



HEADACHE

NEWSLETTER OF THE AHS COMMITTEE FOR HEADACHE EDUCATION

Dear Members of the American Headache Society® and Public:

The American Headache Society® Committee on Headache Education (ACHE) offers you the second of a quarterly publication of the ACHE Online Newsletter. This May 2009 issue contains 4 articles I expect you will find of value.

The first by Dr. Dawn Buse discusses open communication between patient and provider with emphasis on headache triggers. The importance of this patient-provider communication relates to the influence on the patient's ability to stick to decisions made. Then, as Editor I offer a discussion about risks for progression from infrequent to frequent near-daily headache. This article emphasizes medication overuse and steps patients should expect to take to stop overuse. Dr. Randy Evans offers us critical information on mild traumatic brain injury. This non-modifiable risk factor for progression to daily headache is particularly prominent with reports of our Iraqi troops and the untimely death of actress Natasha Richardson. Finally with summer about to be in full swing, Dr. David Dodick, President-elect of the American Headache Society, writes of high altitude as a specific trigger for headache and acute mountain sickness.

This document is available in both XPS and PDF formats. Please be aware that you can access these documents from achenet.org under ACHE 2009 Newsletter.

I intend to make this value added AHS benefit as timely, practical and readable as possible. Your help in making this come true is greatly appreciated.

At your service,
Frederick R. Taylor, MD
ACHE Online Newsletter Editor

The Role of Adherence and Triggers in Headache Management

Dawn C. Buse, PhD

Key Points:

1. *The patient plays a vital role in the success of his or her headache management.*
2. *Open patient-provider communication is essential for effective headache treatment. You and your healthcare provider (HCP) must work together as a team to manage your headaches.*
3. *It is very helpful to keep a headache calendar or diary to identify your personal headache "triggers", and share that information with your HCP.*
4. *Reduce the chance of headache by a.) maintaining a healthy lifestyle of regular sleep, exercise and eating plan, and b.) practicing relaxation and stress management techniques.*
5. *Take supplements and medications exactly as prescribed and discuss any questions, concerns, or side effects with your HCP.*

Adherence: What Is It and Why Does It Matter?

"Adherence" and "compliance" are terms that refer to a patient's role in his or her medical care. "Compliance" refers to the degree to which patients follow medical recommendations of their health care providers (HCPs). "Adherence" is a preferable term in headache care because it refers to collaboration between the patient and the HCP. The patient plays a vital role in the success of his or her headache management. While a HCP may provide medical advice and prescriptions, it is the patient who ultimately chooses if, when, and how to use that advice.

Effective headache care can include both pharmacological (medication) and non-pharmacological

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(behavioral) components. Adherence challenges in pharmacological treatment include improper use of medication. Examples include not filling prescriptions, overusing medications, changing doses, or stopping medication without your doctor's consent. Some of these behaviors have severe consequences. For example, overusing medication can lead to "medication overuse headache" or "rebound headache." Combining medications without medical advice can lead to dangerous interactions and side effects. Taking medications too early (before the pain of migraine begins) or too late into an attack can limit their effectiveness.

Following the behavioral advice of your headache treatment plan can be even more challenging. This may include keeping appointments, keeping a headache calendar or diary, practicing proper sleep hygiene, exercising regularly, incorporating stress management and relaxation techniques into daily life, maintaining a healthy weight or losing weight, reducing or eliminating caffeine, and not smoking.

Motivation and Behavior Change

Making behavior changes such as weight loss or stopping smoking can be extremely difficult. Psychologists believe that there are two vital parts to successful behavior change: 1. self-efficacy (the confidence in one's ability to perform an action), and 2. outcome efficacy (the belief that a behavior or set of behaviors will have a desirable result). Therefore, in order to accomplish a goal, one must both want to change and have the knowledge and tools necessary to complete the change. Behavioral change and achieving goals can occur in small steps. One theory proposes that behavior change can be broken down into five stages: 1. Precontemplation or pre-thought (the patient is not thinking about changing behavior and does not recognize the need or a problem); 2. Contemplation or thought (the patient

recognizes a need or problem and begins to think about changing behavior and may be developing a plan, but has not taken any action); 3. Preparation or planning (the patient has done research, developed a plan and may begin making minor changes or actions); 4. Action or doing (the patient is actively engaged in the behavior change or new actions); and 5. Maintenance (the patient is continuing behaviors necessary to maintain changes). This theory can be applied to many types of behavior change including starting an exercise regimen, quitting smoking, or following a healthy diet. This model helps both patients and HCPs recognize that small steps are important in reaching a goal. A step back, that is a "lapse" or "relapse" is not a failure, but rather a step from which the patient can recover.

