THORACIC INJURIES

IN

MOTORCYCLE FLAT TRACK RACING

FLAT TRACK SAFETY GROUP

BACKGROUND

Immediately after founding the Flat Track Safety Group, we realized that we couldn't provide all the necessary answers to how to improve the safety of the sport immediately. Frankly, it may take several years to offer a comprehensive safety program, knowing that there is a need for thorough technical research, testing, rider and parent training, promoter cooperation and to help change the fundamental way in which we approach safety in our sport.

Based upon those formidable tasks, we decided to borrow from the medical community and performed triage on the safety of our sport. It took little time to determine that the critical and life-ending injuries were concentrated in three areas:

- Brain injury
- Spinal injury
- Thoracic injuries

Out of those, thoracic injuries were the most common and deadly. Not to dismiss brain and spinal injuries, but the simple fact is that thoracic injuries are more life-threatening. You can't treat a brain or spinal injury if the rider succumbs to traumatic thoracic injuries. Thus, this is the reason that the Flat Track Safety Group has such a large initial concentration on thoracic injuries – we can make the most significant impact on life-threatening injuries by concentrating in this area.

STARTLING FACT

Thoracic injuries have been the largest cause of fatalities and critical injuries in flat track, followed distantly by the head and spinal injuries. Since there is a high incidence of thoracic deaths and most riders wearing inadequate protection of the thoracic cage, we saw this as Flat Track Safety Group's job #1. So, let's get on with tackling this glaring safety challenge. It's ugly but it can be fixed!

Our research has shown that the area most vulnerable to thoracic injury is the rib areas under the arms. Flat track racers see a higher incidence of this type of injury compared to other forms of motorcycle racing, due to the very close proximity of riders, which only gets closer as the track size gets smaller.

HOW DO THORACIC INJURIES HAPPEN

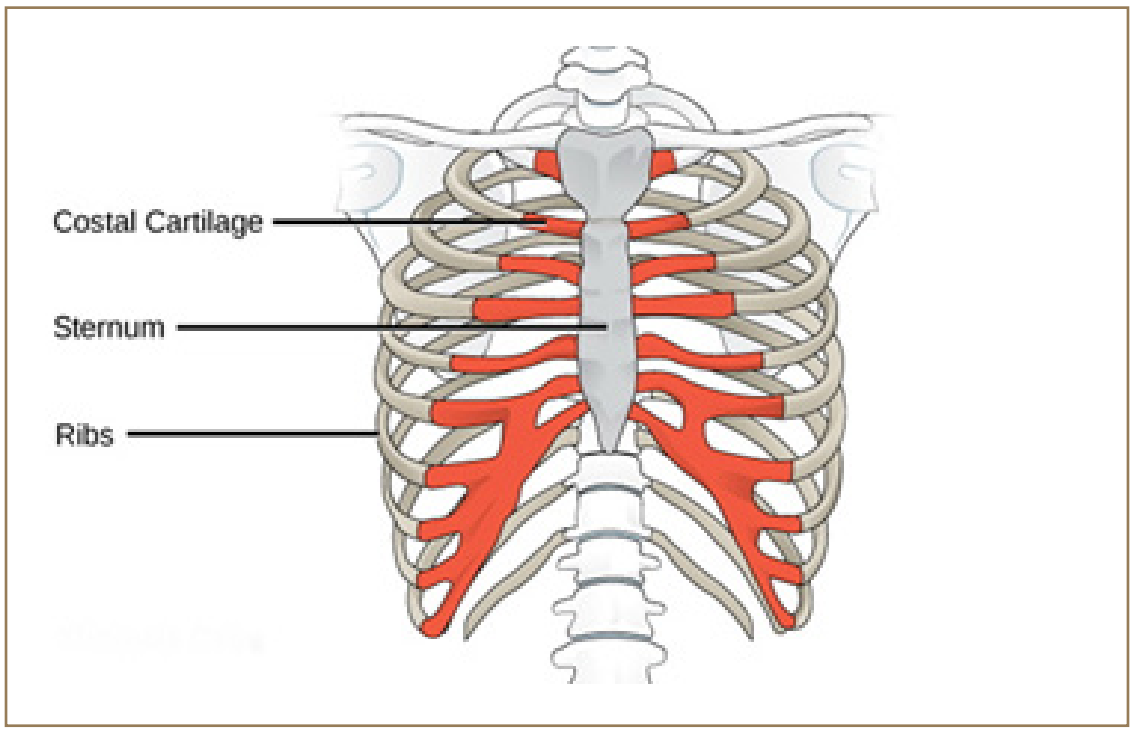
Most commonly, it occurs when a rider falls during riding. The incidence of a thoracic injury is minimal if it occurs on a low side, but increases substantially as the probability of occurrence on the high side. However, the highest incidence of substantial major thoracic injury happens after the initial crash. The downed rider can get hit by a bike or rider in four states:

