Bicycling Injuries and Prevention

The bicycle as we know it today has been around since the late 1800's. It was used first for recreation, and then quickly became an important mode of personal travel in many areas of the world. Its form changed little until demand-driven innovations began pouring out of the bicycle industry, enhancing a broader use, and attracting a larger market of users. If we can disregard the stationary bicycle for a moment, there remain three general categories of bikes.

Choosing the Right Bike for You

The *road bike* or "racing bike" consists of a diamond-shaped frame with gears. Because of road racing rule restrictions, the basic design has changed little since its initial development. It features a tighter geometry to enhance "stiffness" and a response to the energy imparted by the cyclist. This has been the prototype bought by most American consumers. With a more aerodynamic forward-leaning body position and a relatively harsh ride, it has always been best accepted by the subset of riders interested in training and road racing.

The *touring bike* is similar in design to the road bike, but has a more relaxed geometry for a comfortable ride, and more gear combinations to accommodate the long-distance touring cyclist possibly carrying baggage. The bike is generally heavier and has a third chain ring, or set of sprockets, at the pedal end of the chain. The freewheel, or gear cluster, on the hub of the rear wheel often has seven to eight gear selections.

The *mountain bike*, or more appropriately, the all-terrain bike, makes up the third category of bikes. In its original conception, it was designed to be sturdy enough to climb up and plunge down rocky foot rails, but has become popular for even casual street riding. It has a more upright body position, multiple gear combinations similar to the touring bike, a comfortable front and, sometimes, rear shock absorbers. These bikes are also available with less heavy-duty frames and tires that are better suited for roads than trails.

With all of these variations many people are discovering the enjoyment of riding for pleasure and exercise. However, the streets are not always user-friendly for the biker. There remains a need for the acquisition of good bike handling skills as well as a healthy dose of caution as people ride, since designated bike lanes and trails are still infrequent in most areas.

The skills are best mastered by riding with more experience cyclists. Group rides are often organized or promoted by bike shops in your community. Taking proper precautions while riding includes a variety of intrinsic actions. The standard of biking while on the road is to ride

with flow of traffic, not against it and to stay to the right. As a cyclist, you need to obey the same rules you would if you were driving a car.

Helmets

The bicycle safety helmet has become standard, and data supporting the reasonableness of its use are overwhelmingly on its side. Two rating services, ANSI and Snell, approve helmets based on their safety performance. These helmets are sold through any biking store. Even among professional riders helmet use has become well accepted. Reflective vests and gear for the bikes become critical for safety for those choosing to ride in the early morning or late evening. Protective clothing varies according to the weather and road conditions.

Insuring a Proper Fit

For both personal comfort and injury prevention, it is important that riders select the bike that best "fits" them. Your first consideration should be proper frame size. The staff at your local bike shop should be helpful in making sure you have correctly chosen this basic necessity. Frame size is important because your upper body should feel comfortable as you lean forward and grasp the handlebars. In addition, the size of the bike needs to match the length of your legs. The seat should be adjusted so that when one leg is fully down and the foot is flat on the pedal, there is a slight 15 to 20 degree bend in the knee. If there is any question, error on the high side for your knee's sake.

As you pedal, you should be able to maintain a level pelvis. If there is rocking from side to side with your pedal strokes, you need to lower the seat in small increments until that disappears.

The use of special pedals with clip-in devices attached to your shoes optimize your pedaling efficiently by generating power not only in the push down phase but in the pull up and transition phases as well. However, becoming comfortable while tethered to the bike takes some getting used to. Bike spills are often safer with the feet in the pedals than extended protectively to the sides.

Handlebars

The handlebars most commonly seen on racing bikes have been the standard until recently, when the more upright position permitted by the straight handlebar of the mountain bike became popular. This allows a more relaxed body position for the recreational rider and is often found to be easier on the back. Additional bar end extensions can give the rider a choice of hand positions. The most comfortable and efficient hand position will change with variations in terrain and incline. Newer handlebar designs for better aerodynamic position on the bike have become popular in triathlons and time trial bike races. However, when using aerobars, one sacrifices some stability and quick response. Rearview mirrors have been attached to handlebars, helmets, and even eyeglasses, and remain very important in assessing the traffic, which may be developing behind when riding on the road.

Training with a Bike

There are many training techniques that can help you maximize the use of your bike for fitness. It is important that you acquire a sense of cadence. Learning to keep your pedal speed with a certain range, despite the terrain, by using different gear combinations can minimize some of the injuries that come from "cranking." You will be best served by learning to maintain a pedal rate of 80 to 100 strokes per minute. For the beginning rider who is comfortable on a bike, trying to ride two to three times per week will help build a base of training that can later be expanded with ease. Select a terrain and a pace that cause you to be comfortably fatigued in 20 to 30 minutes of relatively steady riding, and expand the riding time gradually to an hour or more depending on your interest. For basic fitness you might be satisfied with the initial recommendation, but if harder workouts are desired, develop at least a good two to three month base of riding before seeking out the hills and hard-pushed workouts. Though highly trained riders might ride up to 500 miles a week, both enjoyment and fitness can be gained on a fraction of this without nearly as high of a risk of injury.

Stationary Bikes

Perhaps the most common bike for training purposes is the *stationary bike*. The necessity of fit on a stationary bike is just as important to injury prevention as it is on a road bike, but few people consider this seriously. To safely use the stationary bike, consider how the seat or saddle feels to you, whether you can adjust the seat height appropriately, whether you can apply foot straps or toe clips if you desire to later, and how smoothly the bike creates resistance as you spin the pedals. Many people simply record the miles that they ride, but in reality, a better gauge of effort is the combination of pedaling speed, time pedaled, and the amount of resistance. The manufacturers of the more expensive bikes provide these facts, and these bikes tend to be more durable over time.

When using the bike primarily for fitness, learn to monitor your pulse rate using your wrist or neck. If you are basically healthy and are not on medications that alter pulse rate, you should strive to maintain your pulse at a level between 60% and 80% of your predicted maximum pulse rate. That number can be determined accurately by undergoing a maximum aerobic test under supervision. You can also calculate an approximation by simply subtracting your age in years from 220. As you become more efficient on the bike, more effort will be required to maintain your heart rate in this range thereby verifying the training effect of cycling for you.

Preventing Injuries

The injuries that occur while cycling can be categorized into extrinsic injuries, such as those which occur from a fall, and intrinsic injuries, which relate to overuse or overstress of a body part. Developing good bike handling skills, avoiding dangerous situations, and wearing the proper protective clothing best avoid the extrinsic injuries.

The most common intrinsic injuries are those to the hands and knees. Sustained pressure on the palms from resting on the handlebars can cause an injury to either the median or ulnar nerves of the hands. The earliest perception of this is a tingling or numbness. This can be averted by using bike gloves, which now are generously padded, or by frequently changing your hand position on the handlebars.

Knee injuries are best avoided by proper seat height. However, if the knee is a problem in spite of proper seat height, consider the foot position on the pedal (usually toeing in slightly will help with this). Also, be sure to concentrate on spinning rather than pushing down hard with each revolution. This is not natural, but rather a learned skill and will require some discipline initially. If these changes do not result in rapid resolution, ask for help from the staff at a bike shop or experienced riders.

There are few intrinsic injuries that result in permanent damage, but it is not worth pushing through pain. Find out who the sports physicians are in your community and try to find someone who is knowledgeable about cycling. It is a great sport when you stay healthy, and there is a special enjoyment in knowing you are on the most efficient machine that man has yet devised.

**This is general information. It does not purport to encompass all risks associated with bicycling, nor is it a substitute for your own good judgment.