Partnership and Communication With Your HCP

Open patient-provider communication is essential for effective headache care. You should see your doctor for an accurate diagnosis of your headache. This should rule out any injury or illness that may be the cause of your headache. You and your HCP must work together as a team to manage your headaches. Work with your HCP to create a personalized headache care plan that fits with your goals and preferences. Your HCP needs to know about the frequency and severity of your headaches, personal headache triggers, and how headaches affect your life. It is very helpful to keep a headache calendar or diary, and share that information with your provider. This care plan should include "acute treatment" (successful relief when treating a headache) and "preventive treatment" (reducing the frequency and severity of your headache). This plan may include behavioral techniques that you can learn with a professional or on your own as well as medication. You and your doctor may try many

options before you discover what works best for you. This plan should be evaluated regularly and may be updated as needed. See achenet.org under Articles for "How to Talk to Your Practitioner About Your Headaches" for more advice about preparing for your appointment and speaking with your doctor about your headaches.

What Can You Do to Manage Your Headaches?

The most important things that you can do to control your headaches are: 1. Communicate openly with your HCP about how headaches affect your life; 2. Identify your personal headache triggers and work with the HCP for ideas to reduce them; 3. Control universal triggers by a.) maintaining a healthy lifestyle of regular sleep, exercise and eating plan, and b.) practice relaxation and stress management techniques; 4. Take supplements and medications as prescribed and discuss any questions, concerns, or side effects with your HCP.

What are Headache Triggers?

Headache triggers are factors that may lead to a headache or make it more likely for you to have an attack. They vary for each individual; however, there are some common triggers. The best way to identify these is to keep a "[headache diary](#)" in which you record when you have a headache as well as what you eat, drink, when you sleep, your hormonal cycle (for women), medications taken, factors in the environment, weather, and any other changes. Keeping a headache diary for one to two months helps identify any triggers or patterns to avoid or change to improve your headaches. You can use this information to identify your triggers yourself and also take this diary with you to your next medical appointment. Some of the most common headache triggers and suggestions for maintaining a healthy lifestyle are:

1. Diet and nutrition: Eating appropriate portions, eating healthy, and maintaining a healthy weight are all very important habits for people who suffer from

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headaches. It is very important that you eat a healthy, well balanced eating plan with meals scheduled on a regular basis throughout the day (including breakfast). Stay hydrated and drink plenty of water. Include healthy choices such as fresh fruits and vegetables, lean meats, poultry and fish, other sources of protein, and whole grains. Whenever possible choose fresh foods and avoid chemicals in overly processed or preserved foods. Don't skip a meal or wait too long to eat or become dehydrated. Caffeine and alcohol overuse or withdrawal can also trigger headaches. In addition, certain cheeses, chocolate, red wine, tea, and coffee are reported to trigger headaches in some people. You can keep a food diary to determine if specific foods are related to your headaches.

2. Sleep: It is important to maintain a healthy and regular sleep cycle. Most people feel that 7-8 hours a night is an appropriate amount of sleep for an adult. You should pay attention to your own body to learn your own sleep needs. It is important to maintain a regular sleep and wake cycle, both during the week and on the weekends. Avoid getting too little or too much sleep. Be aware that less than 6 hours and more than 9 hours is a proven provoker for next day headache

3. Environmental factors: Environmental factors may trigger a headache. Examples include bright or flickering lights, strong smells such as perfume, and changes in the weather including a drop in barometric pressure (which often occurs before a storm). You may not be able to control all of these factors. You may be less likely to trigger a headache by changes you make in your home and work environment. In addition, you may want to keep an eye mask and ear

plugs on hand in case of a headache. Many people find that they can help stop a headache if they lie down in a dark, quiet room and relax or sleep.

