

# MEDICAL EDGE



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## Though Uncommon, Broken Bones Can Lead to F.E.S.

**DEAR MAYO CLINIC:** If you have a broken bone, can bone marrow leak into your system? If so, how does it affect the rest of your body?

**ANSWER:** When you break a bone, fat tissue from the bone marrow can leak into your blood. In many cases, this doesn't cause any problems. But in some situations, it may lead to a disorder known as fat embolism syndrome (FES). Although uncommon, FES can result in serious complications such as severe lung problems and seizures.

Bone marrow is the spongy tissue inside bones that makes blood cells. Fat tissue is one part of bone marrow, and some bones have more fat in the marrow than others. For example, in the body's long bones, such as those in the legs (femur, tibia and fibula), the bone marrow is made up mainly of fat cells. Smaller bones have much less fat tissue. With a broken bone, fat cells can enter the body's circulatory system and be carried by the bloodstream throughout the body. This is called fat embolism.

Fat embolism is quite common after major trauma in which one or more large bones are broken. But the body is usually able to clear the fat from circulation without any significant damage. Rarely, though, FES develops and people who have this condition can become quite ill as a result.

The exact cause of FES isn't well understood. Whether the condition occurs after a broken bone seems to depend, in part, on how much fat leaks into the circulation, as the risk of FES increases when larger bones break and when multiple bones are broken. Men develop FES more often than women, and younger people - particularly those between the ages of 10 and 40 - have a higher risk than older people.

In addition to broken bones, other causes of FES can include the trauma associated with total joint replacement of the hip and knee, and procedures that affect the central section of long bones that contain bone marrow (intramedullary canal), such as certain bone grafting procedures and some types of leg-length correction operations.

FES can affect many parts of the body, resulting in a wide variety of symptoms. Diagnosis, though, is based on the presence of one or more of the following major criteria within approximately 24 hours of an injury or orthopedic surgery: a rash of tiny round spots that appear on the skin due to bleeding under the skin (petechial rash); impaired lung function; and symptoms that indicate problems with the central nervous system (brain and spinal cord). Lung function damage from FES can cause conditions such as hypoxia (the tissues in the body don't get enough oxygen), and, in severe

cases, acute respiratory distress syndrome (ARDS), a sudden failure of the respiratory system. Central nervous system symptoms from FES may range from drowsiness to seizures to coma.

There's no definitive treatment for FES. Once a person develops the disorder, treatment is geared toward minimizing the symptoms and providing supportive care that allows the body to eventually clear fat from the circulation. Common therapies for FES include stabilizing broken bones, managing blood pressure and, in severe cases, using a ventilator to assist with breathing.

Fortunately, most broken bones do not lead to FES. Also, when doctors can identify people who may be at risk for this condition, they can take steps, such as quickly immobilizing bones that are broken, to help prevent FES from developing. - **Tad Mabry, M.D., Orthopedics, Mayo Clinic, Rochester, Minn.**

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- 8 (NICK) Married... With Children
- 8 (ESPN) SportsCenter
- 8 (TNT) Leverage
- 8 (USA) White Collar
- 8 (BRAVO) The Real Housewives of New Jersey
- 8 (LIFE) Against the Wall
- 8 (A&E) The Glades
- 8 (HIST) Modern Marvels
- 8 (FAM) America's Funniest Home Videos
- 8 (DISN) So Random!
- 8 (STARZ) Movie ★★★  
"The Lord of the Rings: The Fellowship of the Ring" (2001) Elijah Wood, Ian McKellen. Creatures unite to destroy a powerful ring and defeat a lord.
- 8 (HBO) True Blood
- 8 (MAX) Strike Back
- 8 (PPV) WWE SummerSlam
- 8 (PLAY) Movie "Dana DeArmond Does the Internet"
- 11-04 (AMC) Breaking Bad
- 11-30 (I) Mike 'n' Up: The Franchise Sports Final
- 8 (I) Everybody Loves Raymond
- 8 (I) Abortion: The Documentary
- 8 (I) Two and a Half Men
- 8 (NICK) Married... With Children
- 8 (DISN) So Random!
- 11-35 (I) Criminal Minds
- 8 (I) Grey's Anatomy
- 11-50 (I) (MAX) Movie "Sexual Witchcraft"
- 12-00 (I) TMZ
- 8 (ION) Movie "The Pelican Brief"
- 8 (I) The Unit
- 8 (I) Paid Program
- 8 (I) Curb Your Enthusiasm
- 8 (I) Member Favorites
- 8 (I) Yellowstone: Land to Life
- 8 (DSC) The Exorcist Files
- 8 (I) TLC High Stakes Sweepers
- 8 (NICK) Married... With Children
- 8 (TNT) Leverage
- 8 (USA) Movie "Fast & Furious"

- 8 (WTBS) Movie "Without a Paddle"
- 8 (BRAVO) The Real Housewives of New Jersey
- 8 (LIFE) Drop Dead Diva
- 8 (FAM) Joel Osteen
- 8 (DISN) Wizards of Waverly Place
- 8 (HBO) Entourage
- 8 (PLAY) Badass!

