

= Migraine =

Migraine is a primary headache disorder characterized by recurrent headaches that are moderate to severe . Typically , the headaches affect one half of the head , are pulsating in nature , and last from two to 72 hours . Associated symptoms may include nausea , vomiting , and sensitivity to light , sound , or smell . The pain is generally made worse by physical activity . Up to one @-@ third of people have an aura : typically a short period of visual disturbance which signals that the headache will soon occur . Occasionally , an aura can occur with little or no headache following it .

Migraines are believed to be due to a mixture of environmental and genetic factors . About two @-@ thirds of cases run in families . Changing hormone levels may also play a role , as migraines affect slightly more boys than girls before puberty and two to three times more women than men . The risk of migraines usually decreases during pregnancy . The underlying mechanisms are not fully known . It is , however , believed to involve the nerves and blood vessels of the brain .

Initial recommended treatment is with simple pain medication such as ibuprofen and paracetamol (acetaminophen) for the headache , medication for the nausea , and the avoidance of triggers . Specific medications such as triptans or ergotamines may be used in those for whom simple pain medications are not effective . Caffeine may be added to the above . A number of medications are useful to prevent attacks including metoprolol , valproate , and topiramate .

Globally , approximately 15 % of people are affected by migraines . It most often starts at puberty and is worst during middle age . In some women they become less common following menopause . An early description consistent with migraines is contained in the Ebers papyrus , written around 1500 BCE in ancient Egypt . The word " migraine " is from the Greek ????????? (hemikrania) , " pain on one side of the head " , from ???- (hemi-) , " half " , and ???????? (kranion) , " skull " .

= = Signs and symptoms = =

Migraines typically present with self @-@ limited , recurrent severe headache associated with autonomic symptoms . About 15 ? 30 % of people with migraines experience migraines with an aura and those who have migraines with aura also frequently have migraines without aura . The severity of the pain , duration of the headache , and frequency of attacks are variable . A migraine lasting longer than 72 hours is termed status migrainosus . There are four possible phases to a migraine , although not all the phases are necessarily experienced :

The prodrome , which occurs hours or days before the headache

The aura , which immediately precedes the headache

The pain phase , also known as headache phase

The postdrome , the effects experienced following the end of a migraine attack

= = = Prodrome phase = = =

Prodromal or premonitory symptoms occur in about 60 % of those with migraines , with an onset that can range from two hours to two days before the start of pain or the aura . These symptoms may include a wide variety of phenomena , including altered mood , irritability , depression or euphoria , fatigue , craving for certain food (s) , stiff muscles (especially in the neck) , constipation or diarrhea , and sensitivity to smells or noise . This may occur in those with either migraine with aura or migraine without aura .

= = = Aura phase = = =

An aura is a transient focal neurological phenomenon that occurs before or during the headache . Auras appear gradually over a number of minutes and generally last less than 60 minutes . Symptoms can be visual , sensory or motor in nature and many people experience more than one . Visual effects occur most frequently ; they occur in up to 99 % of cases and in more than 50 % of cases are not accompanied by sensory or motor effects .

Vision disturbances often consist of a scintillating scotoma (an area of partial alteration in the field of vision which flickers and may interfere with a person 's ability to read or drive) . These typically start near the center of vision and then spread out to the sides with zigzagging lines which have been described as looking like fortifications or walls of a castle . Usually the lines are in black and white but some people also see colored lines . Some people lose part of their field of vision known as hemianopsia while others experience blurring .

Sensory auras are the second most common type ; they occur in 30 ? 40 % of people with auras . Often a feeling of pins @-@ and @-@ needles begins on one side in the hand and arm and spreads to the nose ? mouth area on the same side . Numbness usually occurs after the tingling has passed with a loss of position sense . Other symptoms of the aura phase can include speech or language disturbances , world spinning , and less commonly motor problems . Motor symptoms indicate that this is a hemiplegic migraine , and weakness often lasts longer than one hour unlike other auras . Auditory hallucinations or delusions have also been described .