4. Psychological and emotional factors: Many people who suffer from headaches report that stress and multiple demands in their life lead to headaches. It may not be possible to reduce or eliminate the amount of stress in your life. Yet, you can learn ways to manage stress; organize your time and learn to say "no" to unrealistic demands. You can also ask for help when necessary and teach your family and friends about the importance of taking care of oneself. You should try to schedule some time during each day to relax both your body and mind. You may find that it is helpful to schedule exercise, a walk, or a yoga class. You may be comfortable finding time during the day to do a relaxation exercise such as deep breathing or visual imagery. This is as easy as imagining you are sitting on a beautiful, tropical beach while you are sitting at your desk.

5. Hormonal factors (for women): Many women find that their headaches frequently occur during certain times of their menstrual cycle. This is often just before or at the beginning of their menstrual flow. You may want to keep a headache diary and note the timing of your headaches. If you find that headaches are related to your menstrual cycle you should talk to your HCP about treatment options. In addition, you should be aware that maintaining a regular and healthy lifestyle including proper diet, sleep, exercise, stress management, and relaxation will be particularly important for you before and during the week of your period each month.

6. Lifestyle: You may find that intense exercise or long-distance travel, especially across time zones, trigger your headaches. You may find factors both at home and in the [workplace](#) that trigger your

headaches. It may not be possible to eliminate or avoid these triggers; however, you should carefully review your lifestyle determining your stress factors in all areas of your life including occupational or academic, family, social, financial, and personal. When making decisions always try to choose the healthier option, as that will help you avoid headache attacks.

What is relaxation training and stress management?

When you are tense your body activates the "flight or fight" response. This sympathetic nervous system activity makes you more vulnerable to a headache. The goal of relaxation training is to learn to activate the "relaxation response" or the opposite of the "flight or fight response". During the "relaxation response" your body releases chemicals and brain signals that make your muscles and internal organs relax. You slow and deepen your breathing, slow your heart rate, and increase blood flow to the brain. Increased circulation will warm your hands and feet and muscle tension will decrease. Some medications have these effects; but they may also have unwanted side effects. You can train your body and brain to relax just as well without drugs yet remain conscious and aware at the same time. There are several ways to achieve this state including diaphragmatic (deep) breathing, visual imagery, progressive muscle relaxation, and other techniques that you can practice on your own. These techniques will cause the relaxation response in your body.

Behavioral headache management is most successful when you identify triggers and start a plan to avoid or reduce them, practice healthy lifestyle habits, relaxation and stress management, and adhere to your treatment plan. You will find some triggers are impossible or difficult to eliminate or avoid. You may help your headaches by eating nutritious meals on a regular schedule, getting regular exercise, maintaining a regular sleep pattern, and using techniques to manage stress. You can also use relaxation techniques to help avoid headaches or reduce the pain and duration

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of a headache once it has started. It is most important to adhere to what you start and give your plan sufficient time to become a habit. You may also benefit from guidance and assistance from a professional in making healthy lifestyles changes, managing stress, and incorporating relaxation techniques into your life.

Dawn C. Buse, PhD, Director of Psychology, Albert Einstein College of Medicine, Bronx, NY.

Can your Headaches Worsen and Why?

Frederick R. Taylor, MD

Key Points:

1. An increase of frequency from low to high is called progression
2. Progression or transformation may lead to "chronic migraine"
3. Chronic migraine is greater than 15 days/month of headache and greater than 8 days of migraine or headache that responds to acute migraine specific medications like triptans
4. Progression occurs in about one in five with certain risk factors
5. Anxiety and obesity are two critical risk factors to control
6. Acute medication overuse must be recognized and removed for improvement.

Many individuals with migraine suffer their first headaches as children or adolescents. Over time, headaches may become more severe or frequent, with some individuals having headaches increase to a daily occurrence. This increase is called "headache progression or transformation." Transformation in this case means a turn or change to more headaches. A goal of current headache research is to understand the reasons for this progression. Might this change be largely due to physical, environmental or inherited tendencies or some combination?

Why it is important to understand what causes headache progression?

There are several reasons:

1. With headache progression understood, patient and provider may be informed of transformation risks and seek to identify them.
2. If patients at risk are identified, close observation and preventive methods can be aggressively encouraged and used.

