neuronal excitability.



Model for common migraine?

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Sanchez-del-Rio et al. *Curr Op Neurol* 2006





# Ion Channelopathy Hypothesis

- Common Migraine may be a channelopathy

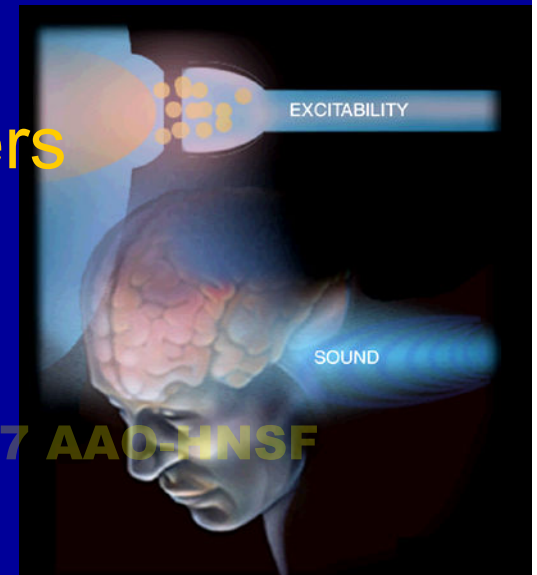
- Possible explanation for dietary triggers

  - Glutamate, tyramine, other substances similar to neurotransmitters may provide the final boost to neuronal excitation

- Possible explanation for drug triggers

  - SSRIs

- Basis for treatment with ion channel active agents





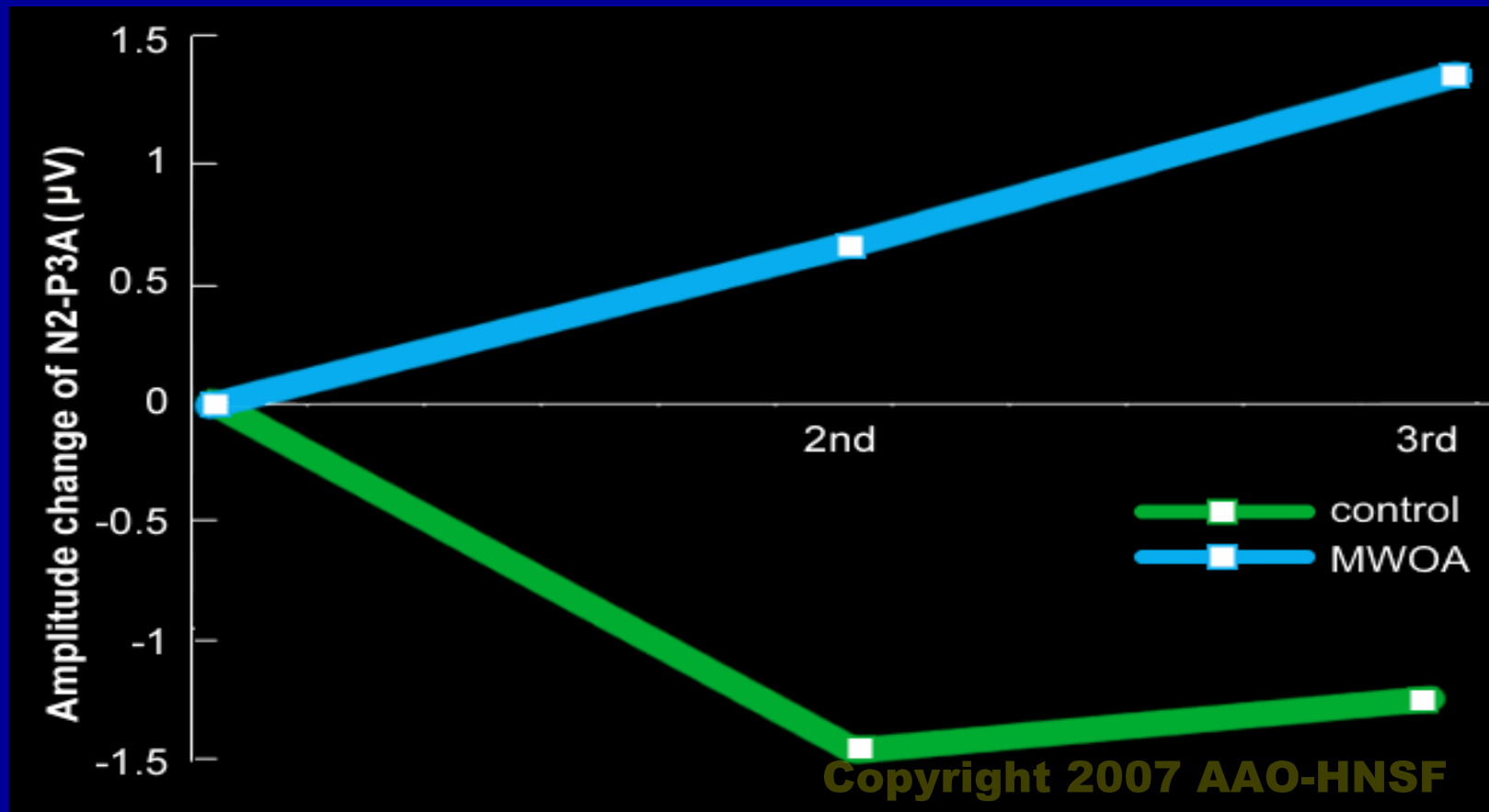
# *SENSITIVE* BRAIN

- Migraine sufferers have altered neurophysiologic responses between attacks
- Stabbing headache (“ice-pick” pains)
- Excitatory amino acids
  - elevated between attacks
  - increase during headache
- Hypersensitivity to multiple sensory stimuli



# Potentiation vs. Habituation of Sensory Responses in Migraine

## Passive "Oddball" Auditory ERP in Migraine



Wang W, Schoenen J. *Cephalalgia*. 1998.



# Triggering Migraine



- Attacks may originate in the nervous system in response to stress or excessive afferent stimulation, such as:
  - Flickering light
  - Noise
  - Smells
  - Excessive motion
  - Painful stimuli- especially in head and neck





# Triggering Migraine



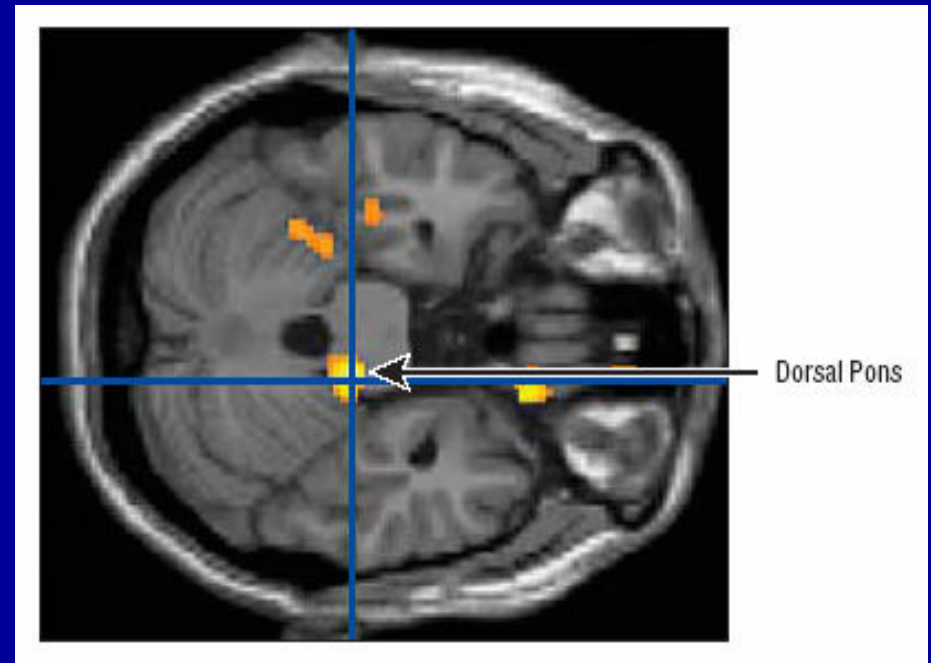
- Attacks may be triggered by
  - Diet
  - Environment
  - Physiologic changes
- Episodes may recur regularly as if initiated by an internal clock in the hypothalamus
- Some triggers act primarily on the cranial blood vessels; craniovascular afferents may then excite central pathways (e.g. nitroglycerin)
- For many patients no factor can be identified



# Triggering Migraine



- The brainstem may be the ultimate site of migraine trigger activation.
- PET (cerebral blood flow) scanning in acute migraine shows changes in brainstem activity during migraine.



