



CLINICAL INVESTIGATIONS FROM THE RACP

# Investigation of patients presenting with headache

MIRIAM WRONSKI MB BS

ALESSANDRO S. ZAGAMI MB BS, MD, FRACP

In this series, we present authoritative advice on the investigation of a common clinical problem, especially commissioned for family doctors and written by members of the Royal Australasian College of Physicians.

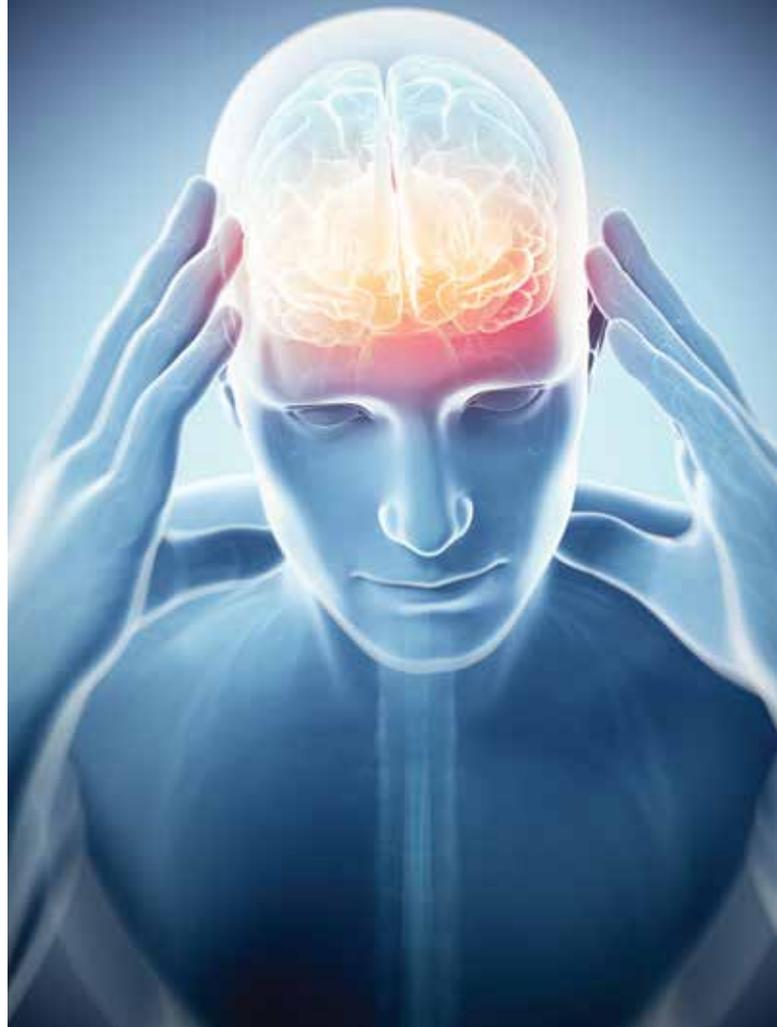
**H**eadache is a common symptom, with headache disorders affecting approximately half of the adult population worldwide.<sup>1</sup> In some patients the headaches can be recurrent and can affect the person for their whole life. These disorders impose a substantial burden on the patient, their family and society itself – this burden is reflected by the presence of headache disorders among the top 10 causes of all disability worldwide for both men and women.<sup>2</sup>

Headache is classified into primary and secondary headache disorders. Primary headache disorders are not associated with any identifiable pathology and include tension-type headache, migraine and cluster headache (a trigeminal autonomic cephalgia). Diagnostic

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Dr Wronski is a Medical Registrar (Basic Physician Trainee) at the Prince of Wales Hospital, Sydney. Associate Professor Zagami is a Neurologist at The Institute of Neurological Sciences, Prince of Wales Hospital, Sydney; and Conjoint Associate Professor at the Prince of Wales Clinical School, University of New South Wales, Sydney, NSW.

SERIES EDITOR: Christopher S. Pokorny, MB BS, FRACP, FRCP, FACG, is Conjoint Associate Professor of Medicine at the University of New South Wales, and Visiting Gastroenterologist, Sydney and Liverpool Hospitals, Sydney, NSW.



