

The Rose City Town Cryer published a series of safety articles over the last seven months and requested they be put on the web-site for easy access. Here are all seven parts in one PDF format for your downloading purposes.



First Aid at a Motorcycle Crash Site (Part 1)



by Andrew Ewens PhD

The National Highway and Traffic Safety Administration reported that in 1990, 3270 people died in motorcycle accidents. The loss of life, even while doing something you enjoy is still tragic. How can the death rate from riding be reduced? Since motorcycles do not have many safety mechanisms to protect the riders during an accident, some devices have been developed to prevent accidents from occurring in the first place. These preventive methods will not be discussed here. I want to discuss what happens and what can be done to save lives during and after a crash.

Speed is very important, not only because it is a major factor in determining the severity of a crash, but because it is under the control of the rider. The amount of energy in an accident increases by the square of the speed. For example, the energy of a person driving 40 mph is 4 times greater than that of a person driving 20 mph, a relatively small difference in speed (energy = 0.5 x weight x speed²). Thus, you can see the importance of avoiding excessive speeds and/or the potential benefit of decreasing your speed as much as possible if a crash is about to occur. Anti-lock brakes can help to safely slow you down more quickly, but

panic braking can also cause a loss of control making your situation even worse. (Refer to Best Braking Practices for more information) A last resort alternative is to force your bike down on the low side. In this case, sliding along the pavement will slow you down, while increasing your chances of being injured with abrasions (aka 'road rash'). However, these are usually less severe than other (think brute-force impact) types of injuries. Of course, in order to slow down before a crash, you must have time to act. Many accidents occur without warning, so that these maneuvers cannot be taken.

Much of the joy, as well as the danger, of biking is being 'out there,' without seat belts, air bags, steel caged passenger compartments and shatterproof windshields. In the absence of 'the cage,' protective equipment is important to limit the amount of injury that can occur in an accident. Helmets protect the head from direct injury, and work well at slow and moderate speeds. 60% of the people who died in 1990 from motorcycle accidents were not wearing a helmet. Other safety equipment includes garments and fabrics that prevent injury from skidding on the road and/or burns

from contact with hot objects. With any motor vehicle crash there are three main levels of injury that can occur. Slow speed crashes typically result in injuries that are minor and non-life threatening. High speed crashes often result in lethal injuries, where death is immediate. In the case of high speed crashes, not much help can be given immediately following the crash that will prevent the death of the driver. Moderate speed crashes may result in injuries that can be life threatening, but may not immediately cause death. This is the level of injury where immediate medical attention can make a life or death difference. The focus of this essay is on what fellow riders, who are not paramedics or doctors, can do to save a life in a crash involving moderate injuries
About the author:

Andrew Ewens received his Ph.D. in Pharmacology from the Roswell Park Cancer Institute Division of the State University of New York at Buffalo in 2004. During his time in Buffalo he worked on the initial development of a curative treatment for breast cancer. He now works as a toxicologist for Technical Resources International in Bethesda Maryland



First Aid at a Motorcycle Crash Site

(Part 2)



by Andrew Ewens PhD

CALLING 9-1-1

One of your best life saving devices will be your cell phone, as you can administer aid and talk at the same time. No coin is needed to call 911 from a pay phone. Try to remain calm and speak clearly. Let the 911 call taker ask you the questions. Call takers are specially trained and there is a reason for each question they ask. Some questions may be asked more than once to clarify or verify the information. No one is deliberately stalling or delaying response to the emergency. As soon as the call taker gets enough information, the call is sent to the appropriate dispatcher for dispatch. While this is occurring, the call taker will ask additional questions and/or give you instructions that will help your particular emergency. Rest assured, even though the call taker is still asking you questions, your call has already been dispatched to emergency personnel. Instructing the operator to “hurry up” or “get them here now” does nothing to make units arrive any faster. Last but not least, do not hang up the phone until you are instructed to do so by the call taker.

Some states have other emergency numbers and have not yet implemented a 911 program. Here is a link that was updated June 07 2003. You may want to call the State police non-emergency number in a state where you are traveling to get updates on changes.

Do NOT call the emergency numbers themselves to see if they work. If you ever call an emergency number by mistake, do not hang up. If the call taker cannot identify you, they will dispatch emergency personnel to try to find you, as they have no way of knowing that it isn't a real emergency.

