

Wilderness Medicine



Question 1

Which medicine has been approved by the Food and Drug Administration (FDA) in the United States for the treatment of giardiasis?

- A. Tinidazole
- B. Metronidazole
- C. Furazolidone
- D. Quinacrine
- E. Paromomycin
- F. Albendazole

A-Tinidazole is the correct answer.

It is the only medicine approved by the FDA for the treatment of Giardiasis.

It is highly effective (>90%) and can be given as a single dose and is well tolerated.

A very common treatment for giardiasis is metronidazole (Flagyl). It has an efficacy rate of 75% to 100%, but it often causes terrible gastrointestinal side effects, such as nausea and a metallic taste as well as dizziness and headaches.

Question 2

You and your friends decide to go on a river trip. You want a clothing fabric that will absorb water and insulate even when wet. Which type of fabric does this?

- a. Wool
- b. Silk
- c. Polyester
- d. Cotton

Question 2

A. Wool is the answer

- Wool absorbs a lot of water.
- For example, merino wool is capable of holding 30% of its weight in water absorption before the wearer can even feel it on their skin.
- Even with the water that it has absorbed, the wool maintains insulation, which is a huge plus for this material.

Question 2

- 80% of the “material” is trapped air
- Wool is also wind resistant.
- Many people use wools as their base layer.
- Once maligned for being itchy, ultra-fine merino wool is itch-free, naturally breathable, moisture-wicking, fairly fast-drying, and not prone to odors.
- **Pros:** Cheap, wind resistant
- **Cons:** More difficult to dry, heavy when wet



Wool and its products

Question 3

Which fabric imitates wool?

- A. Synthetic fibers
- B. Fleece
- C. Microfiber
- D. Synthetic down

Question 3

B. FLEECE is the correct answer.

- Synthetic fiber which imitates wool
- 3D fibers that look like those in wool
- Warm when wet but does not absorb moisture
- **Dries quickly**

- **Pros:** as warm as wool but ½ the weight, inexpensive
- **Cons:** Poor wind resistance

Question 3



Question 4

True or False: 'Cotton Kills'

Question 4

False is the correct answer.

- Cotton does not effectively wick moisture away from your skin,
- It doesn't dry quickly, and it is a very poor insulator
- Conductive heat loss will happen quickly
- In reality, cotton does not kill, but hypothermia does
- It's easier to get hypothermia when you wear cotton.
- Not because it doesn't insulate you as well as other materials, but because it just doesn't insulate you as well when it is wet.

Question 4

- Cotton is a comfortable and cheap option for lounging around at the campsite but should be avoided for active pursuits.
- Beware of “disguises”
 - Corduroy
 - Denim
 - Flannel
 - Duck
 - 50/50 blends

Cotton T Shirts



Name That Disease

- You are hiking with a friend. You are at about 12,000 feet (4,000m) He is a 42-year-old male who complains of shortness of breath, a 'wet cough.' He had similar symptoms in the recent past. He says that his chest feel tight with congestion. You can hear crackles. He is a little blue in color. You went up the mountain very fast.
- What is your best guess to his condition?

HAPE - High Altitude Pulmonary Edema

- He has HAPE
- Factors that can contribute to the development of HAPE
 - Genetic factors
 - Prior development of HAPE
 - Ascent rate
 - Peak altitude
 - Intensity of physical exertion

HAPE - High Altitude Pulmonary Edema

- Treatment is to go down.
- Rapid descent is essential.
- Do not wait 'until morning.'
- Patients improve quickly
- The best way to prevent altitude illness is to go up slowly and acclimatize.
- Lack of pressure is at the root of this condition

Question 5

A 28-year-old lady comes to you with a fine rash that covers most of her body. It has been going on and off for several weeks. It is very itchy and keeps her up at nights. She has tried 'everything' possible. She cannot get rid of it. She is not allergic to anything. She has had nausea and diarrhea as well. She also complains of abdominal pain. She is a hiker and recently hiked in Eastern Tennessee. She had one tick but no other encounters with insects. She took some Ibuprofen after the hike. She has not changed her eating habits at all. She has not tried different soaps or lotions. A very likely cause of this is:

- a. Lyme disease
- b. Food allergy
- c. Medicine allergy
- d. Atopic dermatitis from the humidity in Tennessee
- e. Rocky Mountain Spotted Fever

Question 5

B. Food allergy is the correct answer. She likely has Alpha Gal Syndrome (AGS).

- Alpha-gal (galactose- α -1,3-galactose) is a sugar molecule found in meat, pork, beef, etc.
- Alpha-gal syndrome (AGS) is a serious, potentially life-threatening allergic reaction
- People become sensitized to red meat after being bit by the Lone Star tick that has previously bitten a hoofed animal.

