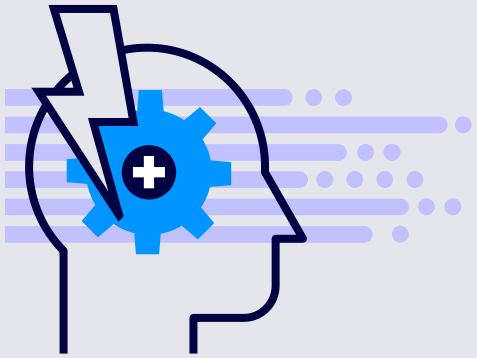
Disease state

Migraine: A Prevalent and Disabling Neurological Disease with High Socioeconomic and Personal Impact



Start >

Pfizer Medical Affairs

Home > **Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact**

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Migraine is a primary headache disorder that can be categorized into subtypes based on symptoms and headache frequency[1]

~40 million people in the US live with migraine[2]

~3× more common in females than males[3,4]

Most common in the productive years[4]

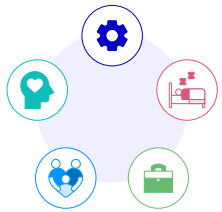
A leading global cause of years lived with disability[5]

Ahead of low back pain and major depression in **women aged 15–49 years**[5]

After low back pain across **all ages and genders**[5]

Among the **top 3 most debilitating neurological diseases in the US**[6]

Impacts multiple aspects of individuals' lives[7–11]

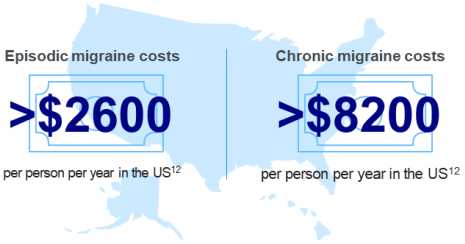


- Daily functioning
- Sleep
- Family & social life
- Education & career
- Mental health

×3 More likely to have comorbid depression and anxiety[11]

2 in 5 experience interictal anxiety[7]

High economic burden due to direct and indirect costs[12,13]



≥60,000

Annual workdays affected by absenteeism and presenteeism across different US industries[13]

Opportunities to optimize migraine management and reduce disease burden exist at each stage of the patient journey[3,4,14,15]

Consultation → Diagnosis → Treatment → Follow-up

MHD, monthly headache day.

1. Headache Classification Committee of the International Headache Society. Cephalalgia 2018;38:1–211; 2. Law HZ, et al. Plast Reconstr Surg Glob Open 2020;8:e2790; 3. Lipton RB, et al. Headache 2022;62:122–40; 4. Lipton RB, et al. Headache 2018;58:1408–26; 5. Steiner TJ, et al. J Headache Pain 2020;21:137; 6. GBD 2017 US Neurological Disorders Collaborators. JAMA Neurol 2021;78:165–76; 7. Gibbs SN, et al. Headache 2020;60:1351–64; 8. Martelletti P, et al. J Headache Pain 2018;19:115; 9. Buse DC, et al. Headache 2019;59:1286–99; 10. Hubig LT, et al. J Headache Pain 2022;23:9; 11. Buse DC, et al. J Headache Pain 2020;21:23; 12. Messali A, et al. Headache 2016;56:306–22; 13. Yucel A, et al. Am J Manag Care 2020;26:e403–8; 14. Buse DC, et al. Headache 2021;61:628–41; 15. Lipton RB, et al. Headache 2019;59:1310–23.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Migraine is a primary headache disorder that can be categorized into subtypes based on symptoms and headache frequency

Migraine *without* aura[1]

- Recurrent headache disorder
- Attacks lasting **4–72 hours**
- Headache usually **moderate or severe**, **unilateral and pulsating**
- Aggravated by routine physical activity[a]
- Associated with ≥1 of the following: 1) **nausea and/or vomiting** and/or 2) **photophobia and phonophobia**

Migraine *with* aura[1]

- Recurrent attacks of **visual**, **sensory**, **or other CNS symptoms**
- Individual aura symptoms lasting **5–60 minutes**
- Symptoms usually **unilateral**, **develop gradually**, and are **fully reversible**
- Usually followed by **headache** and associated migraine symptoms

Episodic migraine[1]