**MONDAY  
 AUGUST 15, 2011**

- EVENING**
- 6:00 (I) CBS 2 News at 6PM
  - 8 (FXSP) The Transit Chapters
  - 8 (NY) News at 6
  - 8 (Fox) News at 6
  - 8 (I) Eyewitness News
  - 8 (ION) Without a Trace
  - 8 (I) Dish Nation
  - 8 (I) Dr. Phil
  - 8 (I) Family Guy
  - 8 (I) NJ Today Summer Edition
  - 8 (I) PBS NewsHour
  - 8 (DSC) Cash Cab
  - 8 (TLC) LA Ink
  - 8 (NICK) iCarly
  - 8 (ESPN) SportsCenter
  - 8 (TNT) Law & Order
  - 8 (USA) NCIS
  - 8 (WTBS) The King of Queens
  - 8 (AMC) Movie ★★  
"Bulletproof" (1996) Damon Wayans, Adam Sandler. Assassins dog a cop and a fugitive witness en route to L.A.
  - 8 (BRAVO) The Millionaire Matchmaker
  - 8 (LIFE) Movie ★★  
"Obsessed" (2009) Isis Eba, Beyoncé Knowles. A stalker threatens a married man's idyllic life.
  - 8 (A&E) The First 48
  - 8 (FAM) Switched at Birth
  - 8 (DISN) Phineas and Ferb
  - 8 (MSG) Summer of '86

- 8 (PLAY) Night Calls Live
- 6:10 (I) (TMC) Movie "Extraordinary Measures"
- 6:15 (I) (HBO) Mantle
- 6:30 (I) CBS Evening News With Scott Pelley
- 8 (FXSP) Downunder
- 8 (I) Horseshoe
- 8 (I) NBC Nightly News
- 8 (I) TMZ
- 8 (I) ABC World News With Diane Sawyer
- 8 (I) (WTBS) The King of Queens
- 8 (I) Family Guy
- 8 (I) Nightly Business Report
- 8 (DSC) Cash Cab
- 8 (NICK) iCarly
- 8 (DISN) Good Luck Charlie
- 8 (MSG) The Game 365
- 8 (PPV) Tom Watson: Lessons of a Lifetime
- 8 (HBO2) Wishful Drinking
- 6:35 (I) (STARZ) Movie ★★  
"The Karate Kid" (2010) Jaden Smith, Jackie Chan. A Chinese master schools an American boy in the martial arts.
- 6:45 (I) (MAX) Movie "I Love You, Beth Cooper"
- 7:00 (I) The Insider
- 8 (FXSP) Saratoga in 30
- 8 (I) Extra
- 8 (I) The Simpsons
- 8 (I) Jeopardy!
- 8 (ION) Without a Trace
- 8 (I) How I Met Your Mother
- 8 (I) Two and a Half Men
- 8 (I) PBS NewsHour
- 8 (I) Burt Wolf in Asia
- 8 (DSC) Dual Survival
- 8 (I) (I) Surprise Homecoming
- 8 (NICK) iCarly
- 8 (ESPN) Monday Night Countdown
- 8 (TNT) Law & Order
- 8 (USA) NCIS
- 8 (WTBS) Seinfeld
- 8 (BRAVO) The Millionaire Matchmaker
- 8 (A&E) The First 48
- 8 (HIST) To Be Announced
- 8 (FAM) The Secret Life of the American Teenager

- 8 (DISN) My Babysitter's a Vampire
- 8 (MSG) Summer of '86
- 8 (PLAY) Sexcetera
- 7:15 (I) (HBO) Movie "Ghosts of Girlfriends Past"
- 7:30 (I) Entertainment Tonight
- 8 (FXSP) Amazing Sports Stories
- 8 (I) Access Hollywood
- 8 (I) The Office
- 8 (I) Wheel of Fortune
- 8 (I) Pograms
- 8 (I) Two and a Half Men
- 8 (I) Cook's Country From America's Test Kitchen
- 8 (NICK) SpongeBob SquarePants
- 8 (WTBS) Seinfeld
- 8 (DISN) Wizards of Waverly Place
- 8 (MSG) Halls of Fame
- 7:45 (I) (SHOW) Movie "The Ghost Writer"
- 8:00 (I) (FXSP) World Poker Tour: Season 9
- 8 (I) America's Got Talent
- 8 (I) Hell's Kitchen
- 8 (I) Bachelor Pad
- 8 (ION) Without a Trace
- 8 (I) (ESPN) NFL Preseason Football New York Jets at Houston Texans (N) (Live)
- 8 (I) The Ellen DeGeneres Show
- 8 (I) Gossip Girl
- 8 (I) Antiques Roadshow
- 8 (I) Lidia's Italy
- 8 (DSC) Dual Survival
- 8 (I) (I) Undercover Boss
- 8 (NICK) My Wife and Kids
- 8 (TNT) The Closer
- 8 (USA) NCIS
- 8 (WTBS) Family Guy
- 8 (AMC) Movie ★★  
"Goodfellas" (1990) Robert De Niro, Ray Liotta. An Irish-Italian hood joins the 1950s New York Mafia.
- 8 (BRAVO) The Real Housewives of New York City
- 8 (LIFE) Movie "Deadly Sibling Rivalry" (2011) Charisma Carpenter, Kyle Richards. Premiere. A woman steals the identity of her comatose twin sister.