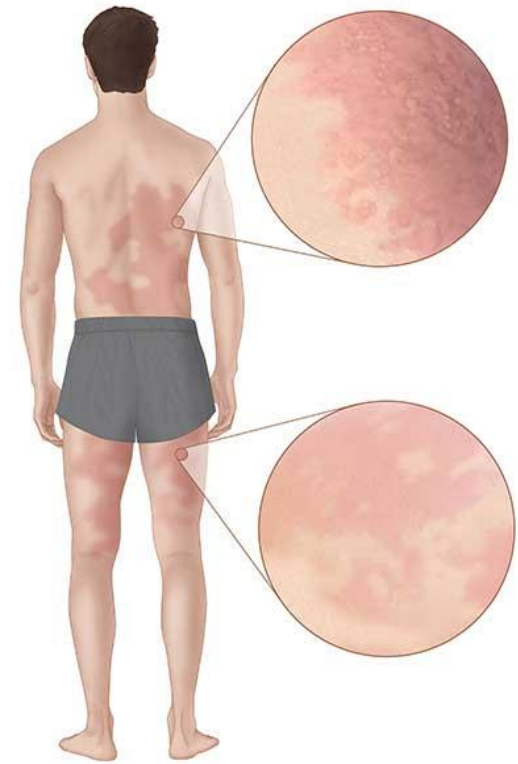
Question 5

- The Lone Star tick is the only tick in the United States known to carry this sugar and sensitize people.
- After a person eats red meat after the tick bite, they develop a serious allergic reaction.



Question 5

- Symptoms commonly appear 2-6 hours after eating meat
- AGS reactions can be different from person-to-person.
- They can range from mild to severe or even life-threatening.
- People may not have an allergic reaction after every alpha-gal exposure.



Question 5

AGS reactions can include:

Hives or itchy rash

Nausea or vomiting

Heartburn or indigestion

Diarrhea

Cough, shortness of breath,
or difficulty breathing

Drop in blood pressure

Swelling of the lips, throat,
tongue, or eye lids

Dizziness or faintness

Severe stomach pain



Question 6

What type of lightning kills most people worldwide?

- A. Ground current
- B. Direct hit
- C. Side splash
- D. Upward streamer
- E. Contact with an object struck with lightning

Question 6

The answer is A. Ground current kills most people worldwide.

Ground current	50-55%
Side splash	30-35%
Upward streamer	10-15%
Direct strike	3-5%
Contact	3-5%



Question 6

- When a lightning strike hits the ground, the electricity does not disappear into the earth.
- It spreads out in the ground
- These currents are lightning's biggest danger because they affect large areas in circles
- Current can travel up one leg, through the body- potentially stopping the heart and breathing- and then down the other leg.

Question 7

Where do the majority of lightning strikes occur in relation to the storm?

- A. In the front of the storm
- B. During the storm
- C. After the storm

Question 5

The answer is A - In front of the storm.

- Some lightning originates in the top of the thunderstorm, the area carrying a large positive charge.
- Positive lightning is particularly dangerous because it frequently strikes away from the rain.
- It can strike as far as 5 or 10 miles (8 or 16 kilometers) from the storm, in areas that most people do not consider to be a lightning-risk area.



Question 8

What has been approved for use as mosquito repellent by the US Center for Disease Control?

- A. DEET, picaridin, oil of lemon eucalyptus
- B. DEET, IR3535, picaridin
- C. DEET, oil of lemon eucalyptus, citronella



Question 8

A is the correct answer. DEET, Picaridin and oil of lemon eucalyptus are the three repellents that the U.S. Centers for Disease Control recommend as being safe and effective for use in repelling mosquitoes.

- DEET works because mosquitoes don't like the smell of it
- Picaridin works as a receptor blocker, preventing mosquitoes from locating their prey.
- Oil of lemon eucalyptus works by blocking mosquitoes' chemical receptors.

Question 8

- IR3535 is marketed as “Skin-So-Soft Bug Guard Plus.”
- It has a half-life of 20 min to 6 hours. Overall, it is less effective than 12.5% DEET.
- Citronella oil is a natural extract that when rubbed on the skin is effective for approximately 40 minutes.
- It is much less effective than DEET.

Question 8



DEET
Great



Picaridin
Very Good



Eucalyptus Lemon Oil
Very Good



IR3535
For babies



• Anopheles



Culex



Aedes aegypti
(Tiger)