Afridi SK et al. *Brain* 2005.

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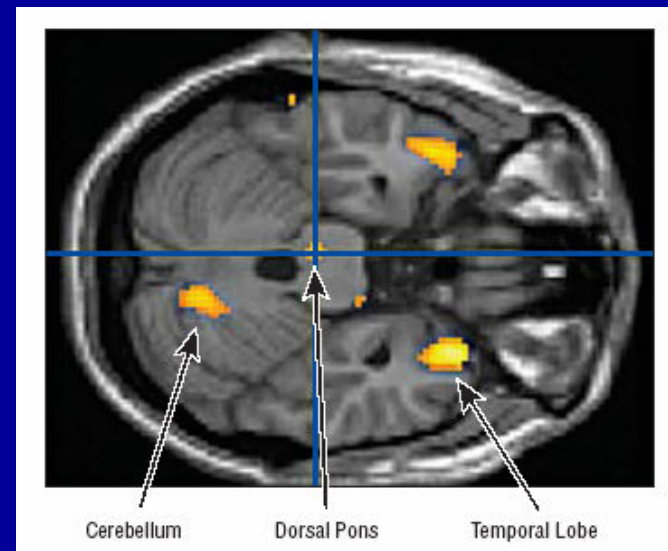


# Triggering Migraine



What may be the brainstem effects?

- Sensitized trigeminal nucleus
  - Lowered pain thresholds
  - Allodynia
  - Patients become sensitive to **any** sensory stimuli: light sound, touch, etc.



Afridi SK et al. *Brain* 2005.

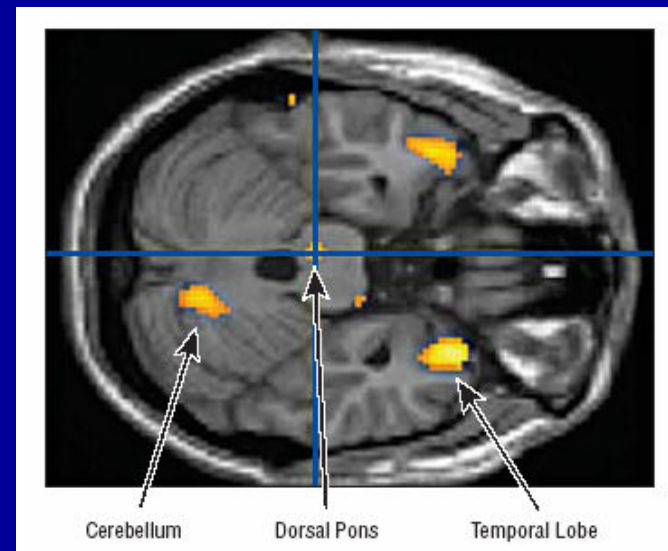


# Triggering Migraine



What may be the brainstem effects?

- Changes in alerting centers (locus ceruleus, dorsal raphe)
  - Altered levels of consciousness and profound fatigue are common in migraine. Even blackouts can occur.



Afridi SK et al. *Brain* 2005.

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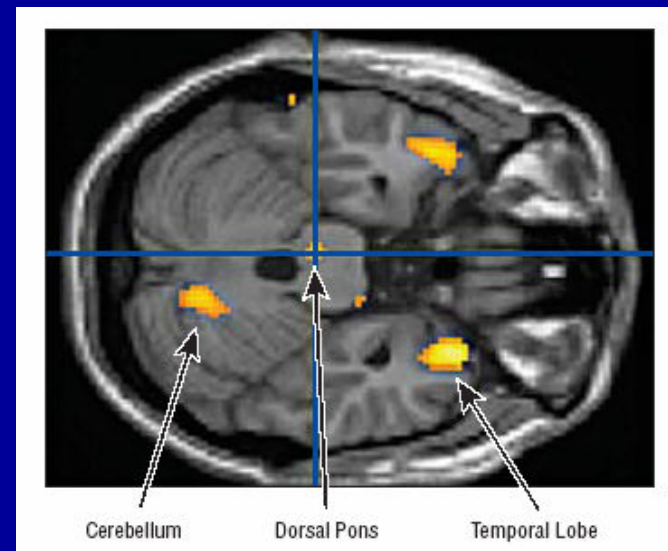


# Triggering Migraine



What may be the brainstem effects?

- Vestibular nuclei
  - Dysequilibrium
  - Head motion intolerance
  - Visual motion intolerance
  - Frank vertigo



Afridi SK et al. *Brain* 2005.

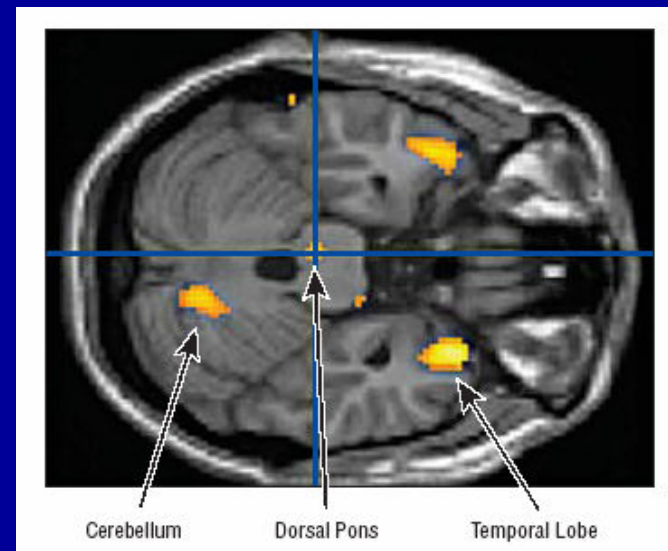


# Triggering Migraine



What may be the brainstem effects?

- Auditory nuclei
  - Phonophobia
  - Hyperacusis
  - Tinnitus



Afridi SK et al. *Brain* 2005.