- **Headache or migraine** occurring on **<15 days/month**
- Does not fulfil the diagnostic criteria for chronic migraine

Chronic migraine[1]

- **Headache** occurring on **≥15 days/month** for **>3 months**
- With **features of migraine** on **≥8 days/month**

Migraine attacks can be heterogeneous[2]

During attacks, a complex and variable sequence of symptoms occur across different phases[3]

During the interictal period, symptoms can persist, and individuals remain susceptible to the next attack[3,4]

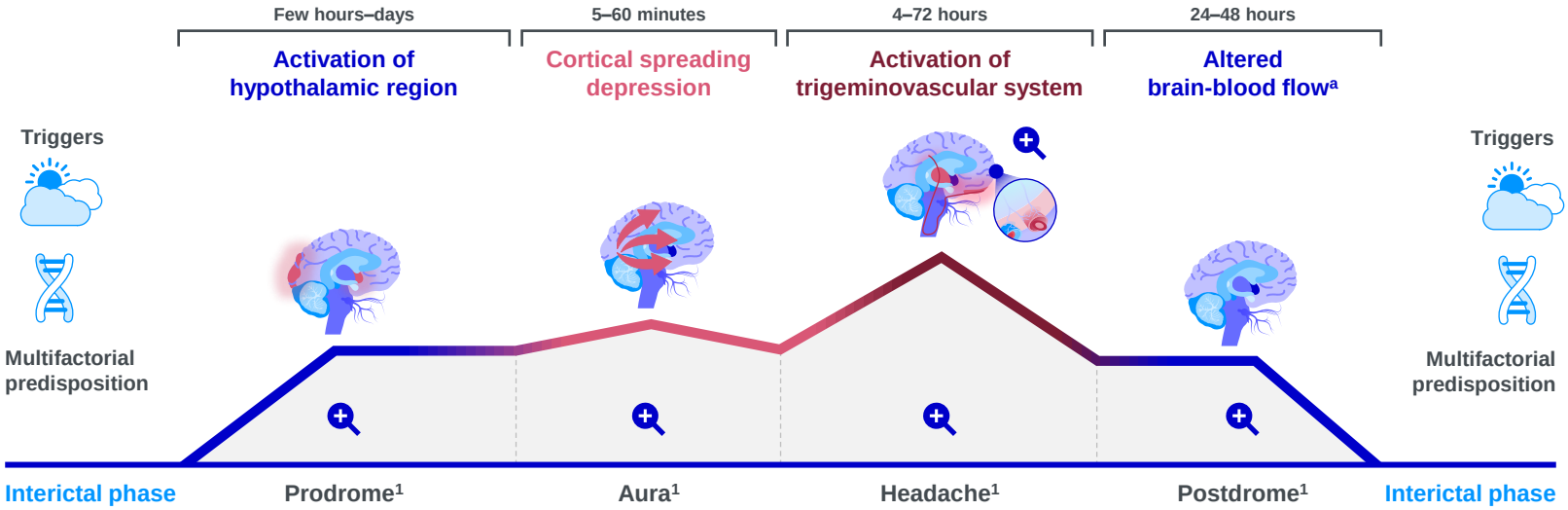
CNS, central nervous system. [a]E.g. walking or climbing stairs.

1. Headache Classification Committee of the International Headache Society. Cephalalgia 2018;38:1–211; 2. Lipton RB, et al. Neurology 2019;93:e2224–36; 3. Andreou AP, Edvinsson L. J Headache Pain 2019;20:117; 4. Lampl C, et al. J Headache Pain 2016;17:9.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Functional changes in different areas of the brain produce an array of symptoms at different stages of an attack[1–3]



Stages can occur sequentially or overlap, and some may not occur at all for some patients[1]

Only ~1 in 3 people with migraine experience aura with some or every attack[4]

[a]Postdrome is the least studied and understood phase.

1. Ferrari MD, et al. Nat Rev Dis Primers 2022;8:2; 2. Dodick DW. Lancet 2018;391:1315–30; 3. Andreou AP, Edvinsson L. J Headache Pain 2019;20:117; 4. Lipton RB, et al. Neurol 2002;58:885–94.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Functional changes in different areas of the brain produce an arra

PRODROME

Few hours–days

Activation of hypothalamic region

Premonitory symptoms (occur in approximately one-third of patients)

- Fatigue
- Drowsiness
- Yawning
- Impaired concentration
- Mental slowness
- Neck pain/stiffness
- Water retention
- Photophobia
- Nausea
- Anorexia
- Diarrhea
- Food cravings
- Speech dysfunction

Triggers

Multifactorial predisposition

Interictal ph

Triggers

Multifactorial predisposition

rictal phase

[a]Postdrome is the least studied and understood phase.