- While still sliding
- After having come to a stop
- Trying to avoid oncoming bikes
- Trying to pick up his bike

Less frequently, a racer crashes into an immovable object such as a fence, wall, post, etc. with equally grim results.

OUR NATURAL THORACIC PROTECTION SYSTEM

The thoracic area is protected by your ribs and sternum. The sternum is the large flat bone located in the middle of the chest. The sternum, together with the ribs, forms the ribcage that helps protect the heart and the lungs, as well as major blood vessels.

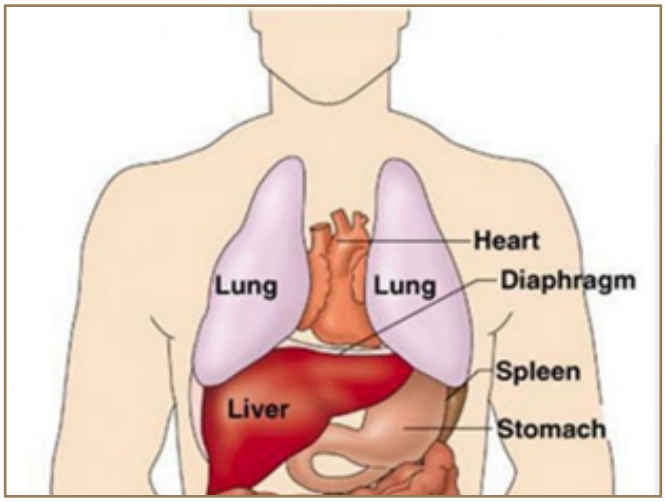


http://www.flattracksafetygroup.org/guardian-angels.html

THE MANY TYPES OF DAMAGE DONE BY THORACIC INJURY

If the blunt force trauma to the chest exceeds our natural protection (ribs and sternum), the following can occur:

Many cases of blunt chest trauma lead to rib fractures. Rib fragments can puncture a portion of the lung, and it can make breathing extremely painful which can result in the collapse of the lung with each breath. The injury can cause pulmonary contusions and as the lung capacity diminishes the chest cavity becomes filled with unwanted air which puts pressure on the heart and the other lung. The bigger the lung puncture, the faster the chest will be filled with air. This condition is called a pneumothorax and is a life-threatening injury.



If a rib is fractured in two or more places and is accompanied by nearby ribs also fractured in two or more locations, you get a flail chest. This involves a paradoxical collapse inward of the section of chest wall not connected to any other part of the body through bony connections. When the patient inhales, the flail chest part of the chest sucks inward paradoxically. It often involves having a pulmonary contusion underneath.

The pathophysiology involved in blunt force trauma to the chest can result in damage to the flow of blood, the flow of air, or both functions.

Sepsis can happen when there is an esophageal perforation, leading to leakage of food contents into the bloodstream.

The heart or major vessels can be damaged, causing hemorrhaging and resulting in a decrease in cardiac output. If severe, it can lead to death.

Increased pressure in the chest means that blood won't move properly through the heart and the patient may become cyanotic. Supplemental oxygen is necessary until surgery can be done to fix the damaged heart.

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THE MANY TYPES OF DAMAGE DONE BY THORACIC INJURY, CONT.

In a pulmonary contusion, the lung tissue is damaged, and the alveoli become blood filled and lung oxygen exchange is blocked. It is commonly seen in flail chest conditions.