# Cortical Changes: The Migraine Aura

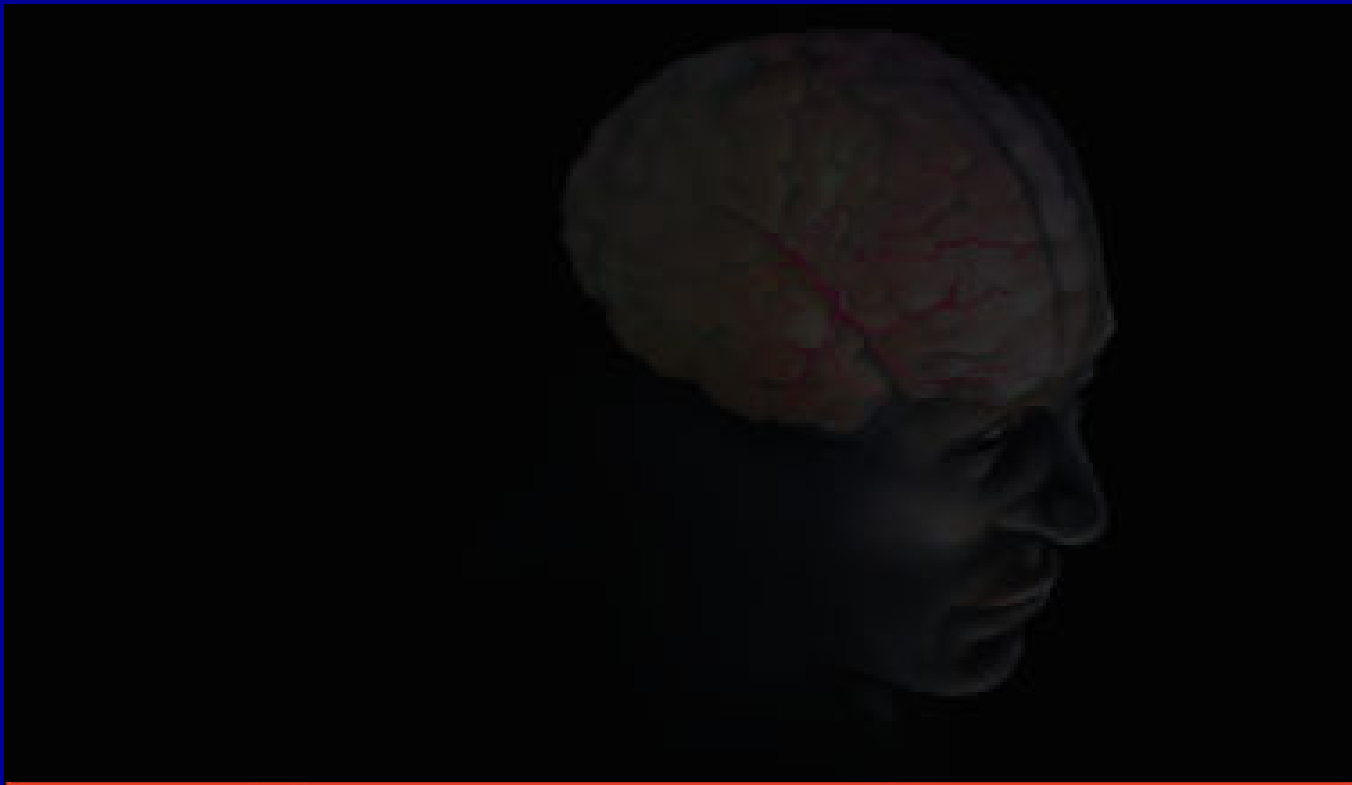


- Only 15% of patients experience the classical “slow march” of sensory symptoms typified by migraine with aura
- Traditionally this was attributed to oligemia spreading across the cortex, and that headache was caused by subsequent vasodilation.

Lashley KS. *Arch Neurol Psych.* 1941. Olesen J, et al. *Ann Neurol.* 1990.  
Woods RP, et al. *N Engl J Med.* 1994. Lauritzen M. *Brain.* 1994

©

# BUT: The Vascular Theory Does Not Fit The Data



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Olesen J, et al. *Ann Neurol*. 1990.

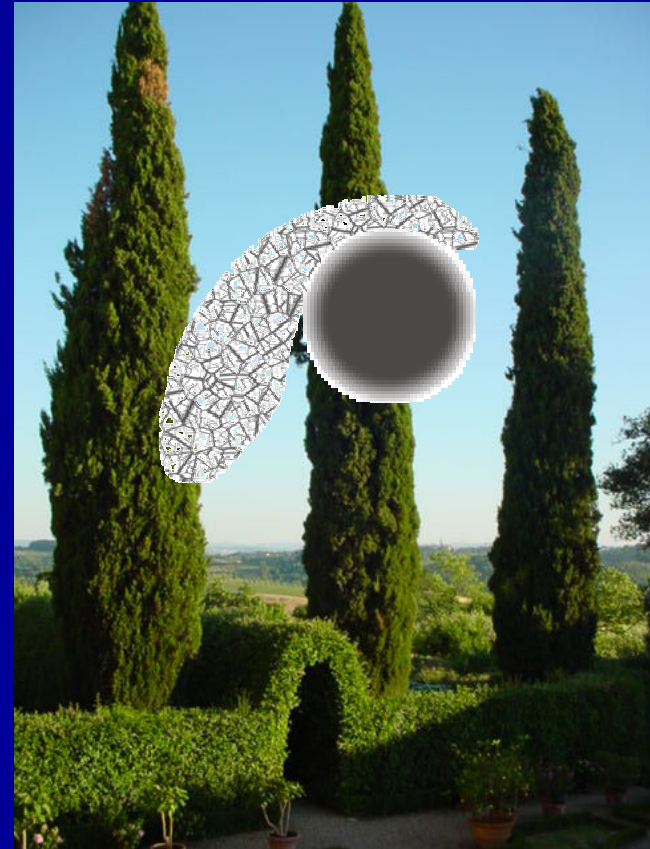




# And the vascular theory does not explain “positive” symptoms

Functional imaging suggests that:

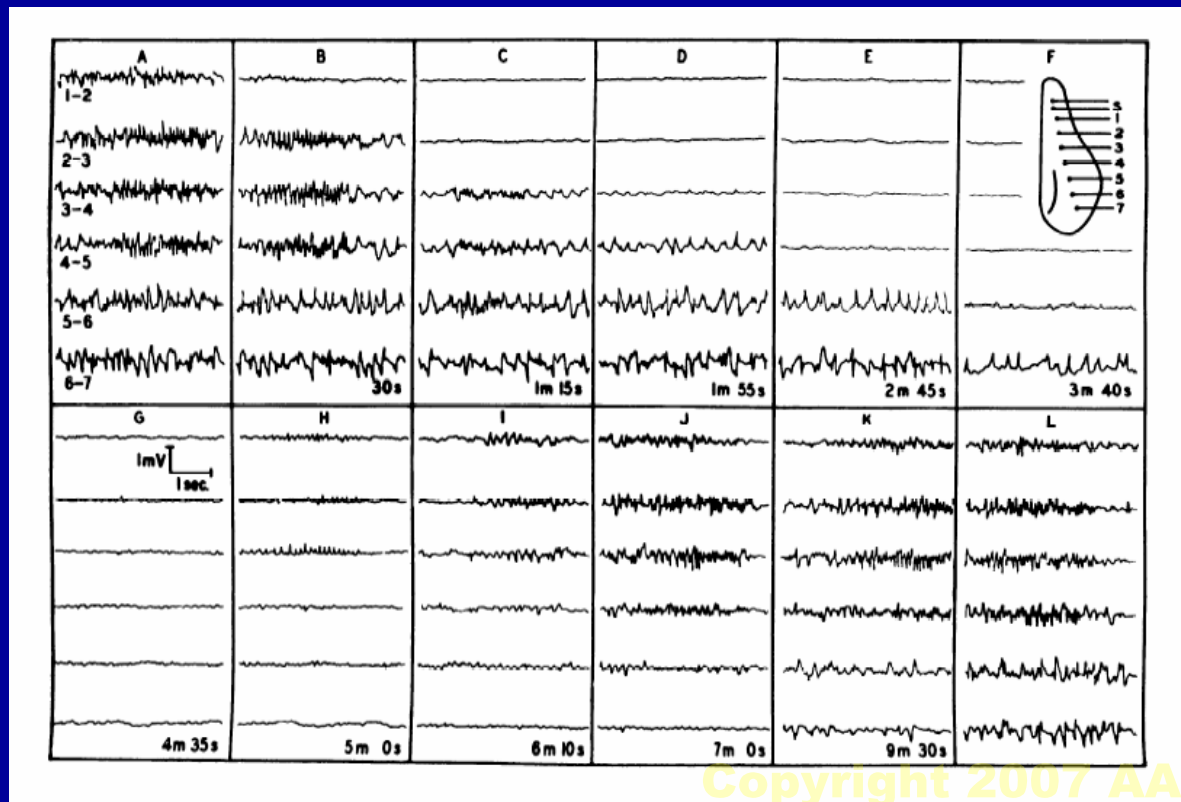
- Scintillating visual patterns (positive symptoms) are caused by a wave of excitation moving across the visual cortex.
- Blind spot (negative symptom) is due to inhibition of activity in its wake.