1. Ferrari MD, et al. Nat Rev Dis Primers 2022;8:2; 2. Dodick DW. Lancet 2018;391:1315–30; 3. Andreou AP, Edvinsson L. J Headache Pain 2019;20:117; 4. Eigenbrodt AK, et al. Nat Rev Neurol 2021;17:501–14.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Functional changes in different areas of the brain produce an arra

AURA

5–60 minutes

Cortical spreading depression

Transient focal neurological symptoms

- Nearly always visual
  - **Most common:**
    - Scintillating scotoma
  - **Less common:**
    - Scotoma
    - Flashing lights
- Sensory symptoms
  - Paresthesia
  - Numbness of face and/or upper extremity
- Expressive language dysfunction
- Rarely, motor dysfunction, sometimes extending into headache phase

Triggers

Multifactorial predisposition

Interictal ph

Triggers

Multifactorial predisposition

rictal phase

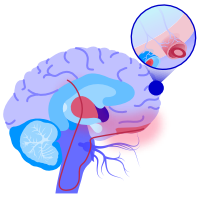
[a]Postdrome is the least studied and understood phase.

1. Ferrari MD, et al. Nat Rev Dis Primers 2022;8:2; 2. Dodick DW. Lancet 2018;391:1315–30; 3. Andreou AP, Edvinsson L. J Headache Pain 2019;20:117; 4. Eigenbrodt AK, et al. Nat Rev Neurol 2021;17:501–14.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Functional changes in different areas of the brain produce an arra



HEADACHE

4–72 hours

Activation of trigeminovascular system

Headache (≥2 characteristics)

- Unilateral
- Throbbing
- Severe (bedridden)
- Increases with activity

Associated symptoms (≥1)

- Nausea, vomiting
- Photophobia and phonophobia

Triggers

Multifactorial predisposition

Interictal ph

Triggers

Multifactorial predisposition

rictal phase

[a]Postdrome is the least studied and understood phase.

1. Ferrari MD, et al. Nat Rev Dis Primers 2022;8:2; 2. Dodick DW. Lancet 2018;391:1315–30; 3. Andreou AP, Edvinsson L. J Headache Pain 2019;20:117; 4. Eigenbrodt AK, et al. Nat Rev Neurol 2021;17:501–14.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Functional changes in different areas of the brain produce an arra

POSTDROME

24–48 hours

Altered brain-blood flow

Recovery phase

- Asthenia
- Tiredness
- Somnolence
- Difficulty with concentration
- Cognitive difficulties

Triggers

Multifactorial predisposition

Interictal ph

Triggers

Multifactorial predisposition

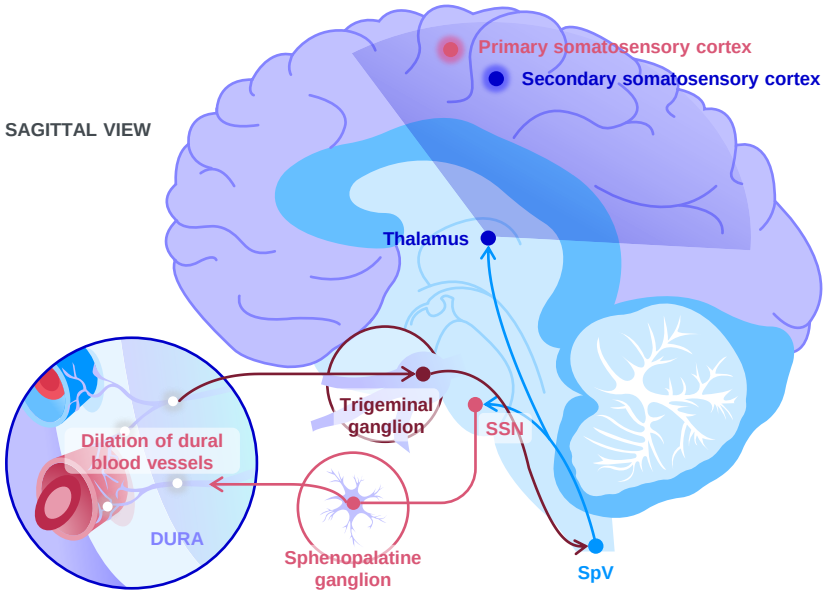
rictal phase

[a]Postdrome is the least studied and understood phase.