= = = Pain phase = = =

Classically the headache is unilateral , throbbing , and moderate to severe in intensity . It usually comes on gradually and is aggravated by physical activity . In more than 40 % of cases , however , the pain may be bilateral and neck pain is commonly associated with it . Bilateral pain is particularly common in those who have migraines without an aura . Less commonly pain may occur primarily in the back or top of the head . The pain usually lasts 4 to 72 hours in adults , however in young children frequently lasts less than 1 hour . The frequency of attacks is variable , from a few in a lifetime to several a week , with the average being about one a month .

The pain is frequently accompanied by nausea , vomiting , sensitivity to light , sensitivity to sound , sensitivity to smells , fatigue and irritability . In a basilar migraine , a migraine with neurological symptoms related to the brain stem or with neurological symptoms on both sides of the body , common effects include a sense of the world spinning , light @-@ headedness , and confusion . Nausea occurs in almost 90 % of people , and vomiting occurs in about one @-@ third . Many thus seek a dark and quiet room . Other symptoms may include blurred vision , nasal stuffiness , diarrhea , frequent urination , pallor , or sweating . Swelling or tenderness of the scalp may occur as can neck stiffness . Associated symptoms are less common in the elderly .

Rarely , an aura occurs without a subsequent headache . This is known as an acephalgic migraine or silent migraine ; however , it is difficult to assess the frequency of such cases because people who do not experience symptoms severe enough to seek treatment may not realize that anything unusual is happening to them and pass it off without reporting any problems .

= = = Postdrome = = =

The migraine postdrome could be defined as that constellation of symptoms occurring once the acute headache has settled . Many report a sore feeling in the area where the migraine was , and some report impaired thinking for a few days after the headache has passed . The person may feel tired or " hung over " and have head pain , cognitive difficulties , gastrointestinal symptoms , mood changes , and weakness . According to one summary , " Some people feel unusually refreshed or euphoric after an attack , whereas others note depression and malaise . " For some individuals this can vary each time .

= = Cause = =

The underlying causes of migraines are unknown . However , they are believed to be related to a mix of environmental and genetic factors . They run in families in about two @-@ thirds of cases and rarely occur due to a single gene defect . While migraines were once believed to be more common in those of high intelligence , this does not appear to be true . A number of psychological conditions are associated , including depression , anxiety , and bipolar disorder , as are many

biological events or triggers .

== = Genetics = = =

Studies of twins indicate a 34 % to 51 % genetic influence of likelihood to develop migraine headaches . This genetic relationship is stronger for migraines with aura than for migraines without aura . A number of specific variants of genes increase the risk by a small to moderate amount .

Single gene disorders that result in migraines are rare . One of these is known as familial hemiplegic migraine , a type of migraine with aura , which is inherited in an autosomal dominant fashion . Four genes have been shown to be involved in familial hemiplegic migraine . Three of these genes are involved in ion transport . The fourth is an axonal protein associated with the exocytosis complex . Another genetic disorder associated with migraine is CADASIL syndrome or cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy .

== = Triggers = = =

Migraines may be induced by triggers , with some reporting it as an influence in a minority of cases and others the majority . Many things have been labeled as triggers , however the strength and significance of these relationships are uncertain . Most people with migraines report to experience triggers . A trigger may be encountered up to 24 hours prior to the onset of symptoms .

== = = Physiological aspects = = = =

Common triggers quoted are stress , hunger , and fatigue (these equally contribute to tension headaches) . Psychological stress has been reported as a factor by 50 to 80 % of people . Migraines have also been associated with post @-@ traumatic stress disorder and abuse . Migraines are more likely to occur around menstruation . Other hormonal influences , such as menarche , oral contraceptive use , pregnancy , perimenopause , and menopause , also play a role . These hormonal influences seem to play a greater role in migraine without aura . Migraines typically do not occur during the second and third trimesters or following menopause .

== = = Dietary aspects = = = =

Between 12 and 60 % of people report foods as triggers . Evidence for dietary triggers , however , mostly relies on self @-@ reports and is not rigorous enough to prove or disprove any particular triggers . A clear explanation for why food might trigger migraines is also lacking .