# Cortical Spreading Depression

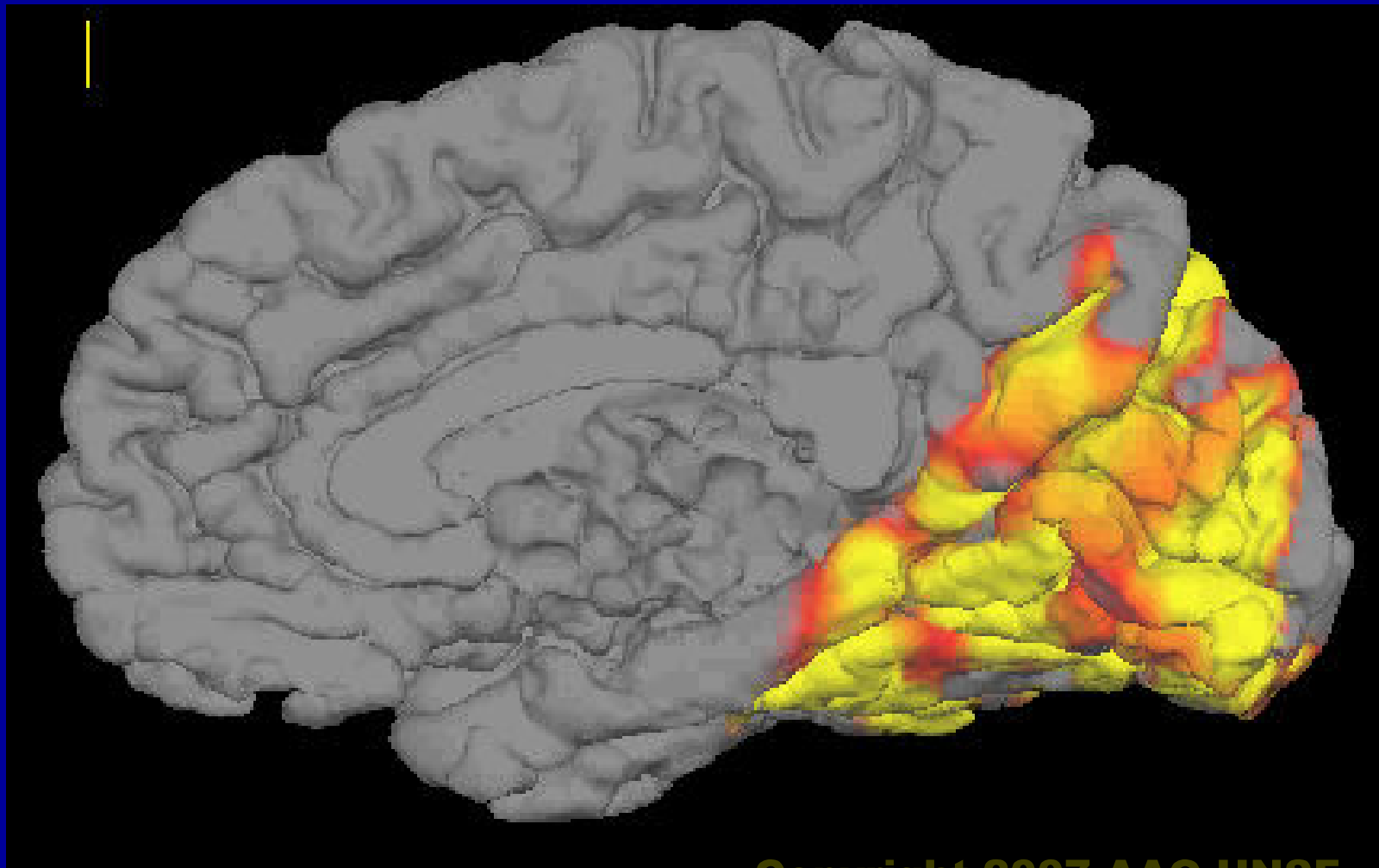
A phenomenon discovered described in 1940's, but only recently linked to migraine.



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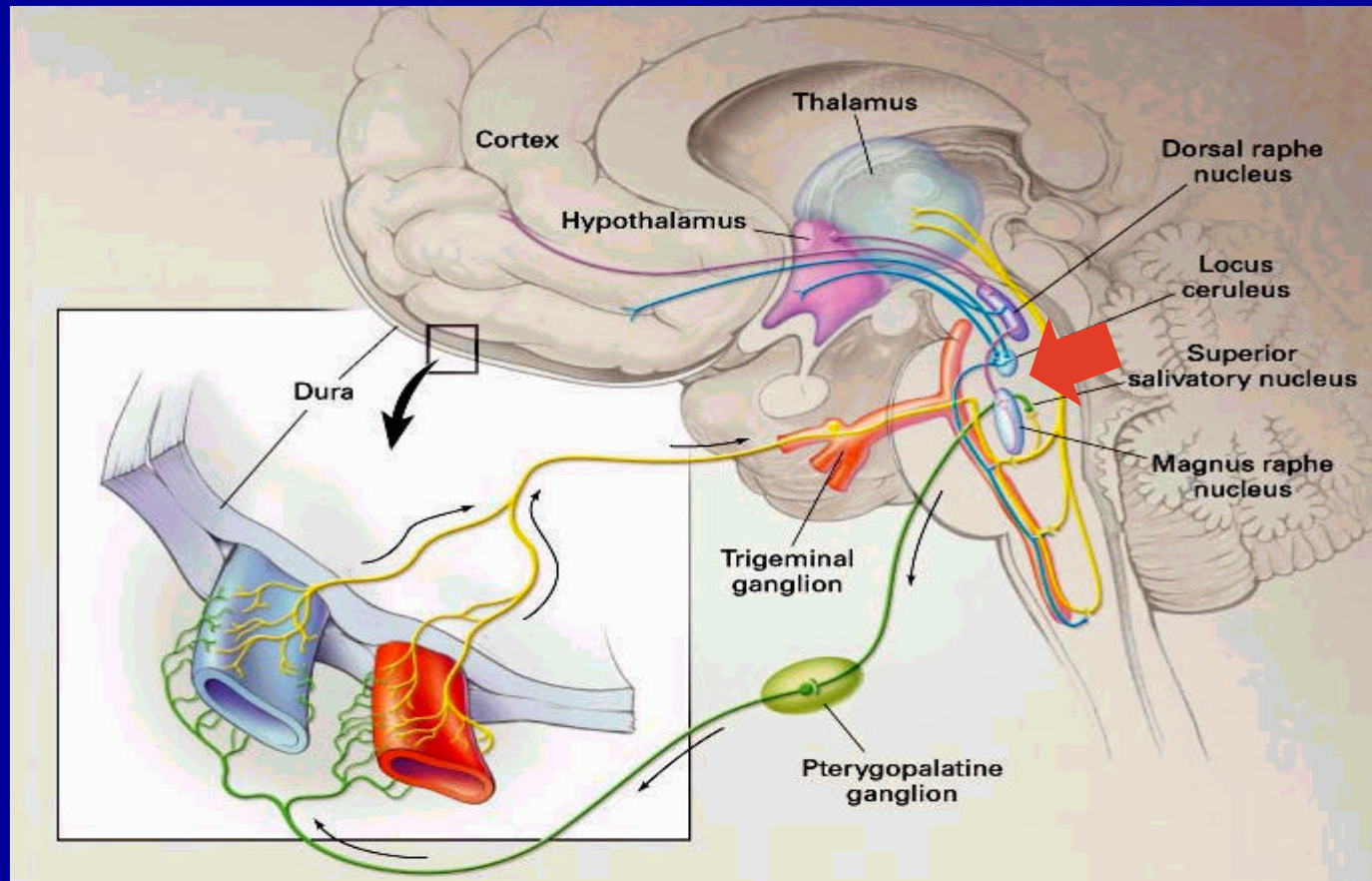
# Spreading electrical changes and aura



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Hadjikhani N, et al. *Proc Natl Acad Sci USA*. 2001.