1. Ferrari MD, et al. Nat Rev Dis Primers 2022;8:2; 2. Dodick DW. Lancet 2018;391:1315–30; 3. Andreou AP, Edvinsson L. J Headache Pain 2019;20:117; 4. Eigenbrodt AK, et al. Nat Rev Neurol 2021;17:501–14.
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Activation of the trigeminovascular system is a component of migraine headache



The trigeminal nerve and its afferent fibers innervate the meninges and intracranial vasculature and project to structures in the CNS

Activation of the trigeminovascular system releases neuropeptides (e.g. CGRP) that induce **vasodilation** of intracranial arteries and may cause local **inflammation**

Neuronal sensitization in the brainstem and thalamus

Nociceptive signals relayed to the areas of the brain that yield the **perception of pain**

Image adapted from Ashina M. N Engl J Med 2020;383;1866–76.
CGRP, calcitonin gene-related peptide; CNS, central nervous system; SpV, spinal trigeminal nucleus; SSN, superior salivatory nucleus.
Ashina M. N Engl J Med 2020;383;1866–76.

MH
1. H
5. D
http
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

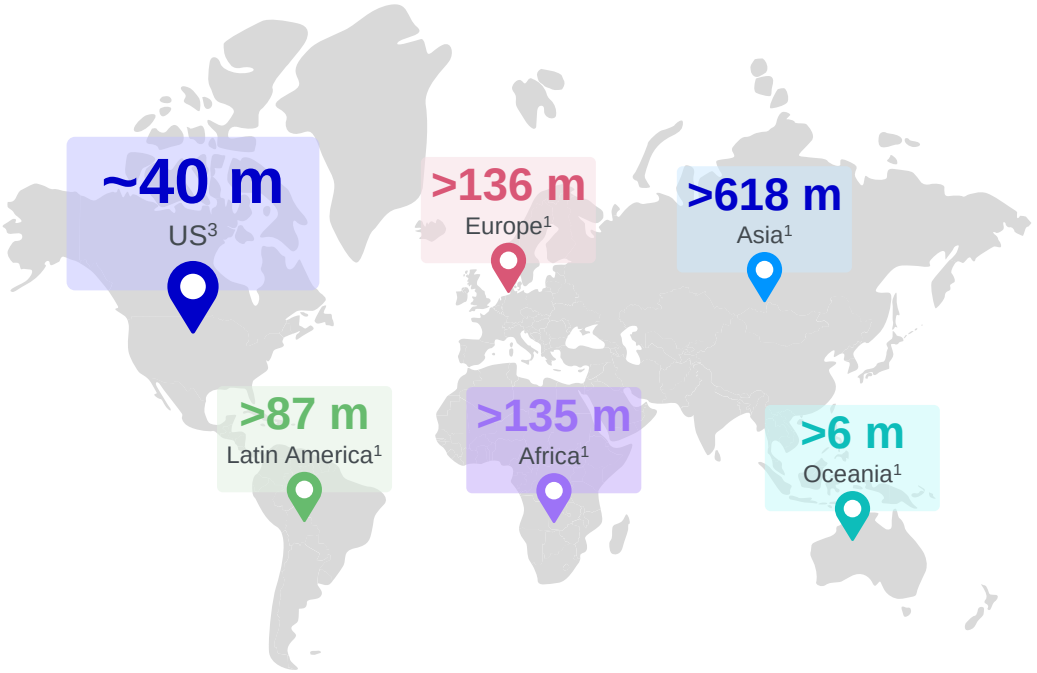
Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

More than 1 billion people live with migraine globally, with approximately 40 million in the United States[1–3]

2nd
Most prevalent **neurological disease** in the US[a,4]

~3×
More common in females than males[5,6]

25–55 years
Most common in the **productive years**[6]



[a]Tension-type headache is the most prevalent neurological disease.