Of the 3,000 species of mosquitos
only 3 infect humans



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Question 9

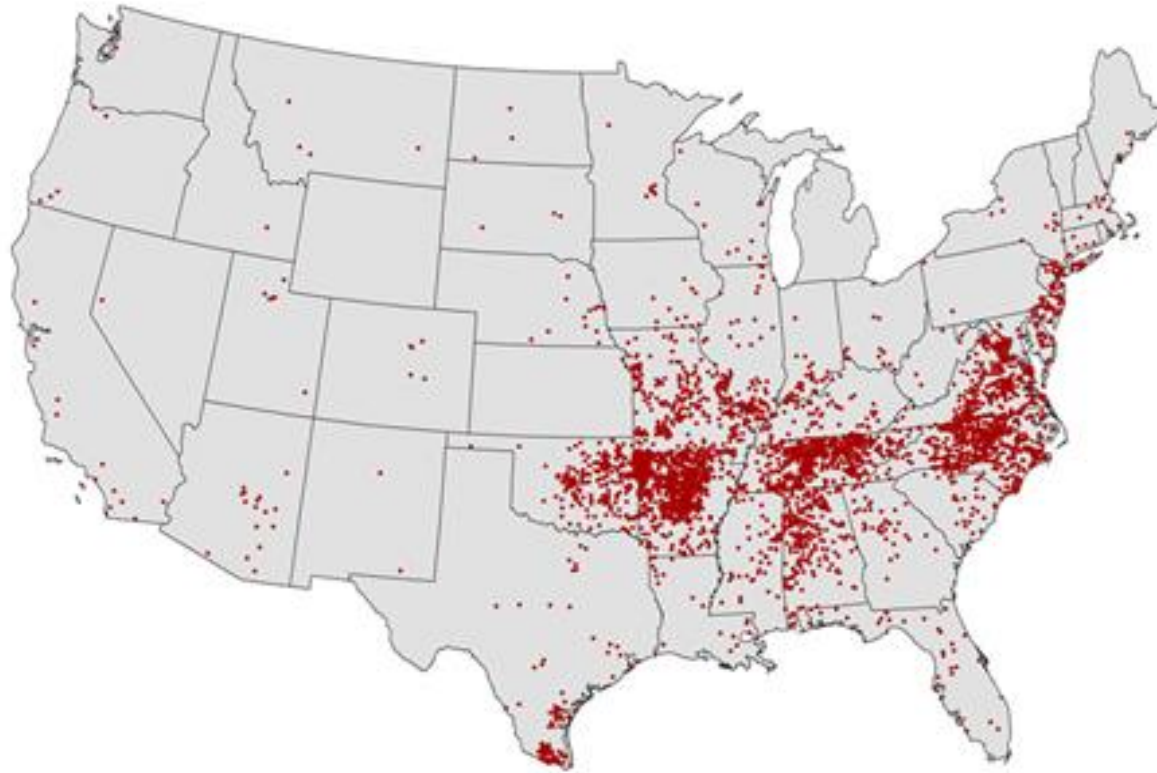
Where is Rocky Mountain Spotted Fever most likely to be seen?

- A. Tennessee, North Carolina
- B. The Rocky Mountain Western United States United States
- C. The Alps near Chamonix-Mt. Blanc

Question 9

A is correct. As an endemic tick-borne disease, Rocky Mountain Spotted Fever most likely to be seen in **South-Central States and Mid-Atlantic states in the**

- However, due to the ease of interstate and international travel, it really could be seen anywhere in the United States
- Recently this disease has been reported throughout Mexico, Canada, Central America, and South America but it is not endemic in these areas. It is not found in Europe.



Question 9

It is important to know where outdoor diseases are located when venturing to the outdoors



Case – Red toes

A 24-year-old male was in an inflatable kayak on Muddy Creek, a desert river in central Utah in the USA. At the end of the second day he had very sore toes. They looked like blister to him. He comes for advice.



Case – Red toes

What is the diagnosis and what is the treatment?



These are
chilblains.

Chilblains are also called Pernio.

Chilblains are small, itchy swellings on the skin that occur as a reaction to cold temperatures.

Rarely cause any permanent damage.



First Aid for Chilblains

- Prevent further exposure
- Remove wet constrictive clothing
- Wash and dry injury gently
- Elevate and cover with loose warm clothing

Case – Painful foot

- You are approached after a long day on a summer river trip.
- A 35-year-old male boatman has painful feet.
- What is your diagnosis?
- What is the treatment?



Immersion Foot

A nonfreezing injury to the foot.

Develops when feet are exposed to moisture and cold for prolonged periods. (12 hours or longer)

Cold and moisture softens skin causing tissue loss and predisposes to infection.



Immersion Foot

- Prevent further exposure
- Remove wet constrictive clothing
- Wash and dry injury gently
- Elevate and rewarm
- Do not pop blisters or allow victim to walk on injury





Case - Frostbite

A 23-year-old was lost in the Wasatch Mountains. In her walking out, her feet pushed through snow and fell into a river beneath deep the snow. She changed all her clothes except her boots. She took Advil and walked out all day with her unaffected companion.

She arrived home that night. This is her right foot (picture taken the next day) What is the diagnosis and what is the immediate treatment?

Frostbite

- Thawing frostbite is very painful
- A poor thawing process will cause harm
- If thawed too slowly it will increase the production of prostaglandins and thromboxane



Frostbite

- The primary treatment is rapid rewarming
- This should only occur when there is no chance of refreezing
- Gently circulated water
- Warmed to 37 - 39°C (98.6 - 102.2°F)
- 15 – 30 minutes or until skin regains pliability and returns to its normal color



Case – Kayak Injury

- You and a bunch of friends have decided to kayak in Idaho (USA).
- You are all experienced kayakers.
- You all have new kayak helmets.
- The river you chose is the Payette River.
- Things are going well until you run Jacob's Ladder rapid.

Case – Kayak Injury

- One of the better kayakers is 22-year-old Lucas Turner who overturns.
- You don't see him come up for nearly 1/4 mile.
- When you get to him his helmet is pushed back over his head and he has an abrasion on his forehead.
- He is unresponsive

Case – Kayak Injury



This is Jacob's Ladder rapid. It is turbulent and rocky.



Lucas Turner

Even though worn appropriately, his helmet had slipped back, and he struck his head.

Case – Kayak Injury

- At the scene, CPR was started.
- The efforts failed and he died.
- His death was officially listed as being secondary to a “long swim.” But this was inaccurate.
- He died of a head injury.