PRESSURE BANDAGE FOR BLEEDING WOUNDS

The first thing to do is clean the area as well as you can. Apply a compress, applying pressure with your hands.

If the wound continues to bleed through the compress, apply more on top of the compress you are using. Do NOT remove the first compress. If the wound continues to bleed and you cannot put continuous pressure on it, apply a pressure bandage. Find a long narrow strip of cloth. You may have to rip a piece of clothing. Start by placing the center of the cloth directly over the compress on the wound. Pull the bandage to keep the compress in place, wrap it around the body part and tie a knot in the bandage directly over the compress.

FIRST AID

Remember A B C 911 = Airway, Breathing, Circulation + call 911

What do you do if you are riding with a friend and they are involved in an accident? Even if you are not a paramedic or a doctor, there are some actions you can take that may save your friend's life. You might also want to consider the risks inherent in solitary sojourns down desolate country back roads. The more people you ride with, the more people who can help out if there is an emergency.

Although it may be fun to get into those “follow your nose” relaxing country rides, it is advisable to keep track of where you are should the need to call for help arise. Alternatively if you have a GPS receiver, you can use it to determine your location.

Many injuries that can occur are highly visible: road rash, a bleeding laceration of the head, or a broken leg bone that is sticking out of the skin. However there are many injuries that can't be seen, such as some spinal injuries, closed head injuries and internal bleeding. It is very important in any crash, especially a motorcycle crash, since there is little protection to the driver, that the injured go to the hospital. They may feel fine and look fine, but nonetheless be injured enough to cause death later.

Penetrating objects should not be removed, but stabilized to keep them from moving. This is because more damage may occur during removal and the object may be preventing severe bleeding.

Secure the crash site : If injured people are still on the road, stop traffic from coming into the crash site. **DO NOT MOVE INJURED PEOPLE OUT OF THE ROAD, LEAVE THEM WHERE THEY ARE UNLESS THEY ARE IN IMMEDIATE DANGER BY BEING AT THAT LOCATION.** Use traffic cones, flares, and reflectors or simply stop the traffic yourself, but being aware of your own safety also. Once traffic is stopped, try to seek assistance from someone to hold the traffic back, as some people may lose patience and try to drive through. Make sure there is enough room for traffic to stop before reaching the crash site, especially if it occurs on a turn, where the line of site is short.

Next you can attend to the injured. **ALWAYS ASSUME INJURY TO THE SPINAL CORD OR HEAD HAS OCCURRED AND LIMIT THE AMOUNT OF MOVEMENT OF THE INJURED AS MUCH AS POSSIBLE, EVEN IF THEY INSIST THEY ARE FINE OR CAN WALK. THE SPINAL CORD CONTAINS NERVES THAT CONTROL BREATHING, SO SPINAL INJURY NOT ONLY COULD CAUSE PARALYSIS OF MUSCLES, BUT COULD ALSO BE LIFE THREATENING BY PREVENTING BREATHING.**



First Aid at a Motorcycle Crash Site (Part 3)



by Andrew Ewens PhD

One of your best life saving devices will be your cell phone, as you can administer aid and talk at the same time. No coin is needed to call 911 from a pay phone. Try to remain calm and speak clearly. Let the 911 call taker ask you the questions. Call takers are specially trained and there is a reason for eaABC: Airway: Opening and clearing the airway.

Breathing : Make sure that the victim is breathing; the brain can only take 4 minutes of oxygen deprivation before brain damage begins to occur. Circulation - applying direct pressure to uncontrolled bleeding and checking for heartbeat and treating for shock are imperative. Detailed directions are below.

Check to see if the person is breathing. Is their chest moving? Can you hear them breathe? Can they talk or can you feel their breath if you put your cheek in front of their face or on their chest? If they are breathing, then check for bleeding

Unconscious and Not Breathing : Open their mouth to see if they are choking on anything, like broken teeth or typically the tongue. Carefully remove any objects by placing your pointer finger in their mouth and with a sweeping or hooking motion remove the object. You may want to hold a solid object between their teeth that is wider than your finger in case they try to bite you. If a person vomits when they are on their back, use extreme caution and roll the person to the side to wipe out the mouth, keeping the head, neck and spine inline as you roll them. If a choice has to be made – life cannot be sustained without oxygen.