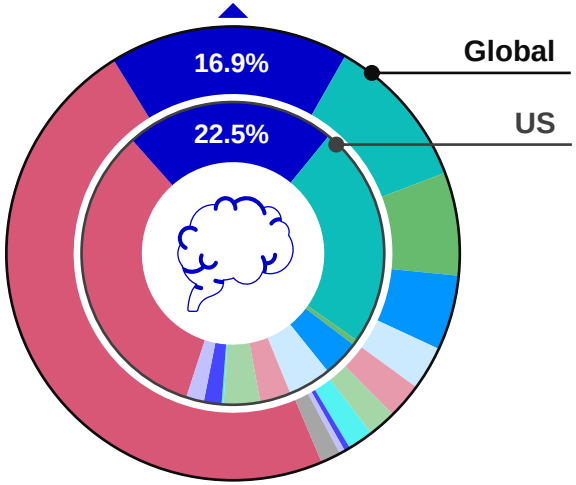
1. GBD 2016 Headache Collaborators. Lancet Neurol 2018;17:954–76; 2. Stovner LJ, et al. J Headache Pain 2022;23:34; 3. Law HZ, et al. Plast Reconstr Surg Glob Open 2020;8:e2790; 4. GBD 2017 US Neurological Disorders Collaborators. JAMA Neurol 2021;78:165–76; 5. Lipton RB, et al. Headache 2022;62:122–40; 6. Lipton RB, et al. Headache 2018;58:1408–26.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

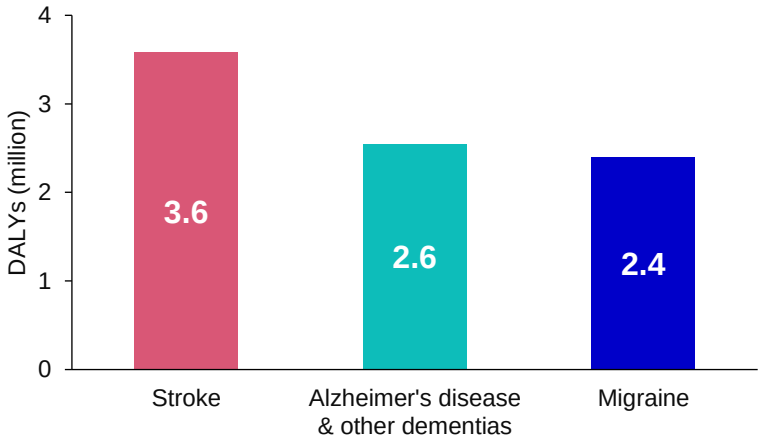
Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Migraine ranks among the top 3 most debilitating neurological diseases

In 2017, migraine accounted for ~20% of DALYs caused by neurologic diseases[1,2]



Absolute number of DALYs attributed to the top 3 most burdensome neurologic disorders in the US[2]



Stroke
Alzheimer's disease & other dementias
Migraine
Motor neuron disease
Multiple sclerosis
Brain and nervous system cancer
Meningitis
Encephalitis
Epilepsy
Parkinson's disease
Tension-type headache
Others

DALY, disability-adjusted life-year.

1. Deuschl G, et al. Lancet Public Health 2020;5:e551–67; 2. GBD 2017 US Neurological Disorders Collaborators. JAMA Neurol 2021;78:165–76.

DALYs by state >

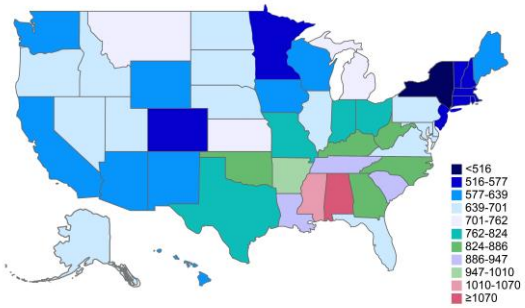
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

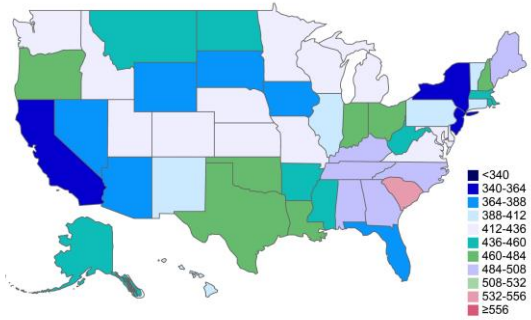
Compared with stroke and Alzheimer's disease, migraine disability is relatively evenly distributed across the United States