**The next slide is an image
of Lucas' body.**

**It is shown at the request
of his father who wants his
son's story to be told.**

**Notice the wound on his
head.**



Case – Kayak Injury

- This was the helmet Lucas wore. It is a typical helmet. It cost \$75.
- It ‘pivoted’ back over his head when it hit the water exposing his head.
- This case illustrates a misperception that white water helmets are always protective.
- In fact, in many cases, they will pivot off a kayaker’s head.



Case – Kayak Injury

- After years of dedication and work, Lucas' father helped to develop a safe whitewater helmet.
- He contracted with engineers at Johns Hopkins Bloomberg School of Public Health.

Case – Kayak Injury

- This is the helmet they developed.
- It is called the 'Current'.
- It is a multi-impact helmet with a 'Superior Retention System' with multiple and removable shims that help keep the helmet in place.



Johns
Hopkins
University's
Bloomberg
School of
Public
Health



To test how their helmet would perform in fast-moving water, students strapped the prototype onto a dummy's head, and put it in the path of a high-pressure fire hose.

Case – Discussion

- Whitewater helmets “hit” the water before they hit an underground rock and may pivot backwards.
- Helmets must not only be worn in outdoor activity, they must also be protective.
- New designs should be worn in whitewater activity.

Case – Abdominal Pain in the Mountains

- You are the doctor for a mountain camp about 4 hours from help.
- A 9-year-old boy comes in complaining of severe right lower abdominal pain.



Case – Abdominal Pain in the Mountains

- He is sore to the touch mostly in the RLQ, and there is some guarding.
- He does not have a fever.
- The rest of the exam is normal.
- Do you watch the patient of take him to the hospital 4 hours away?



Case – Discussion



- The boy was observed in camp by the physician.
- His pain resolved.... with a bowel movement.
- Constipation is a common cause of abdominal pain in the back country

Case – Sick on the River

- A university professor traveled down Cataract Canyon of the Colorado River.
- It is in a very remote location.
- On the morning of the third day of a five-day trip 5 people out of 35, began having symptoms of “food poisoning.”

Case – Sick on the River

- The sky was clear, and the temperature was over 100 degrees.
- The biggest rapids of the trip were ahead.
- None of the five can keep water down.
- They vomit but no diarrhea is seen.
- It is 50 miles by river from any help.



Case – Sick on the River

- This is a Cataract Canyon rapid.
- Is it safe to take these patients through the rapids?



Which is the
next step in
the
management
of this
patient?

- Send one guide down river in a raft with a motor to quickly obtain help from the NPS.
- Put all of the sick people in one boat with a one guide and get them out quickly.
- Put them in several of the “safest” boats, try to keep them cool and reassess as the day goes on.
- Take a layover day.

Which is the
next step in
the
management
of this
patient?

- It was felt that sending one person ahead all alone would be to risky.
- It was felt to be unsafe to let one guide take all the sick people down the river. If they had trouble, then they would be alone.
- Taking a layover day might work, but if they were still sick the next day, they would have lost one day to get to help.
- They decided to put them in the safest boats and reassess throughout the day.

Which was the source of the infection?

- A. Accidentally drinking river water
- B. Not cleaning the dishes well the day before
- C. Not washing hands before eating



What
steps
should be
taken to
correct the
problem?

- A. Make people wash hands before eating
- B. Wash dishes well in hot water
- C. Use a bleach rinse on dishes



Case – Discussion

- Good hygiene is essential in backcountry travel.
- While a simple case of the “stomach flu” at home is miserable, it can become life-threatening in the backcountry.

Case – Passed Out on the Beach

- A 40-year-old female is sitting on a raft in Cataract Canyon on a hot June day.
- The water is very high and it's still run-off season.
- The boat stops to scout a rapid.



Case – Passed Out on the Beach

- She needs help to leave the raft, becomes weak and collapses to the ground.
- She has no underlying medical disease.



Primary Assessment

- M- No major bleeding.
- A- Airway is clear. No suspicion of c-spine injury.
- R- Patient is breathing normally.
- C- Heart rate is slightly elevated. No visible bleeding.
- H- Patient is wet from the river, ambient temperature is 95 degrees Fahrenheit. Two more days on the river before help can be contacted.

Secondary Assessment

- **A**- Allergies / Altitude
- **E** – Epilepsy / Environment
- **I** – Infection
- **O** – Overdose of water, meds, alcohol
- **U** – Under dose of medications
- **T** – Trauma / Toxins (plant/animal)
- **I** – Insulin
- **P** – Psychological
- **S** - Stroke

Which is the most likely diagnosis?

- She is hyperthermic – it is a hot day.
- She is scared/hysterical from the rapids.
- She is hypothermic from the cold water.
- She took too many medicines
- She is having a seizure.
- She is bleeding somewhere from trauma in the rapids.

Case – Discussion

- The patient was hypothermic. While the air was hot, the water was very cold. The wind blowing up the river made her even colder.
- Her rectal temperature was less than 93 degrees. It took hours on a hot day to warm her back up.
- Even in hot weather, it is possible to become hypothermic.