Regarding specific agents there does not appear to be evidence for an effect of tyramine on migraine , and while monosodium glutamate (MSG) is frequently reported as a dietary trigger , evidence does not consistently support this .

== = = Environmental aspects = = = =

A review on potential triggers in the indoor and outdoor environment concluded that there is insufficient evidence to confirm environmental factors as causing migraines . They nevertheless suggested that people with migraines take some preventive measures related to indoor air quality and lighting .

== Pathophysiology ==

Migraines are believed to be a neurovascular disorder with evidence supporting its mechanisms starting within the brain and then spreading to the blood vessels . Some researchers believe neuronal mechanisms play a greater role , while others believe blood vessels play the key role . Others believe both are likely important . One theory is related to increased excitability of the

cerebral cortex and abnormal control of pain neurons in the trigeminal nucleus of the brainstem . High levels of the neurotransmitter serotonin , also known as 5-HT hydroxytryptamine , are believed to be involved .

=== Aura ===

Cortical spreading depression , or spreading depression according to Leão , is bursts of neuronal activity followed by a period of inactivity , which is seen in those with migraines with an aura . There are a number of explanations for its occurrence including activation of NMDA receptors leading to calcium entering the cell . After the burst of activity the blood flow to the cerebral cortex in the area affected is decreased for two to six hours . It is believed that when depolarization travels down the underside of the brain , nerves that sense pain in the head and neck are triggered .

=== Pain ===

The exact mechanism of the head pain which occurs during a migraine is unknown . Some evidence supports a primary role for central nervous system structures (such as the brainstem and diencephalon) while other data support the role of peripheral activation (such as via the sensory nerves that surround blood vessels of the head and neck) . The potential candidate vessels include dural arteries , pial arteries and extracranial arteries such as those of the scalp . The role of vasodilatation of the extracranial arteries , in particular , is believed to be significant .

=== Diagnosis ===

The diagnosis of a migraine is based on signs and symptoms . Neuroimaging tests are not necessary to diagnose migraine , but may be used to find other causes of headaches in those whose examination and history do not confirm a migraine diagnosis . It is believed that a substantial number of people with the condition remain undiagnosed .

The diagnosis of migraine without aura , according to the International Headache Society , can be made according to the following criteria , the " 5 , 4 , 3 , 2 , 1 criteria " :

Five or more attacks ? for migraine with aura , two attacks are sufficient for diagnosis .

Four hours to three days in duration

Two or more of the following :

Unilateral (affecting half the head) ;

Pulsating ;

Moderate or severe pain intensity ;

Worsened by or causing avoidance of routine physical activity

One or more of the following :

Nausea and / or vomiting ;

Sensitivity to both light (photophobia) and sound (phonophobia)

If someone experiences two of the following : photophobia , nausea , or inability to work or study for a day , the diagnosis is more likely . In those with four out of five of the following : pulsating headache , duration of 4 ? 72 hours , pain on one side of the head , nausea , or symptoms that interfere with the person 's life , the probability that this is a migraine is 92 % . In those with fewer than three of these symptoms the probability is 17 % .

=== Classification ===

Migraines were first comprehensively classified in 1988 . The International Headache Society most recently updated their classification of headaches in 2004 . According to this classification migraines are primary headaches along with tension @-@ type headaches and cluster headaches , among others .

Migraines are divided into seven subclasses (some of which include further subdivisions) :

Migraine without aura , or " common migraine " , involves migraine headaches that are not accompanied by an aura .

Migraine with aura , or " classic migraine " , usually involves migraine headaches accompanied by an aura . Less commonly , an aura can occur without a headache , or with a nonmigraine headache . Two other varieties are familial hemiplegic migraine and sporadic hemiplegic migraine , in which a person has migraines with aura and with accompanying motor weakness . If a close relative has had the same condition , it is called " familial " , otherwise it is called " sporadic " . Another variety is basilar @-@ type migraine , where a headache and aura are accompanied by difficulty speaking , world spinning , ringing in ears , or a number of other brainstem @-@ related symptoms , but not motor weakness . This type was initially believed to be due to spasms of the basilar artery , the artery that supplies the brainstem .