DALYs per 100,000 persons for the top 3 most burdensome neurological disorders in the US States (2017)

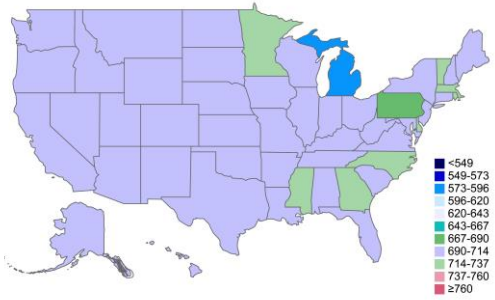
Stroke



Alzheimer's disease & other dementias



Migraine



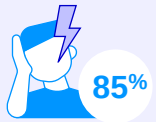
DALY, disability-adjusted life-year.
GBD 2017 US Neurological Disorders Collaborators. JAMA Neurol 2021;78:165–76.

< Absolute DALYs

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Migraine impacts multiple aspects of individuals' lives



Report being very or extremely limited during headache phase[1]

Report impaired sleep[1]

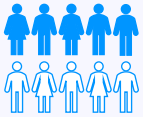
Feel fatigued often or always[2]

Need help with daily tasks[1]

Worry about long-term financial security[3]

50–80% report that they would get more enjoyment from their free time without headaches[3]

~20% indicate that migraine has contributed to relationship problems[3]



>50% report feeling helpless at least some of the time[4]

~40% believe that they would be a better parent if they did not have headaches[3]

~70% of individuals have a severe **interictal burden;**[4] **2 in 5** experience **interictal anxiety**[1]

People with migraine are **~2–4 ×** more likely to have depression, anxiety, insomnia and some CV comorbidities[5]

CV, cardiovascular; QoL, quality of life.

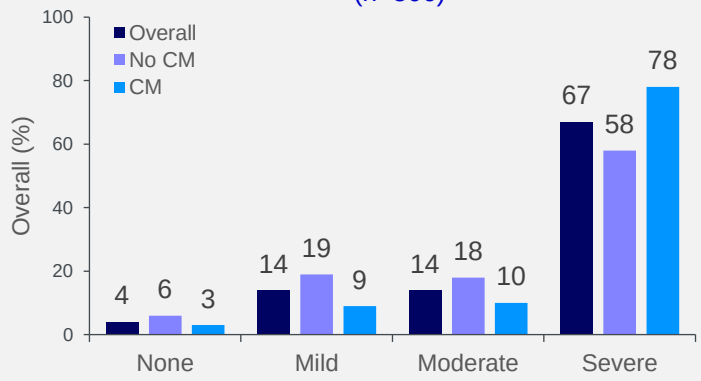
1. Gibbs SN, et al. Headache 2020;60:1351–64; 2. Martelletti P, et al. J Headache Pain 2018;19:115; 3. Buse DC, et al. Headache 2019;59:1286–99; 4. Hubig LT, et al. J Headache Pain 2022;23:9; 5. Buse DC, et al. J Headache Pain 2020;21:23.

MH
1. H
5. D
http
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Many individuals report a substantial interictal burden associated with migraine frequency and impact of migraine attacks[1,a]

Level of interictal burden (MIBS-4) among people with migraine in the US and Germany[1]
(n=506)



~70% report **severe interictal burden** (MIBS-4), which was correlated with **migraine impact** (HIT-6) and **migraine frequency** (MMD and MHD)[1]

~70% worry about planning leisure or social activities because they may have a headache[1,b]

>50% agree that headache affects their work or school at times when they do not have a headache[1,b]

>50% feel helpless because of their headaches at times when they do not have a headache[1,b]

~50% agree that migraine has an impact on their life at times when they do not have a headache[1,b]

Interictal anxiety is common: 41% of individuals are very or extremely fearful of their next attack[2,c]