Question10

- In what habitats do ticks usually live and feed?
 - A. Trees, bushes and tall grasses
 - B. Ground level, short grasses, shady moist areas, and near the edge of wooded land
 - C. In rotting carcass of animals

Question10

B is correct. Ticks (particularly Ixoides) prefer to live at ground level, short grasses, shady moist areas, and near the edge of wooded land.

- They will cling to grass and short shrubs usually no more than 18-24 inches (45 to 60 cm) off the ground.
- They also live in lawns and gardens, especially at the edges of woods and around old stone walls.

Question 11

What is the appropriate technique to remove a tick?

- A. Touch the tick with a burnt out hot match
- B. Using tweezers or forceps, gently grasp the tick as near to the skin as possible, then pull smoothly and directly out.
- C. Apply tape to the tick, then briskly (or quickly) pull to remove it.
- D. Cover the tick with Vaseline and wait for it to back its way out.
- E. Scrape the skin around the tick with a credit card or something similar.



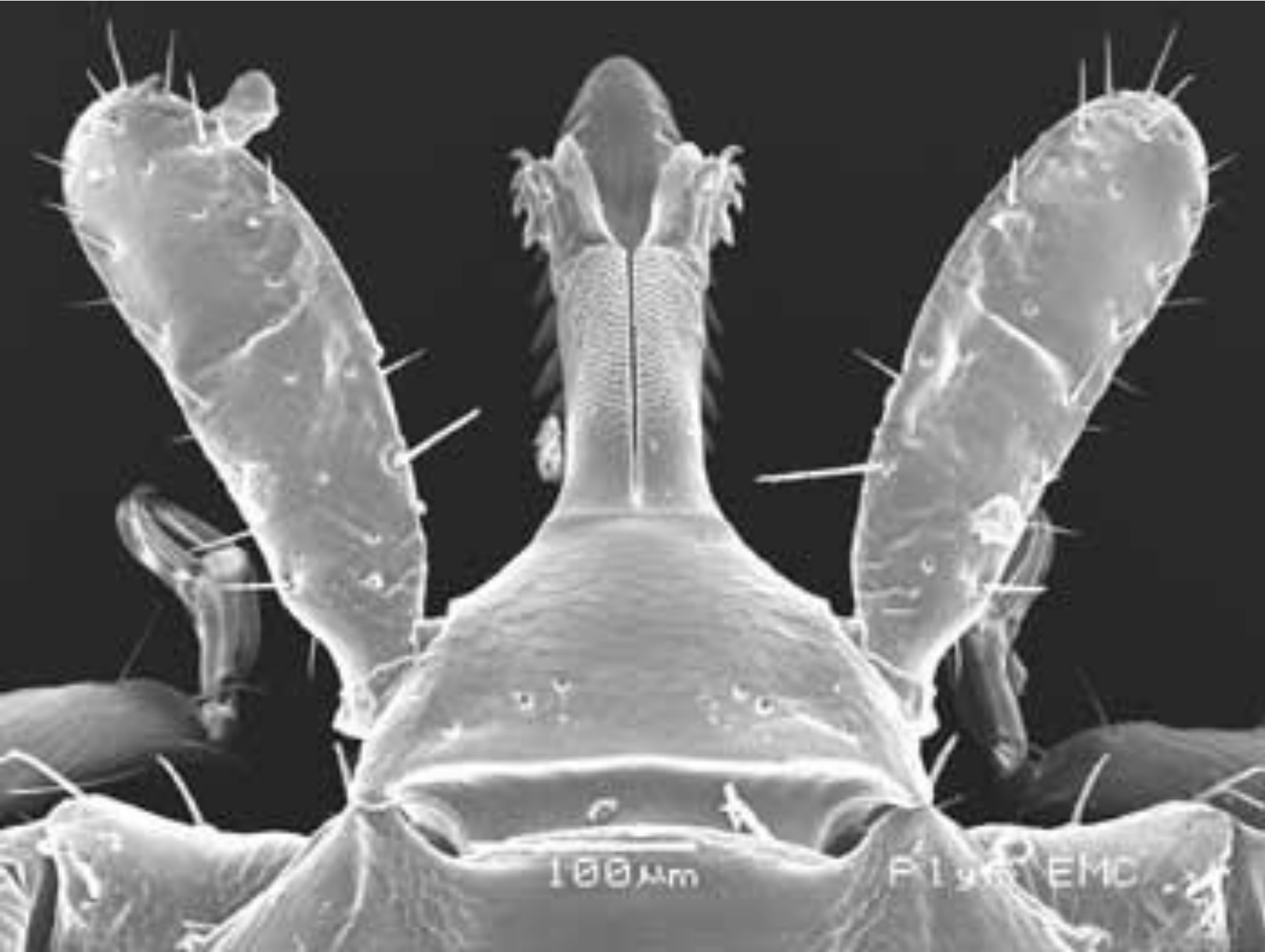
Question 11

- B is correct. Using tweezers or forceps, gently grasp the tick as near to the skin as possible, then pull smoothly and directly out.
- A tick has no 'head' but rather a proboscis called a hypostome that pokes straight into the skin. So a tick is easily removed in this way.
- If a small part of the hypostome remains, it is of little or no consequence.