A pericardial tamponade can occur which is when blood fills up the pericardial space. It prevents the heart from expanding completely as it pumps. The heart pulses become diminished, and the heart pulse pressure will become less. The result, if untreated, is low blood pressure, shock, and death. The treatment is to insert a needle into the pericardial space and draw out the excess blood.

Commotio Cordis can occur, which is an often-lethal disruption of heart rhythm that occurs as a result of a blow to the area directly over the heart (the precordial region), at a critical time during the cycle of a heartbeat causing cardiac arrest.

SYMPTOMS OF CHEST TRAUMA

Signs of chest trauma can be roughly the same, regardless of whether the injury was blunt force or penetrating. These symptoms include:

- Difficulty in breathing
- Hypotension from blood loss
- Failure of the lungs to expand properly
- Crunching sounds when palpating the rib cage
- Bruising of the chest wall
- Coughing up blood
- Flail chest, where a section of the chest wall sucks in when the patient is inhaling
- Puncture wound to the chest that sucks air into the thorax

HOW TO REDUCE OR PREVENT THORACIC INJURIES

Don't Crash: This seems so obvious, but you or someone you know is a serial crasher. It's only a matter of time before that person gets badly hurt or hurts someone else. Do yourself a favor and learn to keep it on two wheels. And if a competitor is a crasher, stay away from them whenever possible. Peer pressure may be brought upon the rider to learn to ride better. Lastly, it is the promoter's responsibility to identify and manage unsafe riders.

Reduce Target Fixation: We have observed many instances of riders fixating on a downed rider and crashing directly into them. The only solution is proper rider training. The racer needs to learn to look through the turn, not just at the apex. And second, the rider needs to look ahead and not in front. That shortness of vision is called "riding the front wheel." You'll never be safe if you're not looking ahead. The Flat Track Safety Group has been working on drills that help racers overcome target fixation, and we hope to publish a video soon.

Proper Chest Protection: Our research has shown that many racers and parents are not aware of what adequate chest protection consists of. Many assume that a motocross roost guard provides adequate chest protection. It does not. It deflects roost and rocks from the chest area, not usually a concern for flat track, except for some cushion tracks where there is considerable roost. Proper chest protection covers the entire 360 degrees of the thorax and is designed to disperse the energy from blunt blows to the chest to a broader area.

Leathers are not Chest Protection: Many riders have a false sense of security in wearing leathers. Leathers provide little protection against blunt trauma, but instead they are worn to reduce abrasion injuries. Proper chest protection must be worn under or over the leathers. As leathers are built to fit snugly, chest protection worn under leathers must be built-in, or size allowances made for the protective gear during their manufacture.

Immovable Unprotected Objects: Promoters should remove any objects within the trajectory of a racer on the track. Objects that can't be moved should be protected by a material that can absorb the sudden impact of a rider and a bike so that blunt trauma injury can be minimized.

Education: Proper education and awareness training on the above subjects are imperative to lessen these types of injuries. We encourage promoters, sanctioning officials and club officials to learn this topic thoroughly and then pass it along to your riders and their parents in a formal, regular fashion. This information can be shared during rider meetings, at tech inspection, and through one-on-one discussions.
It is our hope that once more riders begin wearing proper protection, that other racers and parents will follow suit and gear up appropriately.

The Flat Track Safety Group provides this information on our website and Facebook page, at Feel Like a Pro Dirt Schools, at races we attend, and to our contacts who have shown enthusiasm in the spreading the word. This document will help us achieve our goal.

http://www.flattracksafetygroup.org/guardian-angels.html

GUARDIAN ANGEL FREE SAFETY GEAR PROGRAM

The Flat Track Safety Group offers a program where someone can sponsor a youth rider, by providing a $200 donation to be spent on that rider's safety gear purchases, including the Thoracic Protection described in this document. Anybody who sponsors a youth rider donation is a Guardian Angel. Learn more:

http://www.flattracksafetygroup.org/guardian-angels.html

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ROOST PROTECTOR

NOT CHEST PROTECTION

360 DEGREE PROTECTION

RECOMMENDED CHEST PROTECTION

http://www.flattracksafetygroup.org/guardian-angels.html

FLAT TRACK SAFETY VESTS

Flat Track Safety Group Protect 360*:

http://www.flattracksafetygroup.org/flat-track-safety.html

Protect Armor:

http://protectarmor.com/

MotoXvest:

http://www.motoxvest.com/

Motocross Vest:

http://motocrossvest.co/

** In the past, there were no manufacturers who specialized in flat track chest protection so the Flat Track Safety Group made the decision to design our own product. We offer it at a discounted price and the profit made is channeled back into the organization. Everyone wins.*