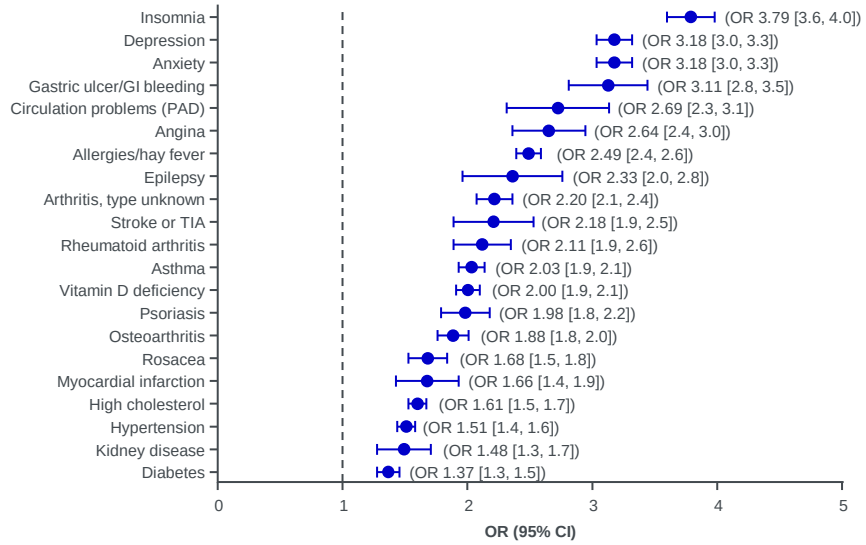
[a]Web-based study of 506 people with migraine (US: n=257; Germany: n=249); [b]Based on MIBS-4 responses 'some of the time', 'much of the time', and 'most or all of the time';
[c]Web-based survey of 1101 people with self-diagnosed migraine in the United States (My Migraine Voice).
CM, chronic migraine; HIT-6, Headache Impact Test; MHD, monthly headache days; MIBS-4, Migraine Interictal Burden Scale; MMD, monthly migraine days.
1. Hubig LT, et al. J Headache Pain 2022;23:97; 2. Gibbs SN, et al. Headache 2020;60:1351–64.

MH
1. H
5. D
http
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

People with migraine experience a wide range of comorbid health conditions

Relative odds for migraine among comorbid conditions (vs migraine-free controls)[1]



Comorbidities and chronification

~3% of individuals with episodic migraine progress to chronic migraine each year[2]

Risk factors for chronification include female sex, lifestyle factors (e.g. high caffeine consumption), ineffective treatment, medication overuse and untreated comorbidities[3]

Conversely, risk of nearly all comorbidities increases with headache frequency[1,4]

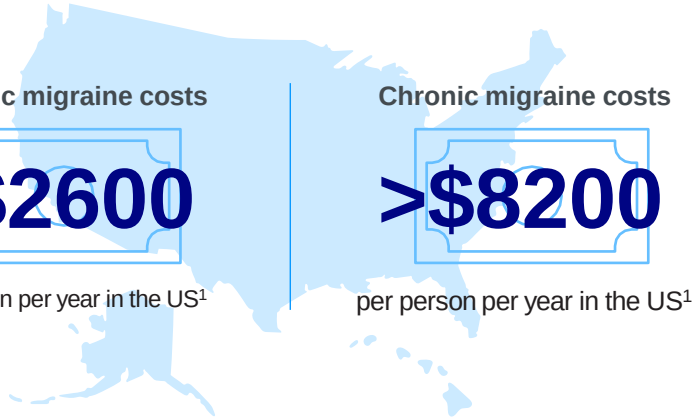
Risk of sleep and psychiatric comorbidities also increases with pain intensity[1]

CI, confidence interval; GI, gastrointestinal; OR, odds ratio; PAD, peripheral artery disease; TIA, transient ischemic attack.
Data from prospective web-based survey of US population samples with migraine (N=15,133). Data adjusted for sociodemographic characteristics.

1. Buse DC, et al. J Headache Pain 2020;21:23; 2. Dodick DW. Lancet 2018;391:1315–30; 3. Torres-Ferrús M, et al. J Headache Pain 2020;21:42; 4. Lipton RB, et al. Neurology 2019;93:e2224–36.
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Migraine is associated with high socioeconomic burden



Episodic migraine costs

>$2600

per person per year in the US[1]

Chronic migraine costs

>$8200

per person per year in the US[1]

Estimated cost of productivity losses due to migraine in the US[2]

60,000–686,000
annual workdays affected by absenteeism and presenteeism across different industries