Question 11

- Techniques such as taping or scraping with a credit card on the skin are only suitable to remove larval ticks. Vaseline does not ease, or speed, the removal of ticks.
- Freezing a tick using liquid nitrogen is appropriate but few people carry liquid nitrogen into the wilderness.





Question 12

- What is the timeframe to transmit disease from a tick to a human?
 - A. It's a very short timeframe-seconds.
 - B. It's generally a very long timeframe, 2-3 days.

Question 12

- B is correct. It typically is days for transmission to occur.
- The tick carrying Lyme disease must feed for >36 hours before transmission of the spirochete
- The risk of acquiring Lyme disease is only 1.2 to 1.4 percent, even in an area where the disease is common.

Question 12

- The organism that causes Lyme disease, *Borrelia burgdorferi*, lies dormant in the inner aspect of the tick's midgut.
- The organism becomes active only after exposure to the warm blood meal entering the tick's gut. Once active, the organism enters the tick's salivary glands.
- As the tick feeds, it must get rid of excess water through the salivary glands.
- Thus, the tick will literally salivate organisms into the wound, thereby passing the infection to the host.

Question 13

We knew that ticks are second only to mosquitoes in disease transmission. About how many diseases are transmitted from ticks to humans?

- A. 7
- B. 20
- C. 34
- D. 62

Question 13

- B is correct. About 20 diseases are known to be transmitted from tics to humans.
- Three of these were discovered within the last six years

Question 13



- Bacteria
 - Lyme disease
 - Relapsing fever
 - Rocky Mountain Spotted Fever
 - Helvetica Spotted fever
 - Ehrlichiosis
 - Bartonella
 - Tularemia

Question 13



- Viruses
 - Tick-borne meningoencephalitis
 - Colorado tick fever
 - Crimean-Congo hemorrhagic fever
- Protozoa
 - Babesiosis
 - Cytauxzoonosis
- Allergies
 - AGS
- Toxin
 - Tick paralysis

Case – Sick on the River

- Two men in their 20's develop nausea, malaise after the first day of a river trip while floating down the Colorado River.
- By the end of the 4th day they had diarrhea, severe abdominal cramping, and rectal pain.



Case – Sick on the River

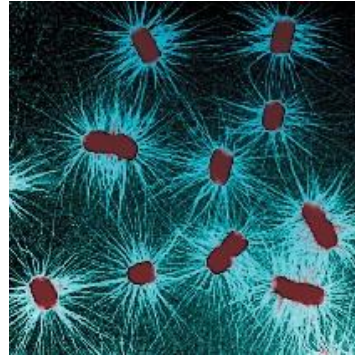
- They had been very careful to make sure dishes were clean and food was fresh.
- They were not vomiting
- They did not have a fever
- No blood was seen in their stools



Which is the most likely cause of their gastric problems?

- A. They probably drank untreated river water.
- B. Even though they tried, they did not clean their plates or prepare their food well.
- C. They became ill from contaminated food that was purchased at a store.





- A. Enterotoxigenic E. Coli
- B. Campylobacter
- C. Entamoeba Histolytica
- D. Giardia
- E. Norovirus

Which are the likely pathogens?

Which are the likely pathogens?

- The most likely source of infection are cows (E. Coli) and birds (Campylobacter) .
- The incubation time for giardia is much longer. (1-2 weeks).
- Norovirus is a common cause of gastroenteritis and diarrhea in group settings, but usually presents with vomiting. Infection is usually self-limiting.
- Entemoba Histolytica is usually not found on this river and presents with bloody diarrhea.
- However, since they did not have a fever and did not have blood in their stools (dysentery) a “non-dysenteric” pathogen must be the cause.
- Enterotoxigenic E.Coli is the likely source.

Discussion

- These men inadvertently drank contaminated river water while swimming the first day
- They developed an E. Coli infection from cows that defecate in the water
- Cipro and extra hydration were given to them and they recovered quickly

It is important to take appropriate antibiotics on a trip and know common pathogens that might infect participants.

A few less likely pathogens

- Cholera- very uncommon in developed world, but a serious possibility internationally. Profuse 'rice water' stools and dehydration.
- Rotavirus- common cause of diarrhea for children. Dehydration is very common.
- Shigella is a common cause of dysenteric diarrhea.
- Other viruses can cause self limiting gastroenteritis that usually resolves within a few days.

Case - Weakness

- A 45-year old man was backpacking in the Sierra Nevada mountains. He drank a small amount of untreated lake water. He contracted diarrhea about 4 days after returning home.
- He was diagnosed with Campylobacter infection and was treated.
- He then developed weakness in his legs to where he could not walk. He was hospitalized and recovered.
- Why did he get weakness in his legs?

Case - Weakness

- A. The patient developed severe dehydration and subsequent leg weakness.
- B. He developed Guillain-Barré Syndrome.
- C. He had an autoimmune reaction to the antibiotic.
- D. Campylobacter is known to inhibit muscle function

Case - Weakness

- B is the correct answer. The patient developed Guillain-Barré Syndrome. This syndrome is known to follow infections from campylobacter.
- After infection from campylobacter, the innate system responds with an acute inflammatory reaction with the creation of granulocytes.
- These particular antibodies cross-react with myelin components this can lead to the development of Guillain-Barré syndrome.