Once you are sure they are not choking, gently lift their chin, which moves the jaw forward and tilts the head backward. This is done by kneeling above their head and putting your index finger at the base of their jaw, near where it joins to the skull and place your thumb next to the ridge of their eye and lift their jaw upward. Do not push the forehead to tilt the head, as this could cause more injury to the neck, head or spine. If the person has a severe injury to the mouth, then ventilate through the nose while keeping the injured person's mouth sealed shut.

If they do not start breathing on their own, start ventilation. Pinch their nose closed, then blow slowly twice in their mouth, making sure to have an airtight seal. Check to see if their chest rises as you blow into their mouth and that air comes out when you stop blowing. If air does not go in, reposition and try

again. Still not, check for more obstructions. Keep repeating until the air successfully fills the chest.

Next check for a heartbeat. Check the carotid artery in the neck. Place your index and middle finger on top of the hard trachea in the middle of the neck, then move your fingers to the far side of the trachea, there will be a band of muscle on the side. Slide your fingers up along the junction of the hard trachea and the band of muscle toward the jaw, stop when you run into tissue under the jaw and feel to a pulse in the area where the trachea, band of muscle and tissue under the jaw meet. Check for pulse for at least 15 seconds. **CHECKING FOR A HEART BEAT MUST BE DONE QUICKLY TO DETERMINE IF THE CHEST COMPRESSION PART OF CPR IS NEEDED.**

If a heartbeat is found, just continue blowing air into their mouth (ventilating) as before until they start to breath on their own.

If no heartbeat is found, do chest compressions. Expose the chest, using your middle and index fingers, find the bottom of the ribs on both sides. Follow the ribs up toward the head to the point where the ribs join the breastbone. This point is called the Xiphoid Process . With your middle finger on this point, place your index finger on the sternum itself. Slide the heel of your other hand down the sternum until it reaches your index finger. This should be the middle of the lower half of the sternum. The second hand is positioned over the first and the fingers of the second hand entwine or interlock the first. Ensure that pressure is not applied over the casualty's ribs and that there is no pressure exerted over the upper abdomen or bottom tip of the sternum. Position your body directly above the casualty's chest and, arms straight, press down on the sternum with two hands between 4-5 cm. Release all the pressure without losing contact between the hand and sternum. Compress at a rate of about two compressions a second, 15 times in a row. Then check to see if the injured person is breathing, if not, then blow 2 times into their mouth, Repeat the chest compressions and blowing in the mouth until help arrives or the injured person starts to breath on their own, checking their breathing between each cycle. Current CPR guidelines for 1 person CPR suggest a 15:2 ratio for compression to ventilations.

If it will be a long time before help arrives, get someone to help take over when you get tired. Also, if it is cold out, have someone else cover the injured person as much as possible without interfering with your CPR.



First Aid at a Motorcycle Crash Site (Part 4)



by Andrew Ewens PhD

Observe for closed head injury: Details below.

Positioning and Spinal Support : Spinal injury can occur but the injured may initially feel fine. Unnecessary movement may make the injury worse; it is best to leave the person where they are unless they are in immediate danger. The most stable position for the spine is lying on the back. This also makes it easier to perform CPR if necessary and helps if they are in shock. If they try to walk around, help them lay down. If they are laying down on their side, or face down, carefully roll them on to their back. This will require three people. **IF AT ANY TIME THE INJURED PERSON COMPLAINS OF PAIN OR LOSES SENSATIONS IN A PART OF THE BODY WHILE DOING THIS PROCEDURE, STOP IMMEDIATELY.**

Positioning :

With as little movement as possible, position the injured person's arms straight down at their side. Position their legs straight down which will keep their spine straight. Have one person, First Responder 1 kneel above their head – facing their feet and hold their head or helmet. Hold their head or helmet with your pointer finger just above the spine in the back of the head and your thumb toward their chin and other fingers under their head.

A second person, Responder 2 kneels to the injured persons side and hold their arms and chest while a third person, Responder 3 kneels to the same side and holds their legs.

In a single coordinated move, roll the person over to their back while supporting their head – keeping their neck straight and untilted – and keeping their back straight and supported. This is done by Responders 2 & 3 pulling on the far side of the injured person's arms and legs toward them to roll them over onto their back, while the head is supported by Responder 1 and turned along with the body to keep it aligned with the spine. If you are the only person available, try to roll the person over keeping their head, neck and spine aligned by using a board.