# THE NEUROVASCULAR THEORY



Goadsby, PJ, et al. Migraine - Current Understanding and Treatment, Jan. 24, 2002  
New England Journal of Medicine, No. 4, Volume 346:257-270 Copyright (C) 2002.  
Massachusetts Medical Society. All rights reserved.

# THE NEUROVASCULAR THEORY

## Migraine is a neurovascular pain syndrome

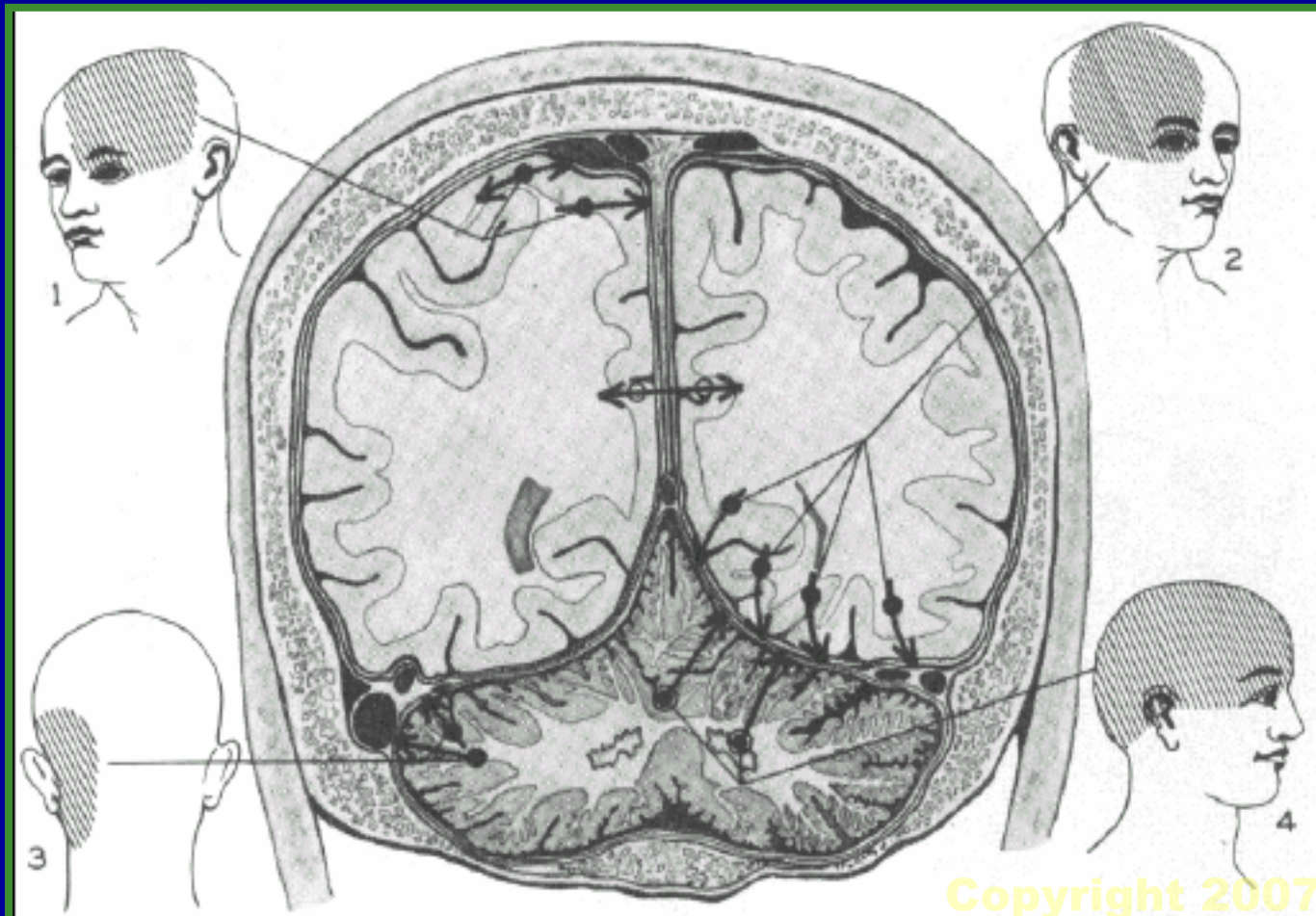
- Pathogenesis of pain is poorly understood; involves trigeminal innervation of the cranial vessels, reflex connections of V with the parasympathetic outflow

- Referred pain from dura mater and blood vessels to V1 and C2 cause typical occipital and fronto-parietal pain distribution

- V1 Stimulation results in extravasation of plasma proteins and inflammatory neuropeptides around intracranial vessels. One of these (CGRP) is a potent vasodilator



# PAIN-PRODUCING INTRACRANIAL STRUCTURES



- Large cranial vessels
- Proximal cerebral vessels and dural arteries
- Large veins and venous sinuses

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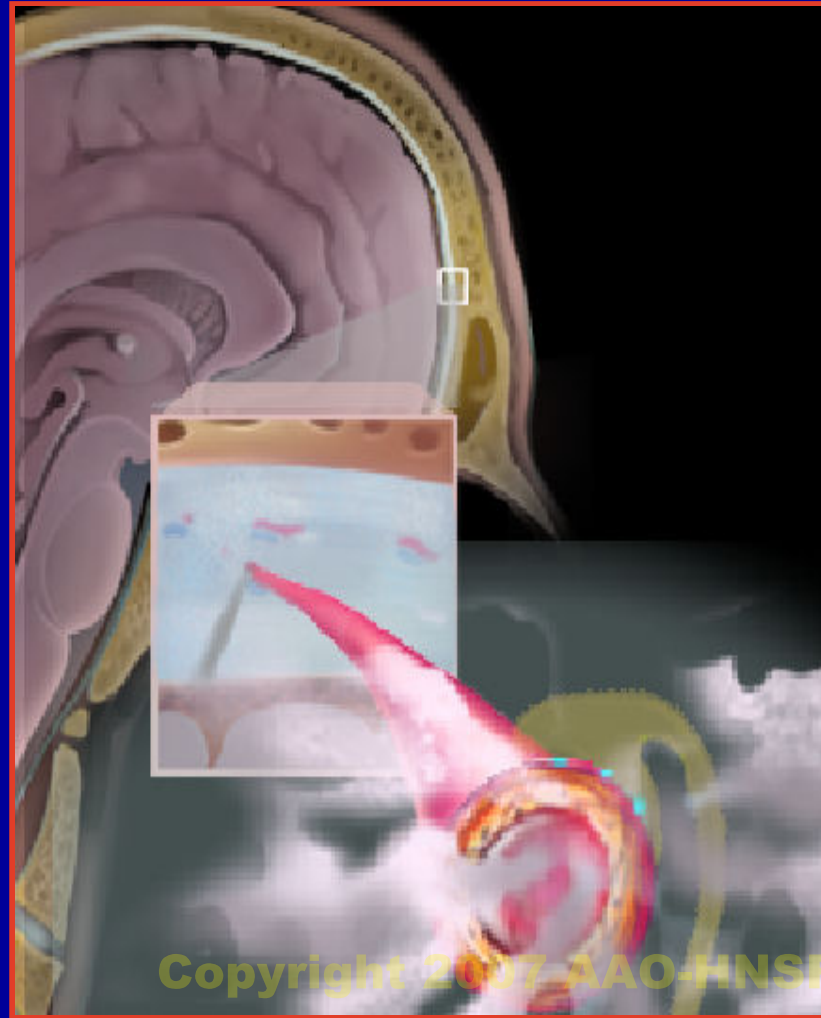
(after Wolff 1940)



# Trigeminal outflow causes local tissue inflammation

- Meninges – meningitis-like headaches
- Nasal and sinus mucosa – sinusitis symptoms
- Inner ear – another possible source of hearing loss, vertigo

(Vass et al. Neuroscience 2001;103:189-201)





# Cutaneous Allodynia



- Pain resulting from an innocuous stimulus to normal skin or scalp. The stimulus that triggers allodynia is not normally painful. The pain can be provoked by combing or brushing the hair, shaving, showering, wearing glasses or earrings.
- Cutaneous allodynia is believed due to a transient increase in the responsiveness of central pain neurons that process information arising from the skin. It is commonly associated with migraine.