Childhood periodic syndromes that are commonly precursors of migraine include cyclical vomiting (occasional intense periods of vomiting) , abdominal migraine (abdominal pain , usually accompanied by nausea) , and benign paroxysmal vertigo of childhood (occasional attacks of vertigo) .

Retinal migraine involves migraine headaches accompanied by visual disturbances or even temporary blindness in one eye .

Complications of migraine describe migraine headaches and / or auras that are unusually long or unusually frequent , or associated with a seizure or brain lesion .

Probable migraine describes conditions that have some characteristics of migraines , but where there is not enough evidence to diagnose it as a migraine with certainty (in the presence of concurrent medication overuse) .

Chronic migraine is a complication of migraines , and is a headache that fulfills diagnostic criteria for migraine headache and occurs for a greater time interval . Specifically , greater or equal to 15 days / month for longer than 3 months .

= = = Abdominal migraine = = =

The diagnosis of abdominal migraines is controversial . Some evidence indicates that recurrent episodes of abdominal pain in the absence of a headache may be a type of migraine or are at least a precursor to migraines . These episodes of pain may or may not follow a migraine @-@ like prodrome and typically last minutes to hours . They often occur in those with either a personal or family history of typical migraines . Other syndromes that are believed to be precursors include cyclical vomiting syndrome and benign paroxysmal vertigo of childhood .

= = = Differential diagnosis = = =

Other conditions that can cause similar symptoms to a migraine headache include temporal arteritis , cluster headaches , acute glaucoma , meningitis and subarachnoid hemorrhage . Temporal arteritis typically occurs in people over 50 years old and presents with tenderness over the temple , cluster headaches presents with one @-@ sided nose stuffiness , tears and severe pain around the orbits , acute glaucoma is associated with vision problems , meningitis with fevers , and subarachnoid hemorrhage with a very fast onset . Tension headaches typically occur on both sides , are not pounding , and are less disabling .

Those with stable headaches which meet criteria for migraines should not receive neuroimaging to look for other intracranial disease . This requires that other concerning findings such as papilledema (swelling of the optic disc) are not present . People with migraines are not at an increased risk of having another cause for severe headaches .

= = Prevention = =

Preventive treatments of migraines include medications , nutritional supplements , lifestyle alterations , and surgery . Prevention is recommended in those who have headaches more than two

days a week , cannot tolerate the medications used to treat acute attacks , or those with severe attacks that are not easily controlled .

The goal is to reduce the frequency , painfulness , and / or duration of migraines , and to increase the effectiveness of abortive therapy . Another reason for prevention is to avoid medication overuse headache . This is a common problem and can result in chronic daily headache .

== Medication ==

Preventive migraine medications are considered effective if they reduce the frequency or severity of the migraine attacks by at least 50 % . Guidelines are fairly consistent in rating topiramate , divalproex / sodium valproate , propranolol , and metoprolol as having the highest level of evidence for first @-@ line use . Recommendations regarding effectiveness varied however for gabapentin . Timolol is also effective for migraine prevention and in reducing migraine attack frequency and severity , while frovatriptan is effective for prevention of menstrual migraine .

Amitriptyline and venlafaxine are probably also effective . Angiotensin inhibition by either an angiotensin @-@ converting enzyme inhibitor or angiotensin II receptor antagonist may reduce attacks . Botulinum toxin (Botox) has been found to be useful in those with chronic migraines but not those with episodic ones .

== Alternative therapies ==

While acupuncture may be effective , " true " acupuncture is not more efficient than sham acupuncture , a practice where needles are placed randomly . Both have a possibility of being more effective than routine care , with fewer adverse effects than preventative medications . Chiropractic manipulation , physiotherapy , massage and relaxation might be as effective as propranolol or topiramate in the prevention of migraine headaches ; however , the research had some problems with methodology . The evidence to support spinal manipulation is poor and insufficient to support its use .

Tentative evidence supports the use of stress reduction techniques such as cognitive behavioral therapy , biofeedback , and relaxation techniques . Of the alternative medicines , butterbur has the best evidence for its use .