Case - Weakness

- Evidence of *Campylobacter jejuni* infection has been found in approximately one out of every four cases of Guillain-Barré syndrome
- The risk of developing Guillain-Barré syndrome during the months following a symptomatic episode of *C. jejuni* infection is approximately 100 times higher than the risk in the general population.

Case – Snowmobile Injury

- A 45-year-old man is on a snowmobile about 2 hours from any city.
- He is traveling through trees when a large tree limb strikes his right leg
- He is knocked off the snowmobile and the branch breaks off in his leg.



Primary Assessment

-
- M- significant bleeding, but blood is only slowly oozing from wound
 - A- Patient is alert and talking. Patient was knocked from snowmobile, c-spine injury is possible.
 - R- Normal respiration.
 - C- Pulse is elevated and patient is bleeding slowly but from a large area.
 - H- Patient is warmly dressed but the ambient temperature is 22 degrees F. Two hours from help.

Which is the next step in the management of this patient after the bleeding is controlled?

- Remove the tree limb and clean the wound as best as possible.
- Leave the limb in place and evacuate.
- Call Search and Rescue

- The patient was evacuated to a nearby hospital.
- It was felt that by removing the limb bleeding might be made worse or more difficult to control.

Case – Snowmobile Injury

Case – Snowmobile Injury

- This case illustrates the unusual cases that appear in wilderness medicine.
- Medical professionals should be able to handle a wide variety of cases with improvised treatment.





GREEN RIVER
4 DAY TRIP

Case –
Seizure On
the River

- A 37-year female is rafting on the Green River in Utah.
- It is July and over 100 degrees.
- *On the first day* people noted that she was somewhat lethargic and did not “look well.”

Case – Seizure On the River

- Because it was so hot everyone was encouraged to drink water and try to stay cool.
- By the evening of day 3 she was found laying in her tent sweating profusely.
- She was led to the river to ‘cool off.’



Case – Seizure On the River

- At the river she threw up, then crawled back to her tent.
- About one hour later she began to have a seizure.
- Her husband said that she did not have a seizure disorder.



Case – Seizure On the River

- A. Begin evacuation immediately.
- B. Pour cool water on her – she is hyperthermic and dehydrated.
- C. See if someone has anti-seizure medicines and try to give her some orally.
- .



Case – Seizure On the River

- It was unclear why she was seizing.
- Was she dehydrated?
- Was she hyperthermic?
- Had she had too much water?
- Was she infected?
- She is not a diabetic.



Using this
mnemonic
might help

- **A**- Allergies / Altitude
- **E** – Epilepsy / Environment
- **I** – Infection
- **O** – Overdose of water, meds, alcohol
- **U** – Under dose of medications
- **T** – Trauma / Toxins (plant/animal)
- **I** – Insulin
- **P** – Psychological
- **S** - Stroke

Discussion

- After seizing all night long, she was evacuated by helicopter to the University of Utah Medical Center (USA).
- Lab work demonstrated a sodium level around 21.
- A CT scan of the brain revealed severe cerebral edema.
- She was given sodium intravenously over several days and slowly recovered.

Discussion

- After she was awake, she stated that she had begun to take 12 different herbal medicines several weeks before the trip in order to 'cleanses' her body.
- Her illness was already well underway prior to the trip – hence her ill looking appearance at the start of the trip.
- She had not ingested more water than others on the trip.
- It was felt that the herbal medicines played a role in her low sodium.

Discussion

- The patient was not dehydrated or hyperthermic as seemed to be the obvious case – her sodium in fact was low.
- So it is possible to have too much water on a hot day.
- And while unlikely - the cause might be related to the ingestion of another drug or substance rather than drinking too much water.

Case – Sick in the Mountains

- You are eating at a wedding dinner in Deer Valley, Utah USA (elevation 9,800 feet) when you are called to evaluate an 82 year old lady who is vomiting.



Case – Sick in the Mountains

- Now obtunded, she apparently had been somewhat less responsive for about 10 minutes before the event.



Case – Sick in the Mountains

- Upon your arrival, she is vomiting with her eyes rolled somewhat up in her head.
- She has very good pulses and squeezes your hands.



Case – Sick in the Mountains

- After a minute she begins to speak in soft tones and then louder.
- After about 5 minutes she is able to walk to the lobby where she is evaluated by paramedics.



Case – Sick in the Mountains

- She lives in Salt Lake City (elevation 4,200 feet).
- She has no medical problems.
- She is healthy.
- She has had 2 glasses of wine. She has been at Deer Valley for about 4 hours.



Which is the next step in the management of this patient?

- Her vitals are normal, she is alert, is feeling better, and wants to stay.
 - Allow her to stay
 - Evacuate her to the nearest hospital
 - Drive her down to Salt Lake City and to her home at a lower altitude.
 - Give her an anti-emetic and watch her closely

Which is the most likely cause of the problem?

- She had ascended too high, too quickly, and experienced AMS
- She had a mini-stroke
- She had a seizure
- She had too much alcohol for someone who usually does not drink

Discussion

- The patient was taken from Deer Valley, elevation 9800 feet to Salt Lake City elevation 4200 feet.
- She became alert, the nausea abated, and she felt much better at lower altitudes.
- Subsequent tests ruled out other causes of the event.
- This is likely an unusual presentation of AMS.