Helmet Removal : Casualties should remove their own helmets wherever possible. Only remove the helmet if the injured are not breathing or the airway is obstructed. This should be done with extreme caution and without movement of the neck (cervical spine). Removal of the helmet will always require two first responders.

Responder 1: the person supporting the head stays where they are, and Responder 2 , the person supporting the arms and

chest moves up to the injured person's neck, while still kneeling to their side. Responder 1 takes hold of the helmet on the sides with their fingers over the lower edge of the helmet.

Responder 2: unbuckles the chin strap and puts one hand under the injured person's neck, with their pointer finger and thumb holding the base of their head, with their other hand holding the jaw.

Responder 1: spreads the sides of the helmet as much as possible and rotates the helmet, face side towards them, to clear the nose, then presses in on the sides of the helmet to support the head right before fully removing the helmet.

Responder 2: moves the hand that is under the neck, up to position it under the head – to trade off with the responder who is supporting the head when the helmet is completely taken off.

Responder 1: then rotates the helmet the other way to completely remove it while Responder 2 supports the head.

After the helmet is off Responder 2 places the head down on the ground so that it is aligned with the spine.



First Aid at a Motorcycle Crash Site (Part 5)



by Andrew Ewens PhD

Breathing :

Check to see if the person is breathing. Is their chest moving? Can you hear them breathe? Can they talk or can you feel their breath if you put your cheek in front of their face or on their chest? If they are breathing, then check for bleeding.

Unconscious and Not Breathing :
Open their mouth to see if they are choking on anything, like broken teeth or typically the tongue. Carefully remove any objects by placing your pointer finger in their mouth and with a sweeping or hooking motion remove the object. You may want to hold a solid object between their teeth that is wider than your finger in case they try to bite you. If a person vomits when they are on their back, use extreme caution and roll the person to the side to wipe out the mouth, keeping the head, neck and spine inline as you roll them. If a choice has to be made – life cannot be sustained without oxygen.

Once you are sure they are not choking, gently lift their chin, which moves the jaw forward and tilts the head backward. This is done by kneeling above their head and putting your index finger at the base of their jaw, near where it joins to the skull and place your thumb next to the ridge of their eye and lift their jaw upward. Do not push the forehead to tilt the head, as this could cause more injury to the neck, head or spine. If the person has a severe injury to the mouth, then ventilate through the nose while keeping the injured person's mouth sealed shut.

If they do not start breathing on their own, start ventilation.

Pinch their nose closed, then blow slowly twice in their mouth, making sure to have an airtight seal. Check to see if their chest rises as you blow into their mouth and that air comes out when you stop blowing. If air does not go in, reposition and try again. Still not, check for more obstructions. Keep repeating until the air successfully fills the chest.

Next check for a heartbeat. Check the carotid artery in the neck. Place your index and middle finger on top of the hard trachea in the middle of the neck, then move your fingers to the far side of the trachea, there will be a band of muscle on the side. Slide your fingers up along the junction of the hard trachea and the band of muscle toward the jaw, stop when you run into tissue under the jaw and feel to a pulse in the area where the trachea, band of muscle and tissue under the jaw meet. Check for pulse for at least 15 seconds. **CHECKING FOR A HEART BEAT MUST BE DONE QUICKLY TO DETERMINE IF THE CHEST COMPRESSION PART OF CPR IS NEEDED.**

If a heartbeat is found, just continue blowing air into their mouth (ventilating) as before until they start to breath on their own.

If no heartbeat is found, do chest compressions. Expose the chest, using your middle and index fingers, find the bottom of the ribs on both sides. Follow

the ribs up toward the head to the point where the ribs join the breastbone. This point is called the Xiphoid Process . With your middle finger on this point, place your index finger on the sternum itself. Slide the heel of your other hand down the sternum until it reaches your index finger. This should be the middle of the lower half of the sternum. The second hand is positioned over the first and the fingers of the second hand entwine or interlock the first. Ensure that pressure is not applied over the casualty's ribs and that there is no pressure exerted over the upper abdomen or bottom tip of the sternum. Position your body directly above the casualty's chest and, arms straight, press down on the sternum with two hands between 4-5 cm. Release all the pressure without losing contact between the hand and sternum. Compress at a rate of about two compressions a second, 15 times in a row. Then check to see if the injured person is breathing, if not, then blow 2 times into their mouth, Repeat the chest compressions and blowing in the mouth until help arrives or the injured person starts to breath on their own, checking their breathing between each cycle. Current CPR guidelines for 1 person CPR suggest a 15:2 ratio for compression to ventilations.