Chronic or Transformed Migraine

Recognizing migraine as both chronic and potentially progressive may encourage redefining migraine as a *chronic disorder with episodic attacks that progresses in some migraineurs*. This is important since most individuals who experience migraine do so at least periodically over time and, therefore, suffer headaches "chronically." Yet both the sufferer and medical provider often think of migraine in terms of the last headache and use acute treatments only. When migraines are recognized as chronic, both the sufferer and provider may think about preventing headache. Headache medicine practitioners "officially" make a diagnosis of chronic daily headache, when headache totals exceed 15 days per month, and chronic migraine when headache with migraine symptoms or medications used to treat the headache exceed 8 days per month. Other chronic conditions such as epilepsy, hypertension, asthma or diabetes are managed and controlled by reducing trigger factors, appropriate lifestyle changes and additional treatments. Approaches to prevent progression and manage chronic migraine should be to reduce triggers, use healthy lifestyles and other prevention as mutually agreeable between you and your provider.

What do medical studies tell us about chronic migraine?

- Certain migraineurs have greater risk of suffering more frequent attacks.
- Specific brain changes occur in some of these migraine patients.

- Iron deposits identified by special imaging (not available to providers) found in a pain control area of the brain.
- White matter lesions, of unknown importance, have been identified in routine brain MRI imaging in migraine.
- The brain becomes sensitive and overactive to several kinds of stimuli during migraine and sometimes between attacks. This is known as central sensitization. This is experienced in different ways but described as pain from a non-painful touch or other sensation. An example of this is pain from the hair pulled back in a ponytail and is referred to as allodynia. Allodynia occurs in many but not all migraineurs and should be thought of as a marker for the need for prevention of headache due to this overactive nervous system.

What should the typical migraine sufferer learn from these studies? That it is very important to identify any change in headache frequency. When any type of headache becomes more frequent or more severe, it is very important to consult your practitioner and discuss the risk of headache progression. As a migraine sufferer, it is important to learn about risk factors and control them. This will reduce the chances of progression to chronic migraine.



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What factors create risk for developing chronic migraine?

Adaptable risk factors- factors that the patient can influence with lifestyle changes and appropriate treatment
(1) analgesic overuse, including caffeine
(2) sleep troubles (poor sleep and snoring)
(3) obesity (BMI \geq 30 or waist \geq 35 inches for women and 40 inches for men)
(4) depression and anxiety
(5) stressful life events
Non-changeable risk factors – factors not easily altered
(1) female gender
(2) inherited genes - genetic susceptibility
(3) closed head injury
(4) societal and economic variables

Studies to better understand how to identify migraineurs at risk of headache progression and to establish effective treatment are ongoing. This undertaking is important given the frequent presence of the condition among the general population and in women. The impression of migraine from one of an episodic to chronic illness with progression of disease in individuals at risk is an important idea. If we can influence the public and medical provider minds, then sufferers should benefit from a change in priorities of insurers and healthcare providers.

What's new in the medical literature on progression or chronification of headache?

The January 2008 edition of *Headache: the Journal of Head and Face Pain* provides a series of

comprehensive reviews written for medical professionals on the chronification of headache. While difficult for the average patient to read, unless you are very acquainted with medical writing, if you want in-depth reviews on the mechanisms of migraine chronification, risk factors for progression, treatment of chronic headache, and behavioral strategies aimed at prevention and progression of chronic headache, these may be worth your reading efforts. Specific reviews in this edition include:

- Migraine chronification
- Concepts and mechanisms of migraine chronification
- Risk factors for headache chronification
- Screening and behavioral management: medication overuse headache—the complex case
- Chronic headache and potentially modifiable risk factors: screening and behavioral management of sleep disorders
- Stress and headache chronification
- Headache chronification: screening and behavioral management to co-morbid depressive and anxiety disorders
- Screening and behavioral management: obesity and weight management
- Looking to the future: research designs for study of headache disease progression

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Medication Overuse Headache

Analgesic overuse is the most widely recognized and best agreed upon risk factor associated with migraine progression. The current concept of medication overuse headache (MOH) is defined as greater than 15 days of

headache/month. Regular overuse of pain drugs for greater than 3 months is also required. The overuse consists of one or other medication greater than 10 days per month or any combination of drugs greater than 15 days per month regularly. Finally, headache has worsened during this overuse. Beware: The risk of using non-specific medications is the risk of creating MOH.

Simple MOH is defined as less than one year's overuse with modest doses. The individual also has limited psychological difficulties and no failures in past removal. Complex MOH is everyone else. Simple MOH may require only short-term prevention and an optimal acute therapy used properly, while complex MOH absolutely requires behavioral headache management.