# Cutaneous Allodynia



- Pain thresholds globally decrease during migraine.
  - Low tolerance for pain elsewhere
  - Head/neck pain may be magnified out of proportion to findings
- May trigger migraine/be caused by migraine.
  - Just because they have migraine does not mean they don't have a structural lesion too!



# So, how can I be sure it's migraine?

## Features of the headache:

- The best predictors can be summarized by the mnemonic POUNDing:

Pulsating

Duration of 4-72 hOurs

Unilateral

Nausea

Disabling

- If 4 of 5 are +, the likelihood ratio (LR) for definite/possible migraine is 24 (95% CI 1.5-388)
- If 3 +, the LR is 3.5 (95% CI, 1.3-9.2)
- If  $\leq 2$  +, the LR is 0.41 (95% CI, 0.32-0.52)

Detsky ME, McDonald DR, Baerlocher MO et al. Does this patient with headache have a migraine or need neuroimaging? JAMA 2006;296:1274-1283.



# So, how can I be sure it's migraine?

But the lessons learned from vestibular migraine suggest:

- Headaches may become less severe over time.
- Neurological symptoms may become more prominent
- IHS criteria are not flexible enough to encompass all of the presentations that otolaryngologists are likely to see.

(Neuhauser H, Leopold M, von Brevern M et al. The interrelations of migraine, vertigo, and migrainous vertigo. *Neurology* 2001;56:436-441)



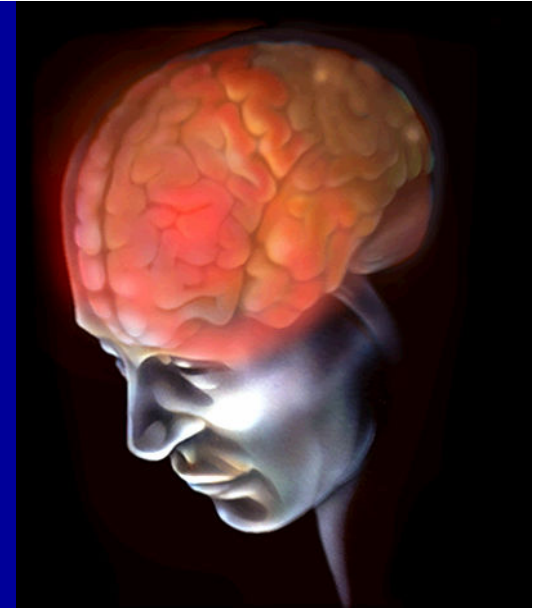
# So, how can I be sure it's migraine?

- Maintain a high degree of suspicion in the patient with
  - Chronic recurrent facial or head pain
  - Allodynia or spreading paresthesias
  - Associated neurological symptoms – may be chief complaint
  - Triggerability
  - No structural lesions to explain pain
  - Past history of migraines
  - Family history of migraines or symptoms similar to the patient's



# Migraine Treatment

- Education
- Teamwork
- Trigger identification and avoidance
- Abortive therapy
  - OTC medications
  - Migraine abortive agents
- Migraine prophylaxis
- Combined therapy- prophylaxis/ abortive
- Lifestyle improvement



# ○ Migraine Treatment-Step Therapy Trigger Identification and Avoidance

- Triggers may be:
  - Environmental
  - Dietary
  - Physiologic
- Highly effective even in severe/refractory cases
- Requires patient education and motivation
- Migraine diary

# Common Environmental Triggers for Migraine Symptoms

- Odors
- Bright Lights- computer
- Noise
- Excessive head motion
- Excessive motion of visual surround
- Weather changes





# Common Food Triggers for Migraine Symptoms

- Byproducts of food aging – e.g. tyramine
  - Fermented products like red wine
  - Aged cheese
  - Yeast in fresh bread, yogurt
- Amines similar to our own neurotransmitters
  - Caffeine
  - Nitrates and other preservatives (lunchmeat)
  - MSG
  - Chocolate





# Common Food Triggers for Migraine Symptoms

- Many surprise foods: Bananas, peanuts, peanut butter
- Effects may come immediately or even days later.
- These are not allergies but direct chemical sensitivities.



# Common Food Triggers for Migraine Symptoms

- Triggers are additive and synergistic
  - Chocolate - no problem
  - Red wine - no problem
  - Chocolate + red wine - problem!
- Only a comprehensive elimination diet pursued for 6-8 weeks is a fair trial.

# Common Physiologic Triggers for Migraine Symptoms

- Anxiety, stress
- Fatigue, lack of sleep
- Oversleeping
- Hunger
- Exercise
- Hormone changes
- Pain- especially C2 cervical pain (whiplash), TMJ, and sinus
- Cutaneous allodynia





# Migraine Treatment-Step Therapy

## Abortive Therapy

- Abortive therapy works best for episodic migraine pain
- Pain can be managed non-specifically with OTC medications in many patients
  - As disability increases non-specific therapy less likely to work
- Specific abortive therapies are effective if used early. (i.e. Triptans)
- Neither should be used more than 2-3 days per week to avoid rebound.



# ACUTE MIGRAINE MEDICATIONS

## ■ Nonspecific

- NSAIDs
- Combination analgesics
- Opioids
- Neuroleptics/antiemetics
- Corticosteroids

## ■ Specific

- Ergotamine
- Triptans





# ACUTE THERAPIES FOR MIGRAINE

## **GROUP 1a:**

Substantial empirical evidence and pronounced clinical benefit in migraine

### **Migraine-Specific Medications**

- Triptans
- Ergotamine
  - SC, IM, IN, IV

### **Nonspecific Prescription Medications**

- Ibuprofen/Naproxen sodium
- Butorphanol IN
- Prochlorperazine IV

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# ACUTE THERAPIES FOR MIGRAINE

## **GROUP 1b:**

Substantial empirical evidence of clinical benefit in restricted populations

### **Over-the-Counter Analgesics**

- Aspirin
- Acetaminophen, aspirin plus caffeine

## **GROUP 2:**

Moderate empirical evidence and clinical benefit

- Opioids
- Others

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# TRIPTANS: A Great Advance in Migraine Management

■ Selective 5-HT<sub>1B/1D/1F</sub> (Serotonin) agonists

■ As a class, relative to nonspecific therapies, triptans provide

- Rapid onset of action- 15- 60 min
- High efficacy for headache relief
- Favorable side effect profile

■ Adverse events- chest pressure, flushing, dizziness, drowsiness, nausea

■ Contraindications- CAD, diabetes, uncontrolled HTN, hypercholesterolemia

■ Differ in half-life, time of onset, side effects.

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# Triptans may have several effects

## Mechanism

- Cranial vasoconstriction
- Peripheral neuronal inhibition
  - Block plasma protein extravasation
  - Neuropeptide release inhibition
- Trigeminal nucleus inhibition

## Receptor Mediation

- 5-HT<sub>1B</sub>
- 5-HT<sub>1D/1F</sub>
- 5-HT<sub>1B/1D</sub>
- 5-HT<sub>1F</sub>

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# ○ Migraine Treatment-Step Therapy Prophylaxis- When to Use

- Useful when headaches are frequent or atypical disabling symptoms that do not respond to abortive therapy are present- e.g. vertigo
- Daily medications usually well tolerated
- Selection of drugs based on co-existing medical conditions
- Response may take up to 6 weeks
- Patients should continue trigger identification and avoidance
- Goal- decrease frequency/severity by 50-70%
- Can be used for hypothesis testing in individual patients

## Well Tolerated Medications for Migraine Prophylaxis

- Beta-blockers: propranolol, propranolol SR
- Calcium channel blockers: diltiazem, diltiazem CD
- Tricyclic antidepressants: nortriptyline, amitriptyline
- Anticonvulsants: valproic acid, topiramate, pregabalin (Lyrica)
- Carbonic anhydrase inhibitor: acetazolamide