If it will be a long time before help arrives, get someone to help take over when you get tired. Also, if it is cold out, have someone else cover the injured person as much as possible without interfering with your CPR.



First Aid at a Motorcycle Crash Site (Part 6)



by Andrew Ewens PhD

Bleeding : if the injured person is breathing, then check for bleeding. If any obvious bleeding is seen, use a sterile bandage if possible to cover the area bleeding and apply direct pressure to the bleeding wound (ice in a plastic bag or a chemical ice pack that is activated by crushing, may also be applied to small wounds to help stop bleeding, especially for a nose bleed). If you suspect a skull fracture, DO NOT apply direct pressure to the bleeding face or head. If bleeding is occurring in an arm or leg, try to elevate it above the chest by placing a blanket or clothing under it. The only applies if the limb is not fractured. Keep pressure on until help arrives. If there are multiple bleeding wounds, have other people help, or tape bandages or compression gauze down to the wound wrapping the tape/gauze around the body to make it as tight as possible.

YOU SHOULD HAVE VINYL GLOVES TO KEEP THE INJURED PERSON'S BLOOD FROM CONTACTING YOU, IF THAT IS NOT POSSIBLE, LEATHER GLOVES OR CLOTHS MAY OFFER SOME PROTECTION.

Abrasions - try to clean as much as possible and bandage .

Punctures - clean and apply bandage if no foreign object is inside - Do not remove objects!

Amputations - loss of a body part - stop bleeding and find missing body part. Try to clean carefully and either put on ice in a plastic bag or keep next to person's skin.

Incisions - stop bleeding with compress bandages, pressure or pressure bandages

Lacerations - stop bleeding with compress bandages, pressure or pressure bandages.

Shock : Treat for shock before checking for shock and even if the victim is not showing signs of shock. Shock is life threatening. SHOCK COULD BE CAUSED BY A

LOSS OF BLOOD NECESSITATING REPLACEMENT OF LOST FLUIDS, THIS MUST BE DONE INTRAVENOUSLY BY A PARAMEDIC – DO NOT TRY TO REPLACE LOST FLUIDS BY HAVING THE INJURED PERSON DRINK WATER, THIS DOES NOT WORK FAST ENOUGH AND MAY CAUSE CHOKING.

Cover them with a blanket; clothing, your rain gear, jacket, etc can be used. If possible, gently elevate their feet by placing clothing or a blanket underneath them, if possible, do the same to their hands, so that their feet and hands are higher than their chest.

IF ELEVATING THEIR FEET AND HANDS WILL CAUSE MOVEMENT OF THEIR SPINE OR CAUSES PAIN IN THEIR BACK OR NECK, STOP IMMEDIATELY AND RETURN THEM TO THEIR STRAIGHTENED POSITION. DO NOT ELEVATE THEIR HEAD. DO NOT ELEVATE THE INJURED PERSON'S LEGS IF YOU SUSPECT A SPINAL OR HEAD INJURY.

To check for shock: Notice if the skin is pale looking and may feel cold and clammy. If their heartbeat feels weak, and breathing shallow and irregular, they may be in shock. Lastly, notice the color the skin under their thumbnail. Press the thumb so that skin becomes pale and count how long it takes to return to normal color. If it takes over 2 seconds to return to normal color they may be in shock.

Major Closed Head Injury : If the victim has a major closed head injury, swelling of the brain may start to occur which may or may not always occur immediately. If help is delayed, it may result in prolonged or

non-reversible brain damage. The problem is that the swelling and bleeding will not be able to expand within the skull. Since the skull cannot stretch to relieve the pressure, the fluid and swelling ends up compressing the brain, compounding any initial damage in the original trauma. This pressure is called inter-cranial pressure "ICP."

Symptoms of a ICP :

- Loss of consciousness, confusion, or drowsiness*
 - Low breathing rate or drop in blood pressure
 - Convulsions
 - Fracture in the skull or face, facial bruising, swelling at the site of the injury, or scalp wound
 - Fluid drainage from nose, mouth, or ears (may be clear or bloody)
 - Severe headache
 - Initial improvement followed by worsening symptoms
 - Restlessness, clumsiness, lack of coordination
 - Slurred speech or blurred vision
 - Inability to move one or more limbs
 - Stiff neck or vomiting
 - Pupil changes**
 - Inability to hear, see, taste, or smell
 - Irritability (especially in children), personality changes, or unusual behavior
- * Ask the person their name, age, address, or the date. If they are unsure or incorrect, they are confused.