## KEY POINTS

- Headache in the primary care setting most often has a benign cause, usually a primary headache disorder.
- The type of most headaches can be determined by taking a detailed history and performing a targeted examination, without the need for special investigations.
- Neuroimaging is not required for people with normal neurological examination results and no warning features ('red flags').
- General practitioners can now request Medicare-reimbursed MRIs of the brain to investigate chronic headache with suspected underlying intracranial pathology.
- Neuroimaging may identify incidental unrelated neurological abnormalities that can heighten patient anxiety and lead to practical and ethical dilemmas regarding management.

**1. DIAGNOSTIC CRITERIA FOR THE THREE MAIN TYPES OF PRIMARY HEADACHE IN ADULTS<sup>3</sup>**

**Episodic headache, tension type**

- Headache lasting 30 minutes to 7 days
- At least two of:
  - bilateral location
  - pressing or tightening (nonpulsating) quality
  - mild or moderate intensity
  - not worsened by physical activity
- Neither of:
  - nausea or vomiting
  - photophobia and phonophobia (but may have one or the other)

**Cluster headache**

- At least five attacks: from one attack every other day up to eight attacks a day
- Headache lasting 15 to 180 minutes
- Strictly unilateral
- Severely to very severe pain around or above the eye and/or in the temporal region
- At least one of (on the same side of the face as the pain):
  - conjunctival injection and/or lacrimation
  - nasal congestion and/or rhinorrhoea
  - eyelid oedema
  - forehead and facial sweating
  - forehead and facial flushing
  - sensation of fullness in the ear
  - miosis and/or ptosis
- A sense of restlessness or agitation (may occur without other features)

**Migraine headache**

**Migraine without aura**

- At least five attacks
- Headache lasting 4 to 72 hours
- At least two of:
  - unilateral location
  - pulsating quality
  - moderate or severe pain intensity
  - aggravated by routine physical activity
- At least one of:
  - nausea and/or vomiting
  - photophobia and phonophobia

**Migraine with typical aura**

- At least two attacks
- At least one of the following fully reversible aura symptoms:
  - visual
  - sensory
  - speech and/or language
- At least two of the following characteristics:
  - at least one aura symptom develops gradually over 5 minutes or longer, and/or two or more symptoms occur in succession
  - each symptom lasts 5 to 60 minutes
  - at least one symptom is unilateral
  - the aura is accompanied, or followed within 60 minutes, by headache

criteria for these three primary headache disorders are listed in Box 1.<sup>3</sup> Primary headache disorders account for more than 90% of cases of headache in patients presenting to primary care and, although nearly always benign, may be disabling.<sup>4</sup>

Secondary headache disorders are attributable to an underlying pathological cause (structural, vascular, infective, inflammatory or drug-induced). Medication-overuse headache (MOH), a complication of the management of primary headache, is the

most common secondary headache in the primary care setting and is important to identify.<sup>5</sup> MOH develops as a consequence of the regular overuse of any acute or symptomatic headache medication, and often resolves after the offending medication is withdrawn; indeed, about 50% of patients with apparent chronic migraine revert to an episodic migraine subtype after medication-overuse is ceased.<sup>3</sup>

A systematic approach to the evaluation of headache is essential to obtain an accurate

diagnosis. The type of most headaches (primary or secondary) can be determined by a detailed history and targeted general and neurological examination, without the need for neuroimaging.<sup>6,7</sup> The clinical imperative during the headache consultation is to recognise the warning signs or ‘red flags’ for secondary headache, which should then prompt further appropriate investigation. In the absence of worrisome features suggestive of a secondary headache, the task is to diagnose a primary headache syndrome based on the clinical features. The third (beta) edition of *The International Classification of Headache Disorders* provides a comprehensive description of the types of headache and can greatly aid the accurate diagnosis of headache disorders.<sup>3</sup>

**Approach to headache evaluation**

**The headache history**

Detailed history taking is paramount in the diagnosis of headache and offers the best chance of establishing whether a headache is primary or secondary in origin.<sup>8</sup> The aim of taking the history is to classify the headache type(s) and screen for secondary headache, looking for ‘red flag’ features. Important red flag symptoms and signs are summarised in Box 2.<sup>6,9-11</sup> Different headache types are not mutually exclusive; patients are often aware of more than one headache type (e.g. both tension-type and migraine headaches), and a separate history should be taken for each. Any new headache in an individual patient or a significant change in headache characteristics should always be treated with caution.