Each practitioner and provider system will manage MOH differently as each sufferer is unique. Several overarching ideas to any management program are outlined here. Treatment of MOH requires stopping use of the offending medication(s). Removal is nearly always successful as an outpatient for simple MOH in a patient who strongly desires to rid themselves of overuse and its problems. For complex MOH patients, inpatient is frequently necessary.

Outpatient therapy can proceed as a slow or fast taper of the overused medication. In selected instances, based on your decision, abrupt withdrawal with a medication "to bridge" the initial week of withdrawal is typically considered. Success is likely with strong support of family or friends in highly motivated individuals. Necessary steps to successful removal include 1. education, 2. removal of the offending medication, 3. possible "bridge therapy" to treat withdrawal symptoms, 4. medication prevention with non-pharmacologic interventions where appropriate, 5. specific acute treatment, without contraindications, with limits on usage, and 6. a time to follow up within the month ideally. Education includes helping patients understand the differences in overuse from abuse, habituation, dependency and addiction; which is

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nearly always appropriate to do. Expect that improvement will take time, typically longer than one expects or hopes and that worsening is typical even for several weeks before improvement. But improvement occurs in the majority and headache frequency improves with prolonged avoidance or abstinence. Sticking with a program and follow-up are crucial. Behavioral management has been shown to produce additional benefits beyond pharmacotherapy alone. Behaviors include regular eating, exercise, and sleep hygiene with active better than passive therapies. The headache calendar identifies possible triggers, medication intake, and effect of treatment. Biofeedback training, stress and time management, including understanding “my time” with cognitive therapy and psychotherapy, make for long term success.

Slow taper takes place over about 4-5 weeks typically with standard migraine therapies for age for both acute and prevention therapy. Acute therapy is restricted to no more than 2 days per week with limited quantities. A short course of steroids is often added. Rapid elimination is used for individual with 3 or less tablets per day use of acute medication often with a short 7-10 day bridge of anti-inflammatory, steroid, or triptan use dependent on history. Prevention is typically increased more rapidly and botulinum neurotoxin when possible often offered.

Prevention of Progression and MOH

Migraine progression can be minimized as a risk with attention to reducing triggers, maintaining healthy lifestyles and avoiding overuse of acute medication for headache or any other pain reason. When headache increases seek your providers help. Cut back on acute therapy no matter how hard it is to cope if more than 2 days per week. Emphasize your preventive lifestyles. Consider the role of any anxiety or obesity and life stressors. Seek a mutually agreeable preventative from your health care provider. Stick with a program that begins to pay off.

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Mild Closed Head Injury and Headache

Randolph W. Evans, MD

Key Points:

1. *Mild traumatic brain injury (TBI) is common*
2. *TBI can be associated with significant disability*
3. *Concussion does not require loss of consciousness*
4. *Prolonged post-concussion symptoms are more common in those who expect disability, have psychological difficulties and in older age*
5. *Tension-type headache, occurs in nearly all for some time period*
6. *Treatment depends on the headache type, patient and provider*

Definitions

A traumatic brain injury (TBI) results when an object or blow hits the head. Other causes include a jolt to or shaking of the head. A closed head injury results when there is no entry through the skull into brain tissue. A mild injury means the person may be dazed, confused or lose consciousness for up to 30 minutes. Memory (amnesia) may exist for up to 24 hours. A concussion occurs when head injury causes a person to be dazed and confused or knock a person out or unconscious. Loss of consciousness is not required.

How common are these injuries?

There are about 1.4 million cases of TBI each year in the United States. About 75% result in mild closed head injury. The causes are: a motor vehicle accident (45%), falls (30%), job related accidents (10%), recreational accidents (10%), and assaults (5%). American football, ice hockey, soccer, boxing, and rugby are common sports related causes. In football alone, an estimated 10 percent of US college and 20 percent of US high school players suffer brain injuries each

season. As many as 360,000 U.S. troops have suffered brain injuries, mostly concussions, representing about 20 percent of the 1.8 million who have served in Iraq and Afghanistan. About 75% of these injuries are due to blast trauma due to improved explosive devises and rocket propelled grenades.

How might mild traumatic brain injury or concussion actually damage the brain?