Costs of lost productive time ranging between **$18 million and $155 million**

Annual indirect costs estimated to be **~6–9× higher** than direct costs

Productivity losses by migraine characteristics >

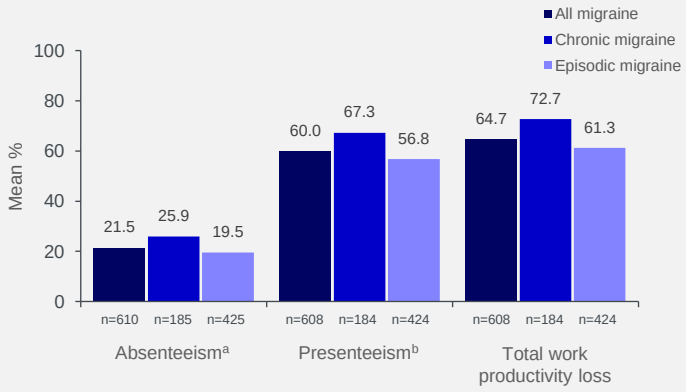
1. Messali A, et al. Headache 2016;56:306–22; 2. Yucel A, et al. Am J Manag Care 2020;26:e403–8.

MH
1. H
5. D
http
2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

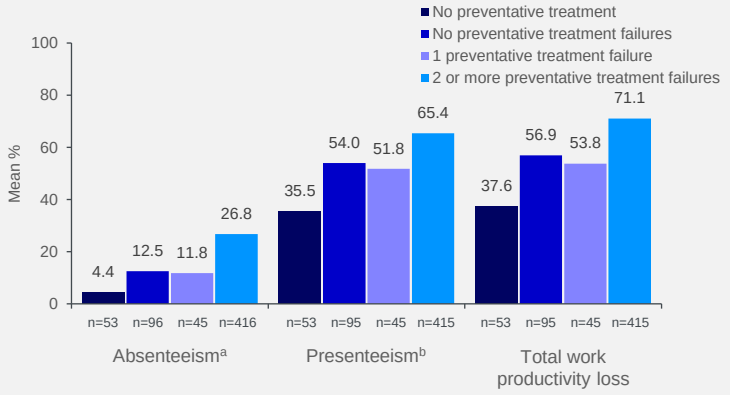
Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Migraine is associated with reduced economic productivity

Work productivity impairment by migraine frequency



Work productivity impairment by preventive treatment history



Productivity losses are greater among those with chronic migraine and those who have had two or more preventive treatment failures

Web-based survey of 1101 people with self-diagnosed migraine in the United States (My Migraine Voice).
[a]Work time missed. [b]Reduced on-the-job effectiveness.
Gibbs SN, et al. Headache 2020;60:1351–64.

< High socio-economic burden

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.

Migraine: A prevalent and disabling neurological disease with high individual and socioeconomic impact

Opportunities to optimize migraine management and reduce burden exist at each stage of the patient journey

Consultation

~20–70% of people with migraine do not consult an HCP[1–3]

~70% first consult a general practitioner[1,2]

18% consult a neurologist and only **2%** consult a headache specialist[1]

Diagnosis

Average time between onset and diagnosis is **~3 years**[2]

~30% do not receive an accurate diagnosis[a,1]

People with episodic migraine are **>2 ×** more likely to receive an accurate diagnosis than those with chronic migraine[1]

Treatment

>60% report exclusive use of OTC medications[4]

~30% do not receive adequate acute treatment[1]

44% do not receive adequate preventive treatment[1]

Avoidance of medication overuse

~35% of diagnosed and treated patients meet the criteria for medication overuse[1]

Medication overuse is **>2 ×** higher among those with chronic migraine vs episodic migraine[1]

HCP, healthcare provider; OTC, over the counter.
[a]Common misdiagnoses for migraine include sinus headache, stress headache and tension-type headache.

1. Buse DC, et al. Headache 2021;61:628–41; 2. Lipton RB, et al. Headache 2022;62:122–40; 3. Lipton RB, et al. Headache 2018;58:1408–26; 4. Lipton RB, et al. Headache 2019;59:1310–23.

2020;21:23; 14. Doane MJ, et al. Neurol Ther 2020;9:535–49; 15. Gooch CL, et al. Ann Neurol 2017;81:479–84; 16. Linde M, et al. Eur J Neurol 2012;19:703–11.