Once it has been established that there is no serious underlying disorder, a simple headache diary may be used as an adjunct to aid diagnosis and guide treatment. If a headache diary is used then the patient should be asked to record the following details of their headaches for a minimum of eight weeks: frequency, severity, associated symptoms (e.g. nausea and vomiting), triggers (if apparent), all medication used (prescribed and over the counter) and relation to the menstrual cycle.

## 2. 'RED FLAGS' WHEN ASSESSING HEADACHE<sup>6,9-11\*</sup>

### A 'new-onset' headache in a patient

- Aged over 50 years
- With a history of cancer or immunodeficiency
- With nausea and vomiting without other obvious cause
- Who is taking an anticoagulant or antiplatelet agent
- Who is pregnant or postpartum
- Who is obese (consider idiopathic intracranial hypertension and obstructive sleep apnoea)
- With seizures but who does not have epilepsy
- With recent use of amphetamine, cocaine or other illicit drugs

### Headache with the following features

- Severe headache of abrupt onset ('thunderclap')
- Fever, neck stiffness
- Focal neurological signs
- Recent head injury (typically within the previous 3 months)
- Change in cognition (confused, drowsy) or in personality
- Symptoms triggered by cough, Valsalva manoeuvre, physical activity or postural changes
- Significant change in the characteristics of headache
- Progressive worsening of headache
- Symptoms and signs of acute narrow-angle glaucoma (e.g. headache with periorbital pain, red eye, unilateral visual symptoms)
- Symptoms suggestive of giant cell arteritis

\* Not a comprehensive list.

A headache diary is likely to be a more accurate account than recollection alone. The information obtained can also be used as a basis for discussion of symptoms and the impact that headache is having on quality of life, to monitor response to interventions and to encourage appropriate follow up.

## Examination

An abnormal result on neurological examination in a patient with headache dramatically increases the likelihood of finding an abnormality on neuroimaging.<sup>12</sup> Therefore, patients presenting for the first time with headache, or with a headache that differs from their usual headache, should have a thorough but targeted general and neurological examination. This examination should include the following:

- blood pressure measurement
- palpation of cranial arteries, including the superficial temporal artery (essential for patients aged over 50 years) – looking for a tender, enlarged, nodular or nonpulsatile superficial temporal artery
- neck examination, including palpation for posterior cervical tenderness
- fundoscopy, looking for papilloedema (if confident with ophthalmoscopy)
- full neurological examination, including cranial nerves, upper and lower limb assessment (looking for focal neurology) and gait, including heel-to-toe walking.

A more detailed assessment should be performed if prompted by the history. A thorough clinical examination is not only crucial to ensure red flags are not missed, but may also help reassure a patient with benign headache that their headache has been fully assessed.

## Investigating the patient with a headache

### When is investigation required?

Neuroimaging for the investigation of headaches in the primary care setting is usually not needed unless a red flag is present. Because, by definition, primary headache disorders do not result from structural brain abnormalities, routine neuroimaging for the investigation of primary headache disorders is not warranted as it is unlikely to show any cause for the headache and may result in identifying incidental findings.<sup>6</sup> Such findings may heighten patient anxiety as well as cause clinician uncertainty, and may result in

## 3. 'SNOOP-4' MNEMONIC FOR RED FLAGS FOR SECONDARY HEADACHE<sup>13</sup>

- Systemic symptoms (fever, weight loss) or Systemic disease (cancer, immunodeficiency)
- Neurological symptoms or abnormal signs (confusion, impaired alertness or consciousness)
- Onset – sudden, abrupt or split-second ('thunderclap')
- Onset after age 50 years (primary headache disorders beginning after the age of 50 years are unusual)
- Pattern change – substantial alteration in headache pattern
- Precipitated by a Valsalva manoeuvre or exertion
- Postural or positional aggravation
- Papilloedema

further unnecessary investigations and treatment (along with their associated risks).