Mild TBI results from bruises on the surface of the brain, damage to nerves and release of excitatory nerve transmitters. A repeat concussion that occurs before the brain recovers from the first—usually within hours, days, or weeks—can rarely result in brain swelling, permanent brain damage, and even death. This condition is called second impact syndrome. This is especially important in athletes who should not return to play until they have recovered. Information is available for high school players, parents and coaches at

www.cdc.gov/ncipc/tbi/Coaches_Tool_Kit.htm and also www.aan.com/practice/guideline under brain injury under Management of Concussion in Sports.

What is the post-concussion syndrome (PCS)?

Post-concussion syndrome is a set of complaints that a person experiences for weeks, months, or sometimes years after a concussion. The most common PCS complaints are headaches, dizziness, fatigue, irritability, anxiety, insomnia, loss of concentration and memory, and noise sensitivity. Other symptoms can include ringing in the ears, hearing loss, blurred vision, light and noise sensitivity, decreased smell and taste, depression, personality change, post-traumatic stress disorder, decreased sex drive, and nausea and sometimes vomiting. One or more PCS complaints occur in about 50% (38-80%) of people with a mild closed head injury. It is not known with any certainty why PCS occurs and sometimes lasts long periods of time. Persistent or prolonged PCS (PPCS) is associated with increased risk when preexisting psychological conditions,

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expectations of disability and older age are present. For most, memory and concentration problems are better within 3 months.

Are tests or further evaluation helpful?

Scans of the brain such as CT or MRI are usually normal or show slight bruising of the brain. Rarely, a mild head injury can cause a blood clot on the brain (a subdural or epidural hematoma), which can be seen on the scan. Brain wave tests (EEG) are not helpful unless seizures are suspect. If memory problems continue, a battery of memory tests, called neuropsychological tests, can be obtained. Additional evaluation depends upon the symptoms. For example, evaluation by an ENT specialist for dizzy spells, ophthalmologist for blurred or double vision, or neurologist for persistent headaches or memory problems.

Post-traumatic headaches

Headaches occur in up to 90% of persons who have symptoms from mild head injuries. Post-traumatic headaches are more common in those who have a prior history of headaches. The headaches start within 7 days after the injury according to official criteria. Many people have more than one type of headache.

What types of headaches occur?

About 85% are tension type. The pain can be infrequent or intermittent or as often as daily and constant. Pain quality is typically pressure, tight, or dull aching. The headache can be all over the head, the back of the head and the neck, across the forehead, the temples, around or on top of the head. Some people have pain maximum at the back of the head, often diagnosed as greater occipital neuralgia (ON). This may be due to a blow to the back of the head or tight muscles pinching this nerve which is responsible for feeling over the back of the scalp. There may be an aching, pressure, stabbing, or throbbing pain in the back of the head. It may also be felt

additionally or instead in the sides or in the front of the head or behind or around the eye. ON can be on one or both sides. About 15% have migraine headaches, which occur for the first time due to the head injury. Acute migraine headaches can also be triggered by minor dings or impacts on the head in those with a history of migraine. This can occur in soccer players who head the ball or football players after minor head injuries. Injury of the nerve above the eyebrow can cause shooting, tingling, aching or burning pain along with decreased or altered feeling of the forehead.

How long before the headaches get better?

The headaches are still present in up to 78% of people 3 months after the injury, 35% after 1 year, and 24% after 2 years.

How are the headaches treated?

Good sleep, exercise to tolerance, relaxation and stress management, reduced caffeine, regular healthy eating and avoidance of acute symptomatic medication overuse are recommended regardless of headache severity or type. Use physical therapy for tension type headaches when a neck pain or injury is also present. Biofeedback training is worth exploring. ON can be treated by an injection around the irritated nerve with a local anesthetic sometimes combined with a steroid medication. Both acute and preventative medications are used determined by headache type(s).

Education

Many people are reassured to learn that their symptoms are not unique or crazy but are instead part of a well-described medical condition. Too many people believe that mild head injuries are not serious. Perhaps this is from watching too many make believe injuries in movies and on television. The trauma (TBI) often looks serious in action, martial arts, Western, detective, and sports stories (and in real life would be deadly) but nothing much happens to the actor. In cartoons or comedies, like "Road Runner or the Three Stooges," head trauma is even funny. People hopefully realize how serious mild head injuries can be when

they think about professional athletes who have had to retire because of football, hockey, and boxing concussions.

Randolph W. Evans, MD. Clinical Professor of Neurology, Baylor College of Medicine, Houston, TX.