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CHEST PROTECTION FOR LEATHERS

For riders who wear leathers and don't want to fit them to make room for a safety vest, Impact SafeT Armor offers excellent products. We recommend their standard chest protector combined with their back protector to provide complete coverage. Impact SafeT Armor is worn by many AFT professional riders.

Impact SafeT Armor:

http://www.impactarmor.com/

FLAT TRACK LEATHERS WITH BUILT-IN ARMOR

NJK is a leading provider of leathers to the flat track racer community. They provide integrated hard armor called Poron XD. Do not order leathers from NJK without this option.

NJK:

http://www.njkleathers.com/index.php/custom-leathers/flat-track

OTHER SAFETY GEAR PROVIDERS

While we spent much time researching the myriad of thoracic protection gear providers, it is certainly possible that we missed a provider who offers gear that meets our strict requirements. If you to have a product you wish to be evaluated, please contact us and we'll promptly review.

Disclosure: *Kelcey Gordon of NJK Leathers and Mike Braxton of Impact SafeT Armor provide technical consulting services to the Flat Track Safety Group. After we found the manufacturers that provide the best thoracic safety gear, we contacted them to learn more and both owners were anxious to help our cause. We thank them for their support.*

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GLOSSARY

Alveoli: The tiny air sacs of the lungs which allow for rapid gaseous exchange where carbon dioxide leaves the blood and oxygen enters it.

Cyanotic: Having low oxygen content in the blood, turning skin blue.

Flail Chest: Flail chest is a life-threatening medical condition that occurs when a segment of the rib cage breaks due to trauma and becomes detached from the rest of the chest wall. Two of the symptoms of flail chest are chest pain and shortness of breath.

Palpation: Palpation is the process of using one's hands to examine the body, especially while diagnosing a disease or illness.

Pathophysiology: The functional changes associated with or resulting from disease or injury.

Pulmonary Contusion: A pulmonary contusion, also known as lung contusion, is a bruise of the lung, caused by chest trauma. As a result of damage to capillaries, blood and other fluids accumulate in the lung tissue. The excess fluid interferes with gas exchange, potentially leading to inadequate oxygen levels (hypoxia).

Ribs: The ribs are flat, thin bones that, together with the sternum, make up the ribcage. The ribs provide protection for vital organs in the upper body, including the heart and lungs. The ribs also help to protect major vessels in the upper body. There are twelve pairs of ribs, accounting for 24 total rib bones.

Sepsis: It is a severe systemic infection that spreads via the bloodstream.

Sternum: The sternum is the flat bone located in the middle of the chest. The sternum, together with the ribs, forms the ribcage that helps to protect the heart and the lungs, as well as major blood vessels. Ribs are connected to the sternum by cartilage.

Target Fixation: It is a phenomenon observed in humans in which an individual becomes so focused on an observed hazard that they inadvertently increase their risk of colliding with the object.

Thorax: The part of the body between the neck and abdomen; it is separated from the abdomen by the diaphragm. Its walls are formed by the 12 pairs of ribs, attached to the sides of the spine and curving toward the front. The principal organs of the thoracic cavity are the heart with its major blood vessels and the lungs with the bronchi, which bring in the body's air supply. The trachea enters the thorax to connect with the lungs, and the esophagus travels through it to connect with the stomach below the diaphragm. Also called chest and pectus.

MISSION STATEMENT

To dramatically decrease traumatic injuries and fatalities in motorcycle flat track racing.

Flat Track Safety Group is a 501(3)(C) Non-Profit Organization

www.flattracksafetygroup.com

https://www.facebook.com/flattracksafety/

This document was made possible by the donations we receive from people like you.

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info@flattracksafetygroup.org 415-320-7889 www.flattracksafetygroup.com