When headache is accompanied by any of the red flag features outlined in Box 2, further investigation including brain imaging is warranted, although each patient's individual factors need to be considered. The mnemonic 'SNOOP-4' can be a useful aid to remember some of the more important red flag features (Box 3).<sup>13</sup>

Investigations appropriate for several important secondary headache types are outlined in the Table.<sup>9-11,14-17</sup>

### Imaging for patient reassurance

Neuroimaging solely for the purpose of reassuring patients is not recommended. Some patients may find it difficult to believe that such disabling headaches are not associated with serious underlying pathology and be adamant about referral for brain imaging for this reason. A randomised controlled trial of 150 patients with chronic daily headache (headache occurring on 15 or more days per month) found that patients who were offered neuroimaging had a decrease in anxiety at three months, but that the reduction in anxiety was not maintained at one year.<sup>18</sup>

**TABLE. DIAGNOSTIC INVESTIGATIONS IN IMPORTANT SECONDARY HEADACHE DISORDERS<sup>9,11,14</sup>**

Secondary headache type	Common clinical presentation	Investigations
Subarachnoid haemorrhage <i>(All thunderclap headaches should be regarded as due to this until proven otherwise)</i>	<ul style="list-style-type: none"> <li>Thunderclap headache (severe headache of rapid onset, reaching peak intensity in less than 1 minute)</li> <li>Focal neurological signs or altered level of consciousness</li> </ul>	<ul style="list-style-type: none"> <li>CT brain without contrast (performed as early as possible)</li> <li>If CT brain is normal, lumbar puncture is required (CSF analysis for red blood cells and xanthochromia, spectrophotometry if available)</li> <li>CT angiogram if CT brain and lumbar puncture are both normal but clinical suspicion of SAH is high; also performed in confirmed SAH to look for underlying cerebral aneurysm</li> </ul>
Space-occupying lesion (e.g. primary or secondary intracranial tumour)	<ul style="list-style-type: none"> <li>Focal neurological deficits, altered mental state or seizures, rather than isolated headache</li> <li>Headache occurs late in the clinical course and is often progressive with symptoms of raised intracranial pressure<sup>45</sup></li> </ul>	<ul style="list-style-type: none"> <li>MRI brain with contrast (if unavailable, CT brain with contrast will detect most tumours)</li> </ul>
Giant cell (temporal) arteritis	<ul style="list-style-type: none"> <li>New onset persisting headache in patient aged over 50 years</li> <li>Visual symptoms, malaise, jaw claudication, temporal artery abnormality on examination</li> <li>May have history of polymyalgia rheumatica</li> </ul>	<ul style="list-style-type: none"> <li>ESR, CRP level</li> <li>If visual symptoms or abnormality of temporal artery, refer for temporal artery biopsy (and urgent treatment with high-dose corticosteroids)</li> </ul>
Carotid or vertebral artery dissection	<ul style="list-style-type: none"> <li>Unilateral headache, neck pain, Horner syndrome, stroke symptoms (due to thromboembolism)</li> <li>Recent neck trauma (even minor); may also occur spontaneously</li> </ul>	<ul style="list-style-type: none"> <li>CT brain and CT angiogram or MRI brain and MR angiography of the head and neck vessels</li> </ul>

*Continued on next page*

Often the reassurance the patient seeks is a clear diagnosis and/or explanation of the problem, and therefore these are important points to include in the discussion. For patients with a typical history of a primary headache syndrome who continue to have severe symptoms despite appropriate treatment, neurology referral to optimise management (rather than neuroimaging) may be helpful.

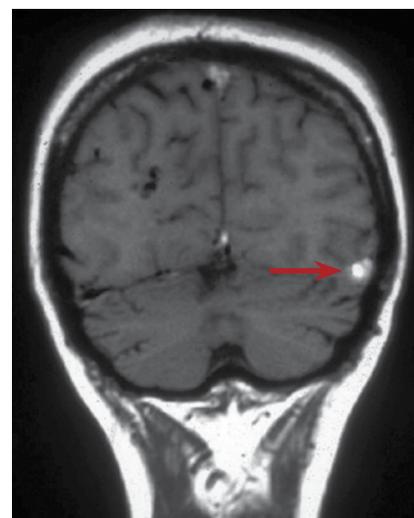
**Imaging modality – CT or MRI?**

The choice of neuroimaging modality (CT or MRI) for patients with headache depends on the clinical context, taking into account factors such as the indication for investigation, the clinical urgency, cost, potential side effects and local resource availabilities.

For most acute headaches (thunderclap headache and other types), an urgent

noncontrast CT of the brain is generally the first investigation of choice. In practice, urgent assessment of acute headaches will nearly always require referral of the patient to the local emergency department for further investigation, such as a CT angiogram (Table).