== Devices and surgery ==

Medical devices , such as biofeedback and neurostimulators , have some advantages in migraine prevention , mainly when common anti @-@ migraine medications are contraindicated or in case of medication overuse . Biofeedback helps people be conscious of some physiological parameters so as to control them and try to relax and may be efficient for migraine treatment . Neurostimulation uses implantable neurostimulators similar to pacemakers for the treatment of intractable chronic migraines with encouraging results for severe cases . A transcutaneous electrical nerve stimulation device is approved in the United States for the prevention of migraines . Migraine surgery , which involves decompression of certain nerves around the head and neck , may be an option in certain people who do not improve with medications .

== Management ==

There are three main aspects of treatment : trigger avoidance , acute symptomatic control , and pharmacological prevention . Medications are more effective if used earlier in an attack . The frequent use of medications may result in medication overuse headache , in which the headaches become more severe and more frequent . This may occur with triptans , ergotamines , and analgesics , especially narcotic analgesics . Due to these concerns simple analgesics are recommended to be used less than three days per week at most .

=== Analgesics ===

Recommended initial treatment for those with mild to moderate symptoms are simple analgesics such as non-steroidal anti-inflammatory drugs (NSAIDs) or the combination of paracetamol , aspirin , and caffeine . Several NSAIDs , including diclofenac and ibuprofen have evidence to support their use . Aspirin can relieve moderate to severe migraine pain , with an effectiveness similar to sumatriptan . Ketorolac is available in an intravenous formulation .

Paracetamol (also known as acetaminophen) , either alone or in combination with metoclopramide , is another effective treatment with a low risk of adverse effects . Metoclopramide is also effective by itself . In pregnancy , paracetamol and metoclopramide are deemed safe as are NSAIDs until the third trimester .

=== Triptans ===

Triptans such as sumatriptan are effective for both pain and nausea in up to 75 % of people . When sumatriptan is taken with naproxen it works better . They are the initially recommended treatments for those with moderate to severe pain or those with milder symptoms who do not respond to simple analgesics . The different forms available include oral , injectable , nasal spray , and oral dissolving tablets . In general , all the triptans appear equally effective , with similar side effects . However , individuals may respond better to specific ones . Most side effects are mild , such as flushing ; however , rare cases of myocardial ischemia have occurred . They are thus not recommended for people with cardiovascular disease , who have had a stroke , or have migraines that are accompanied by neurological problems . In addition , triptans should be prescribed with caution for those with risk factors for vascular disease . While historically not recommended in those with basilar migraines there is no specific evidence of harm from their use in this population to support this caution . They are not addictive , but may cause medication overuse headaches if used more than 10 days per month .

=== Ergotamines ===

Ergotamine and dihydroergotamine are older medications still prescribed for migraines , the latter in nasal spray and injectable forms . They appear equally effective to the triptans , are less expensive , and experience adverse effects that typically are benign . In the most severe cases , such as those with status migrainosus , they appear to be the most effective treatment option .

=== Other ===

Intravenous metoclopramide or intranasal lidocaine are other potential options . Metoclopramide is the recommended treatment for those who present to the emergency department . Haloperidol may also be useful in this group . A single dose of intravenous dexamethasone , when added to standard treatment of a migraine attack , is associated with a 26 % decrease in headache recurrence in the following 72 hours . Spinal manipulation for treating an ongoing migraine headache is not supported by evidence . It is recommended that opioids and barbiturates not be used due to questionable efficacy and the risk of rebound headache .

=== Children ===

Ibuprofen improves pain in children with migraines . Paracetamol does not appear to be effective in providing pain relief . Triptans are effective , though there is a risk of causing minor side effects like taste disturbance , nasal symptoms , dizziness , fatigue , low energy , nausea , or vomiting .

=== Prognosis ===

Long term prognosis in people with migraines is variable . Most people with migraines have periods of lost productivity due to their disease ; however typically the condition is fairly benign and is not associated with an increased risk of death . There are four main patterns to the disease : symptoms can resolve completely , symptoms can continue but become gradually less with time , symptoms may continue at the same frequency and severity , or attacks may become worse and more frequent .