# ○ Medications for Migraine Prophylaxis

## Beta-blockers

- Do not use with asthma, diabetes or low blood pressure
- Propranolol LA 60mg/day starting dose
- Increase as needed to 180mg/day
- May worsen depression
- If depression Nadolol 20mg/day
- Increase as needed to 120mg

# ○ Medications for Migraine Prophylaxis

## Calcium Channel Blockers

- Well tolerated
- Diltiazem CD 120mg starting dose
- Increase as needed to 240-480 mg/day
- Divide dose at higher doses
- Constipation, hypotension

# ○ Medications for Migraine Prophylaxis

## Antidepressants

- Nortriptyline – very effective
- Often good response at low doses (20mg capsule)
- Start with 10mg HS and increase over weeks as needed to 50 mg. Some need up to 150 mg.
- Dry mouth, weight gain at higher doses
- If morning sedation take HS dose earlier in evening
- Amitriptyline- similar dosing and side effects
  - Tablet- useful in some patients with extreme sensitivity to medications
- ECG monitoring controversial – beware of QT prolongation

# ○ Medications for Migraine Prophylaxis

## Anticonvulsants

Sodium Valproate 250-500 mg bid

- Well tolerated
- Monitor platelets, liver function

Gabapentin (Neurontin)

- Start 300 mg/d
- Increase weekly to 300 mg tid (900mg) then to 600mg tid
- Maximum dose limited by sedation
- Well tolerated below sedation dose

# ○ Medications for Migraine Prophylaxis

## Anticonvulsants

### Topirimate (Topamax)

- Anticonvulsant and carbonic anhydrase inhibitor
- Good evidence for efficacy as 1<sup>st</sup> line agent
- Weight loss a plus!
- Slow dose escalation needed
- Cognitive side effects can be limiting
- Start 12.5-25 mg daily, then BID, then increase weekly to 100 BID.
- Risks include kidney stones, rare form of glaucoma





# Alternative Medications

- Petasites
  - Butterbur extract
  - 2 RCTs of Petadolex, active ingredient
    - Provides Grade A evidence of 50% headache reduction
    - Therapeutic gain of ~19% is just below that of amitriptyline (21%), propranolol (24%).
    - Long-term safety data lacking, however.
- Magnesium
  - Low brain levels of Mg consistently reported in migraineurs
  - Grade B evidence : 4 RCTs with differing preparations: 2+, 2-
  - E.g. Mg oxide 200 mg 3X daily
  - May need to be taken for 3-4 months before effective
  - Diarrhea is limiting side-effect.



# Alternative Medications

- Feverfew
  - Species-specific dried chrysanthemum leaves
  - >400% variation in active ingredient parthenolide – active ingredient MIG-99 not available
  - Grade B evidence
- Riboflavin
  - 1 RCT showed Grade B evidence for 400 mg/d
- CoEnzyme Q
  - 1 RCT showed Grade B evidence for 300 mg/d divided TID



# Common Otolaryngologic Presentations of Migraine

- Migraine Associated Vertigo and Dizziness
- Otalgia
- Facial Pressure Without Recurrent Sinusitis
- Aural Pressure
- Menieres Disease?
- Hyperacusis



# Migraine-Associated Dizziness

- A 70-year-old man presented with a 30-year history of dizziness and episodic vertigo. Some of his vertigo attacks were clearly positional, others spontaneous and lasting for hours. These were not associated with changes in his hearing, but he did report left aural fullness, a “bobble-head” sensation, photophobia, and nausea with the attacks. Symptoms progressed to constant disequilibrium.
- Family Hx: migraines and dizziness occurred in his mother, in his sister, and that all 3 of his children.
- Audio: Normal through 4k, then R>L downsloping SHNL, Normal ENG, normal MRI.
- Did not tolerate Neurontin, Depakote. Clonazepam gave some relief. Symptoms resolved on amitriptyline 75 mg/d



# Migraine and Otologic Disorders

## Menieres Disease

- Migraine prevalence in US is 13%.
- 25% of migraineurs have vertigo (3.25%)
- Menieres disease prevalence in US is 0.2%
- In Menieres disease Migraine prevalence is 56%
- Migraine prevalence in bilateral Menieres disease is 85%
- Is there a physiologic connection?

Lipton RB et al. *Headache*. 2001. Kayan A. *Brain*. 1984. Wladislavosky P et al. *Laryngoscope* 1996



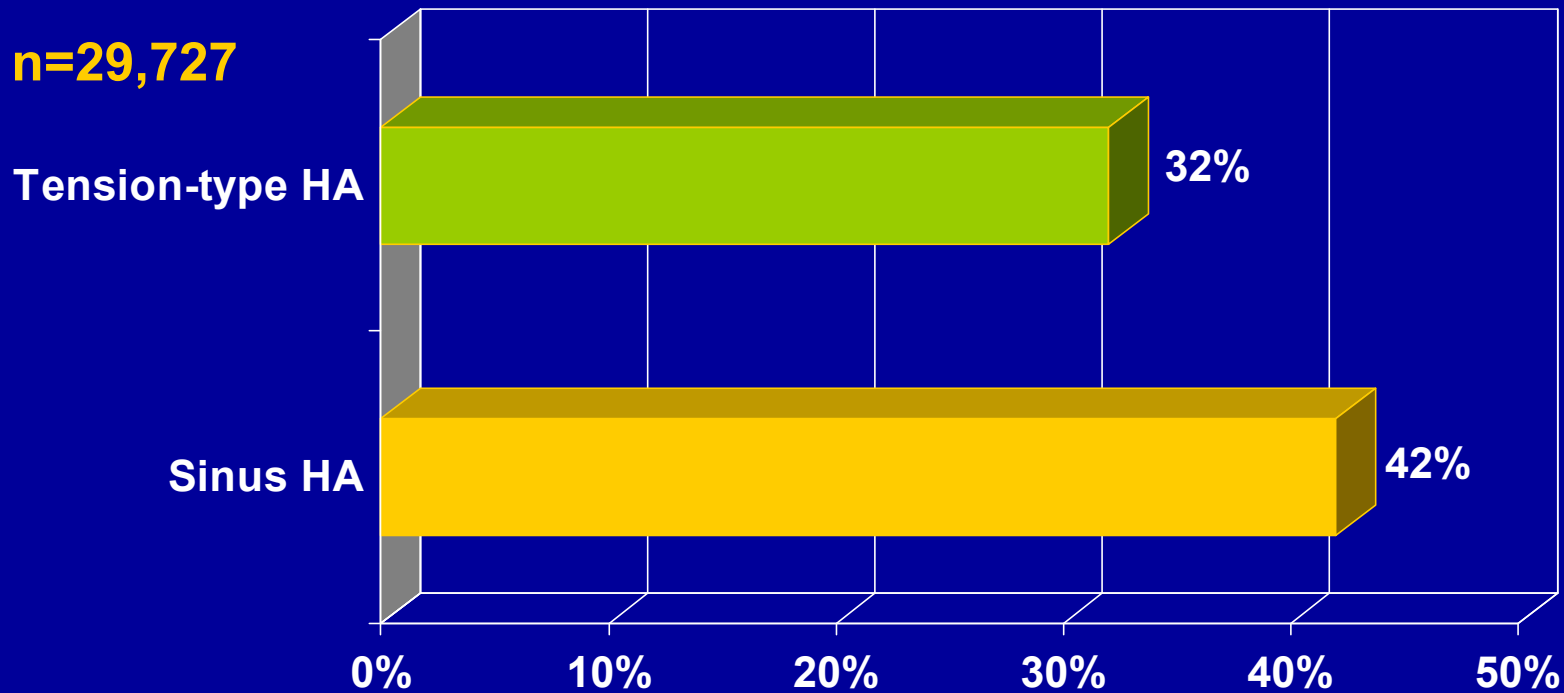
# Migraine and Otologic Disorders

## Menieres Disease

- The blood vessels of the cochlea and vestibular labyrinth are innervated by branches of  $V_1$
- Electrical stimulation of  $V_1$  cause plasma extravasation with substance P in the stria vascularis and cochlear tissues
- A migraine mechanism may therefore cause peripheral otologic symptoms.
- Treatment of patients with MD with migraine therapy has resulted in resolution of symptoms.