International guidelines differ regarding the preferred neuroimaging modality for the investigation of nonacute headaches. MRI may be considered the imaging modality of choice because of its greater sensitivity in detecting intracranial structural pathology. However, although MRI is more sensitive than CT in detecting white matter lesions and benign vascular lesions, many of these abnormalities are incidental and have been shown to be of little importance in the evaluation of patients with chronic headache. CT will detect most space-occupying lesions and therefore if



**Figure.** Noncontrast coronal T-1 weighted MR brain scan showing thrombosis in the left transverse sinus in a 65-year-old woman with essential thrombocythosis. She had presented with a progressive, left-sided headache made worse by coughing and sneezing.

**TABLE. DIAGNOSTIC INVESTIGATIONS IN IMPORTANT SECONDARY HEADACHE DISORDERS<sup>9,11,14</sup> continued**

Secondary headache type	Common clinical presentation	Investigations
Cerebral venous sinus thrombosis	<ul style="list-style-type: none"> <li>Highly variable clinical presentation – acute, subacute and chronic presentations</li> <li>Headache (thunderclap, acute or gradual onset) in a young adult (mean age, 39 years); more common in women than men, especially in pregnancy or postpartum or when taking the ‘pill’<sup>16</sup></li> <li>Signs of raised intracranial pressure, focal neurological deficits, seizures, altered mental state</li> </ul>	<ul style="list-style-type: none"> <li>CT brain and CT venography or MRI brain and MR venography</li> </ul>
CNS infection (meningitis, encephalitis)	<ul style="list-style-type: none"> <li>Headache with fever, neck stiffness, photophobia, meningism or rash</li> <li>In encephalitis: focal neurological symptoms and signs, altered level of consciousness, behaviour change, seizures</li> </ul>	<ul style="list-style-type: none"> <li>Lumbar puncture, blood cultures</li> <li>If meningococcal sepsis is suspected (fever plus rash), consider immediate dose of parenteral benzylpenicillin (after blood cultures) before urgent referral to hospital</li> <li>CT brain is required before lumbar puncture in selected patients (signs of raised intracranial pressure, history of focal CNS disease, immunocompromised) to exclude raised intracranial pressure<sup>10</sup></li> </ul>
Reversible cerebral vasoconstriction syndrome <sup>17</sup>	<ul style="list-style-type: none"> <li>Recurrent thunderclap headaches over 2 weeks; may be triggered by exertion, emotion, Valsalva manoeuvre or bathing</li> <li>Seizures, transient or persistent focal neurological deficits</li> <li>May occur during the postpartum period, with recent exposure to vasoactive medications or illicit drugs, or spontaneously</li> </ul>	<ul style="list-style-type: none"> <li>Aneurysmal SAH should be excluded first (see above)</li> <li>CT and MRI often initially normal; may show cortical SAH, intracerebral haemorrhage, watershed infarctions</li> <li>CT angiography: dynamic, diffuse vasoconstriction, reversible by 3 months</li> </ul>

Abbreviations: CNS = central nervous system; CRP = C-reactive protein; CSF = cerebrospinal fluid; CT = computed tomography; ESR = erythrocyte sedimentation rate; MR = magnetic resonance; MRI = magnetic resonance imaging; SAH = subarachnoid haemorrhage.

MRI is not promptly available, CT should be undertaken instead.<sup>7,19</sup>

Other factors to consider when ordering neuroimaging include the risk of ionising radiation with CT and claustrophobia with MRI (which will occasionally require sedation or even general anaesthesia). In a practical sense, CT costs less and is generally more readily available than MRI. However, accessibility to MRI has improved considerably recently and GPs are now able to request Medicare-reimbursed MRIs of the head for adult patients (over the age of 16 years) to investigate chronic headache with suspected intracranial pathology. The Figure shows a coronal MRI scan of the brain demonstrating thrombosis in the left transverse sinus in a patient presenting with headache.

**Conclusion**

Most patients who present with headache in general practice have a primary headache disorder and will not require neuroimaging. A systematic approach to headache diagnosis, including careful history taking and physical examination to screen for red flag features, will identify those patients who require further investigation, without putting those who clearly have a primary headache disorder through unnecessary tests. MT

**References**

A list of references is included in the website version ([www.medicinetoday.com.au](http://www.medicinetoday.com.au)) and the iPad app version of this article.

COMPETING INTERESTS: None.

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MIRIAM WRONSKI MB BS; ALESSANDRO S. ZAGAMI MB BS, MD, FRACP

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