Migraines with aura appear to be a risk factor for ischemic stroke doubling the risk . Being a young adult , being female , using hormonal birth control , and smoking further increases this risk . There also appears to be an association with cervical artery dissection . Migraines without aura do not appear to be a factor . The relationship with heart problems is inconclusive with a single study supporting an association . Overall however migraines do not appear to increase the risk of death from stroke or heart disease . Preventative therapy of migraines in those with migraines with auras may prevent associated strokes . People with migraines , particularly women , may develop higher than average numbers of white matter brain lesions of unclear significance .

= = Epidemiology = =

Worldwide , migraines affect nearly 15 % or approximately one billion people . It is more common in women at 19 % than men at 11 % . In the United States , about 6 % of men and 18 % of women get a migraine in a given year , with a lifetime risk of about 18 % and 43 % respectively . In Europe , migraines affect 12 ? 28 % of people at some point in their lives with about 6 ? 15 % of adult men and 14 ? 35 % of adult women getting at least one yearly . Rates of migraines are slightly lower in Asia and Africa than in Western countries . Chronic migraines occur in approximately 1 @. @ 4 to 2 @. @ 2 % of the population .

These figures vary substantially with age : migraines most commonly start between 15 and 24 years of age and occur most frequently in those 35 to 45 years of age . In children , about 1 @. @ 7 % of 7 year olds and 3 @. @ 9 % of those between 7 and 15 years have migraines , with the condition being slightly more common in boys before puberty . During adolescence migraines become more common among women and this persists for the rest of the lifespan , being two times more common among elderly females than males . In women migraines without aura are more common than migraines with aura , however in men the two types occur with similar frequency .

During perimenopause symptoms often get worse before decreasing in severity . While symptoms resolve in about two thirds of the elderly , in between 3 and 10 % they persist .

= = History = =

An early description consistent with migraines is contained in the Ebers papyrus , written around 1500 BCE in ancient Egypt . In 200 BCE , writings from the Hippocratic school of medicine described the visual aura that can precede the headache and a partial relief occurring through vomiting .

A second @-@ century description by Aretaeus of Cappadocia divided headaches into three types : cephalalgia , cephalaea , and heterocrania . Galen of Pergamon used the term hemicrania (half @-@ head) , from which the word migraine was eventually derived . He also proposed that the pain arose from the meninges and blood vessels of the head . Migraines were first divided into the two now used types - migraine with aura (migraine ophthalmique) and migraine without aura (migraine vulgaire) in 1887 by Louis Hyacinthe Thomas , a French Librarian .

Trepanation , the deliberate drilling of holes into a skull , was practiced as early as 7 @, @ 000 BCE . While sometimes people survived , many would have died from the procedure due to infection . It was believed to work via " letting evil spirits escape " . William Harvey recommended trepanation as a treatment for migraines in the 17th century .

While many treatments for migraines have been attempted , it was not until 1868 that use of a substance which eventually turned out to be effective began . This substance was the fungus ergot from which ergotamine was isolated in 1918 . Methysergide was developed in 1959 and the first

triptan , sumatriptan , was developed in 1988 . During the 20th century with better study design effective preventative measures were found and confirmed .

= = Society and culture = =

Migraines are a significant source of both medical costs and lost productivity . It has been estimated that they are the most costly neurological disorder in the European Community , costing more than ? 27 billion per year . In the United States direct costs have been estimated at \$ 17 billion . Nearly a tenth of this cost is due to the cost of triptans. including \$ 15 billion in indirect costs , of which missed work is the greatest component . In those who do attend work with a migraine , effectiveness is decreased by around a third . Negative impacts also frequently occur for a person 's family .

= = Research = =

Calcitonin gene related peptides (CGRPs) have been found to play a role in the pathogenesis of the pain associated with migraine . CGRP receptor antagonists , such as olcegepant and telcagepant , have been investigated both in vitro and in clinical studies for the treatment of migraine . In 2011 , Merck stopped phase III clinical trials for their investigational drug telcagepant . Transcranial magnetic stimulation shows promise as has transcutaneous supraorbital nerve stimulation .