Altitude, Acute Mountain Sickness and Headache

David W. Dodick, MD

Key Points

1. *Headache and acute mountain sickness occur commonly over 8,500 feet above sea level.*
2. *Actions to reduce headaches at high altitude include good hydration, gradual ascent with days of rest and sleep at lower altitude whenever possible.*
3. *Take ASA, furosemide or acetazolamide several days before going to high altitude to avoid headache.*

For more than 2,000 years, headache has plagued those who tried to ascend to high altitudes. Headache was so common among travelers along an ancient silk route in Central Asia that a Chinese official named the area "Great Headache Mountain and Little Headache Mountain." Modern evidence that headache occurs frequently at high altitude comes from studies of people living in the South American Andes and from soldiers of the Indian Army who moved frequently between sea level and altitudes up to 6,000 meters in the Himalayas. In addition, headache occurs in almost 50% of the thousands of people who trek, climb, and ski at heights over 3,000 meters (9,900 feet). Even during the Mexico City Olympics, held at an altitude of 2,300 meters, migraine headache occurred more frequently than Olympics held at lower altitudes.

Headache may be a prominent symptom in people with chronic exposure to high altitude. In a study of 379 adult men who

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lived for more than 10 years in Peru at an altitude of 4,300 meters (14,200 feet), nearly half (47%) complained of recurrent headaches, either migraine (32%) or tension-type headache (15%). The occurrence of migraine and tension-type headache increased with age in this group of people, the opposite of that observed at sea level. Because the lungs' efficiency in supplying oxygen to the body declines with age in all individuals, oxygen levels in the blood may decrease even further with advancing age in those who reside at high altitudes. Since migraine occurs more commonly when the blood level of oxygen falls, this might explain why headaches seem to increase with age in those who live at higher altitudes.

We now recognize that nearly one in four people who ascend to 2,600 meters (8,500 feet) above sea level develop symptoms referred to as acute mountain sickness (AMS). Headache is the most prominent symptom of AMS and may be accompanied by other symptoms including:

- Sleep disturbances
- Loss of appetite
- Nausea
- Dizziness
- Vomiting
- Fatigue
- Weakness

The most important variables affecting the incidence of AMS according to studies include an individual's birthplace, acclimatization in the week before the travel, the rate of change in altitude and days of rest while ascending. Rest days were the most potent protective variable.

How can you identify Acute Mountain Sickness headache?

- AMS headache is usually intense, throbbing, and is either generalized or in the forehead.

- It develops within 6 hours to 4 days of arrival at high altitude and can last for up to 5 days.
- The headache often worsens with exertion, coughing, straining or lying flat.
- Facial flushing, eye redness, and sensitivity to light may accompany headache.

The headache does not appear to be the result of low blood oxygen (*hypoxia*) alone because the attack often doesn't begin for hours to days after arriving at the higher altitude. Furthermore, oxygen therapy does not usually relieve the headache. Fortunately, these headaches generally go away after descent to sea level, although in unusual instances the headache may persist for several days to months.

The underlying cause of the headache remains unknown. Swelling of blood vessels has been considered as a potential cause, but not confirmed with experimental studies. Some experts feel that the brain swells with increased pressure within the head, but no direct evidence exists for this explanation either.

Treatment of Acute Mountain Sickness

High-altitude headache responds to ibuprofen, and can be prevented, at least in some individuals or to some degree, by aspirin, furosemide, or acetazolamide (Diamox®) before reaching high altitudes. For acetazolamide 250mg 2X per day (500mg total each day) is possibly more effective than lesser amounts. Because the headaches resemble migraine, sumatriptan has been tried and found effective in some people.

In addition to these medications, there are several tricks to avoiding or limiting the discomfort of adjusting to high altitude for those who are susceptible:

- Avoid dehydration by drinking five 8-ounce glasses of water prior to reaching a higher altitude and while at that altitude.
- If possible, travel to a high altitude should be gradual with rest or minimal activity days to allow your body time to adjust to small, gradual decreases in the amount of oxygen in the air and in your blood.
- Sleep at lower elevations than you play. If you are hiking or skiing at altitudes above 8,500 feet, stay in accommodations below 7,500 feet whenever possible.
- For people who have trouble sleeping and breathing at night, particularly if AMS has occurred in the past, use acetazolamide (Diamox®) as a preventive treatment before and during the time spent at the higher elevation.

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