# Otolaryngologic Presentations of Migraine Sinus Pressure

UNDIAGNOSED MIGRAINE SUFFERERS OFTEN RECEIVE  
OTHER MEDICAL DIAGNOSES



Patients who met IHS migraine criteria but given these diagnoses  
Prevalence of sinus headache is 15%, and IHS Migraine is 13%

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Lipton RB et al. *Headache*. 2001. Rasmussen BK et al. *J Clinical Epidemiology*. 1991.



# REASONS FOR MISDIAGNOSIS OF MIGRAINE AS SINUSITIS

- Migraine is a referred pain syndrome (V1-2, C2-C3)
- Up to 50% of migraine patients report their headaches are influenced by weather
- 45% of migraine patients report attack related 'sinus' symptoms including lacrimation, rhinorrhea, nasal congestion
- Migraine is bilateral in up to 40% of patients

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Raskin NH. *Headache*. 2nd ed. 1988; Barbanti P, et.al. *Cephalalgia*. 2001;  
Kaniecki R. *Cephalalgia*. 2001.





# Migraine or Sinusitis?



## Migraine

- Congestion/ rhinorrhea only at time of headache
- Congestion/ rhinorrhea triggered by stress, diet
- Symptoms last for Hours
- Never infected drainage/ antibiotic rx
- Mucosa normal
- CT usually normal
- Responds to decongestants
- Nasal steroids ineffective

## Sinusitis

- Perennial or seasonal congestion/rhinorrhea
- Symptoms last for Days
- Recurrent infected drainage/ antibiotic rx
- Mucosa allergic/ vasomotor
- CT abnormal
- Responds to decongestants
- Nasal steroids effective

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# Summary

- Migraine is a common clinical problem
- Neurovascular mechanisms are responsible for symptom generation
- Otolaryngologists may encounter many patients with atypical presentations of migraine
- Otolaryngologists should be comfortable with migraine therapy



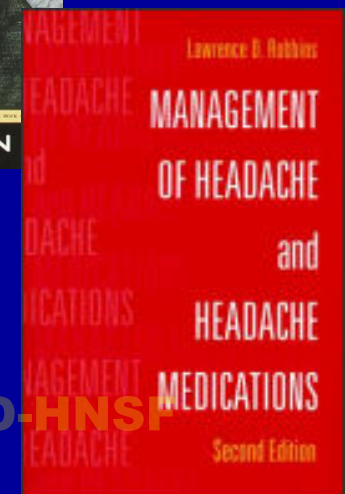
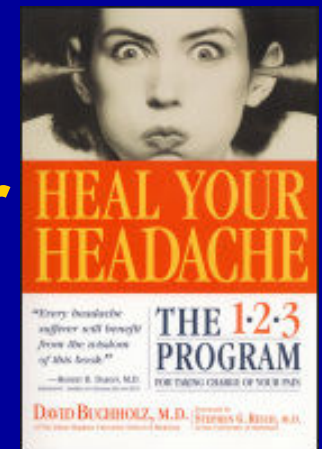
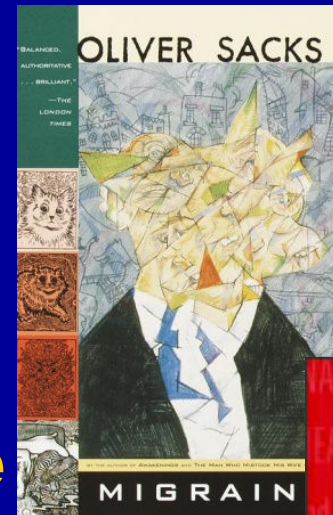
# Should Otolaryngologists Treat Migraine?

Yes! There are so many undiagnosed, misdiagnosed and ineffectively treated patients that otolaryngologists can make a great contribution by becoming familiar with migraine management.



# Highly Recommended Reading for You and your Patients

- **Heal Your Headache: The 1-2-3 Program for Taking Charge of Your Pain** By David Buchholz
- **Migraine** by Oliver Sacks
- **Management of Headache Headache Medications**  
By Lawrence Robbins



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# Questions

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# TRIPTANS: TREATMENT CHOICES

**IMITREX** Sumatriptan-Gold standard

- Tablet (25, 50, 100 mg)
- Injection (6 mg)
- Nasal spray (5, 20 mg\*)

**ZOMIG** Zolmitriptan-Longer half-life, Fastest

- Tablet (2.5, 5 mg)
- Nasal spray (5 mg)

**AMERGE** Naratriptan-Longer half-life, Lower efficacy, minimal side effects

- Tablet (1, 2.5 mg)

**MAXALT** Rizatriptan-Fast

- Tablet (5, 10 mg)

**AXERT** Almotriptan- Low adverse

- Tablet (6.25, 12.5 mg)

**FROVA** Frovatriptan-Long half-life

- Tablet (2.5 mg)

**RELPAK** Eletriptan

- Tablet (40, 80 mg)

## Question and Answer

- Are there differences between the triptans?
- If one triptan fails, will another triptan work?

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\* Pediatric efficacy shown

Ferrari MD et al. *Lancet*. 2001.

# A Word About Vision Changes

- Usually prior to headache
- Seconds-20 minutes
- Can be an isolated symptom. (i.e. ocular migraine)
- Only 40% of patients with “classic” migraine
- Photopsia: sparks, colors, heat waves
- Fortification spectra: Less common. Paracentral decrease in vision fills with zig-zag or other patterns
- Grayout, whiteout or complete visual loss without other neurologic symptoms
- “Floaters” are not aura

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# PREVENTIVE TREATMENT: DRUG CHOICE

DRUG	EFFICACY*	SIDE EFFECTS*	COMORBID CONDITION	
			RELATIVE CONTRAINDICATION	RELATIVE INDICATION
<b>Anticonvulsants</b>				
Divalproex	4+	2+	Liver disease, bleeding disorders	Mania, epilepsy, impulse control
Topiramate	3+	2+	Kidney stones	Epilepsy, mania, neuropathic pain
Gabapentin	2+	2+		Epilepsy, neuropathic pain
<b>Antidepressants</b>				
TCAs	4+	2+	Mania, urinary retention, heart block	Other pain disorders, depression, anxiety disorders, insomnia
SSRIs	2+	1+	Mania	Depression, OCD
MAOIs	2+	4+	Unreliable patient	Refractory depression

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Silberstein SD et al. *Headache in Clinical Practice*. 2nd ed. 2002.

Gray RN et al. *Drug Treatments for the Prevention of Migraine*. 1999.



# PREVENTIVE TREATMENT: DRUG CHOICE

DRUG	EFFICACY*	SIDE EFFECTS*	COMORBID CONDITION	
			RELATIVE CONTRAINDICATION	RELATIVE INDICATION
<b>Antiserotonin</b>				
<b>Methysergide</b>	4+	4+	Angina, PVD	Orthostatic hypotension
<b>β-Blockers</b>	4+	2+	Asthma, depression, CHF, Raynaud's disease, diabetes	HTN, angina
<b>Calcium channel blockers</b>				
<b>Verapamil</b>	2+	1+	Constipation, hypotension	Migraine with aura, HTN, angina, asthma

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# PREVENTIVE TREATMENT: DRUG CHOICE

DRUG	EFFICACY*	SIDE EFFECTS*	COMORBID CONDITION	
			RELATIVE CONTRAINDICATION	RELATIVE INDICATION
<b>NSAIDs</b>				
Naproxen	2+	2+	Ulcer disease, gastritis	Arthritis, other pain disorders
<b>Other</b>				
Riboflavin	2+	1+		Preference for natural products
Feverfew	2+	2+		
Botulinum Toxin A	2+	1+	Myasthenia gravis	Dystonia or Spasticity

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