**If you shine a light into their eyes and their pupils (black center of eye) do not get smaller in response to the light, they may have swelling of the brain (if it is bright out, their pupils may be as small as they can get, try shading their eyes for a minute and test again). If the injured person is conscious, try to get them to hyperventilate (breathing about 24-30 breaths per minute) for only a short amount of time.



First Aid at a Motorcycle Crash Site (Part 7)



by Andrew Ewens PhD

Sucking Chest Wound: If there is a puncture wound in the chest that is making a gurgling noise when the injured person breathes in, they are at great risk of one or more lungs collapsing (tension pneumothorax). Tape down on three sides an airtight material over the wound. Preferable use a sterile impervious bandage, but a latex glove or piece of leather may work if needed. By taping only three sides air might escape out of the chest when the injured person breathes out, but air is preventing from entering when they breathe in.

Broken Bone: Broken bones are less life threatening than the injuries addressed above. Severely broken bones can be seen by an abnormal shape of the body or bone protruding out of the skin. Less severe broken bones may be noticed by bleeding under the skin and pain. Splinting the broken bone may help alleviate pain and prevent further damage. As a general rule, don't move a broken bone; splint it in the position it was found. However, if an arm or leg is broken and the rest of the limb further away from the body feels

numb or a heartbeat may not be felt (as felt on the wrist or ankle) then it might be better to straighten it. If a bone is sticking out of the skin however, never try to push it back in.

When warranted, you may try to gently align the broken bone, but, if pain occurs while straightening stop immediately and splint in the position it is in.

If part of the bone is sticking out of the skin, cover it with a damp (with sterile water or the injured person's own blood) sterile gauze.

Splinting is done by taping a semi sturdy object along the axis of the bone that is broken. A stick, or rolled up blanket could be used. For fingers and toes, tape the broken finger to a neighboring unbroken finger.

If an elbow or knee is broken, you may splint with the joint bent and the supporting object laid across the bones above and below the break as to make an "A" with the bone making the sides and splint making the middle.

Ice in a plastic bag should also be applied to the broken area to prevent swelling and pain.

Eye Injury: An injured eye is not usually life threatening, but may cause blindness. If the eye looks injured, or there is bruising around the eye or bleeding from the nose and eye pain, cover both eyes with a sterile gauze and a light blocking material (like a piece of leather) to prevent the injured person from moving their eyes around which could cause further damage.

These procedures are primarily for life threatening injuries that can be treated without much equipment. More sophisticated treatments are possible by paramedics and at hospitals. No treatment should be done to delay or substitute transporting the injured person to a hospital. The best chance of surviving a crash is to rapidly get to a hospital. Even if the injured person feels alright and seems uninjured, get them to a hospital. There are many types of injuries which are not obvious or noticeable immediately, but may cause death if undetected and untreated.

Equipment List

Blankets (extra cloths – your jacket/chaps/shirt/rain gear, etc.)
Emergency roadside reflectors or flares
Sterile water
Vinyl gloves
Ice in plastic bags (Instant Ice packs – activated by squeezing)
Impervious bandages (leather pieces (leather clothing and scissors))

Cell phone
Sterile bandages
Medical tape
GPS mapping system
Compression gauze
Flash light

Source:

<http://www.brain-damage-center.com/traumatic-brain-injury.html>
<http://www.nlm.nih.gov/medlineplus/ency/article/000028.htm#First%20Aid>
http://www.ehow.com/how_5408_clear-obstructed-airway.html
<http://www.parasolemt.com.au/Manual/triage.asp>
<http://www.cjrm.org/PDFFILES/CDRobertson.pdf>
<http://www.bikesafe.co.uk/bikesafe/firstaid/firstaid.html>
Mosby's Paramedic Textbook, Mick Sanders, Mosby Lijeline, St. Louis, 1994

About the author:

Andrew Ewens received his Ph.D. in Pharmacology from the Roswell Park Cancer Institute Division of the State University of New York at Buffalo in 2004. During his time in Buffalo he worked on the initial development of a curative treatment for breast cancer. He now works as a toxicologist for Technical Resources International in Beltsville Maryland.