Case – On the Trail

- You are hiking along a trail in the Summer and notice a young woman lying in the path. She is breathing, but tachypnic and unresponsive.
- On exam the patient has poor breath sounds and a clenched jaw.

Which is the
next step in
the
management
of this
patient?

- Begin mouth to mouth resuscitation.
- Assess the patient, look for medical information in her backpack and clothing.
- Move the patient out of harm's way – make the scene safe.

Case – Discussion

- In a nearby backpack alcohol was found along with drug paraphernalia.
- She was evacuated to a nearby hospital and found to have been intoxicated and had taken marijuana and narcotics.
- She recovered.
- It is important to consider drugs as a cause of backcountry problems.

- East of Moab, you find a young man crashed on a popular bike trail.
- He is wearing a helmet and typical bike gear.



Case – Bike Crash in Moab

- He is obtunded.
- There are no major signs of trauma.
- Primary survey is begun.



Case – Bike Crash in Moab

Which is the next step in the management of this patient?

- Make the patient cool by pouring water on him.
- Put sugar on his lips.
- Make the scene safe.
- Search his bike pack or clothes for medical tags.

Primary Assessment

- M- No major bleeding.
- A- Patient is talking and does not remember hitting head although he is somewhat confused.
- R- Normal breathing.
- C- Pulse is somewhat elevated. No major bleeding other than some minor lacerations.
- H- Patient is lying in the trail in direct sun. Ambient temperature is 87 degrees F. You are about a 1-hour ride from trailhead.

Case – Discussion

- He was wearing a wrist bracelet indicating that he was a diabetic.
- The patient was given apple juice with some improvement.
- The trail was *not* cleared, and another biker was injured.
- The patient was in “insulin shock” and was transported to a nearby hospital.
- Diabetes is a risk factor that needs to be considered in backcountry problems.



Case – Man Down on the River

- You are ‘jeeping’ near Green River Utah. You notice a fisherman laying by the side of the river.
- His fisherman’s vest is askew and his hat and pole are underneath his body.

Case – Man Down on the River

- His upper pants are wet with dry boots.
- He is diaphoretic but his eyes are slightly open and he is trying to talk.
- You are 6 hours from help by car.



Which is the patient's most likely diagnosis?

- He has had a stroke – give him ASA
- He is a diabetic – give him sugar
- He has had a seizure – monitor him
- He has had trauma – look for blood
- He is hyperthermic – put him in the water
- He is drunk – take him home



Look for medic alert tags and encourage your patients to wear them.

Case – Discussion

- A medic alert tag was found in his wallet.
- The patient has a seizure disorder. He had collapsed near the river in the soft sand. He had been incontinent.
- He was taken to the hospital and did well.

Case – Abdominal Pain in Wyoming



- A 28-year-old female is on a back country ski trip north of Cody, Wyoming.
- On day 2 of the trip, she suddenly complains of right lower quadrant abdominal pain – more severe than she has ever had.
- She does not think she is pregnant.
- She has a history of painful kidney stones

Which is the next step in the management of this patient?

- Evacuate immediately
- Return to the cabin and complete a primary and secondary survey
- Check her urine to see if it looks dark and bloody
- Feel her belly to see if it is soft

Case – Discussion

- She was in too much pain to walk.
- She was carried out on a litter that was made from branches and ski poles.
- She died on the way out.
- A ruptured ectopic pregnancy was found at autopsy.

If an ectopic pregnancy is suspected, immediate evacuation should be initiated.

Even when you do everything right, the outcome might still be bad.

Case – Unconscious

- On a river trip on the Middle Fork of the Salmon River in Idaho, you float by a camp and hear people call for help.
- A 59 year old man standing in about 6 inches of water suddenly dropped into the river.
- He was pulled into a tent about 1 hour prior to your arrival.



A scenic view of a river flowing through a mountain valley. In the foreground, there is a campsite with several green tents and a group of people gathered around a campfire. The river is surrounded by rocky banks and dense evergreen forests. The mountains in the background are rugged and partially covered in snow.

Case – Unconscious

- He is not responsive but breathing with shallow breaths.
- Pupils are fixed.
- BP is 180/110 Pulse 100
- You are in the wilderness one day from help.

Which is the
next step in
the
management
of this
patient?

- Primary Survey & AEIOUTIPS
- Advise the group to take the person out immediately, even though dangerous rapids are ahead.
- Begin CPR immediately.

Why was he
unconscious?

- **A**- Allergies / Altitude
- **E** – Epilepsy / Environment
- **I** – Infection
- **O** – Overdose of drugs, meds, alcohol
- **U** – Under dose of medications
- **T** – Trauma / Toxins (plant/animal)
- **I** – Insulin
- **P** – Psychological
- **S** - Stroke

Case – Discussion

- It was thought that he had a stroke.
- He was placed on a rigid backboard and taken down river through several major rapids (18 hours) where a helicopter picked him up.
- The man had suffered a major hemorrhagic stroke and died several days later.
- It is important to know the causes of unconscious wilderness travelers



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