

Running & Arthritis

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Bottom Line at the Top: Prevailing opinion predicts that young runners grow into old arthritics. Like many such myths, it is wrong. In fact running prevents disability and arthritis.

Stanford University has been studying the Fifty-Plus running club members for years. In 1986 their data showed that runners had a little more arthritis (6.7%) but fewer medical illnesses and greater cardiovascular fitness. Over time they did even better. By 2008, their disability rate was one fourth that of a control group and only 20% were arthritic, compared to 32% of the controls. Most of the Stanford runners managed to exercise vigorously for years, into their 60's and 70's, nearly free of disability.

Other groups have noticed similar benefits, finding that though up to 65% of runners break bones and have short-term injuries, few suffer long term disability from arthritis. In general pain increases with age, but elderly runners report 25% less muscle and bone pain than do sedentary controls. People who think they can't run or walk because of arthritis or some injury actually have less pain and progress to disability more slowly if they do some regular physical activity.

If we view running as a series of collisions with the ground, we can appreciate that learning the 'best way to fall' might minimize injury. Peak compressive forces on the lower leg and knee ranges between 3 to 14 times body weight. Body weight makes a difference but not all runners, or obese non-runners for that matter, develop arthritis. Knee bone and cartilage strength to resist damage and running mechanics probably matter more.

Running is (or should be) straight up and down, with no angular stress at the knee. The runners who develop knee arthritis either have 1) a familial tendency to arthritis, 2) obesity, 3) some type of asymmetry that adds angular stress to the knee, 4) poor hamstring flexibility, 5) greater weekly mileage or 6) greater unbalanced muscular strength.

Running builds up knee cartilage to withstand the load of each running step. Bones respond to the force of impact by growing stronger. Using leg muscles keeps them strong and repaired, assuming we don't abuse them.

Problems develop when a little shear stress induces micro-trauma. Shear stress comes from biomechanical asymmetry, some examples of which are poor hamstring flexibility, foot problems (like pronation or supination), pelvic asymmetry, an injury, muscle imbalance such as much stronger quadriceps (front of the thigh) than hamstrings (back of the thigh), differences in leg length or scoliosis (curved spine). These place an uneven load on the various surfaces in a joint and torque the knee or cause the bones to move side-to-side. Any of these abnormal movements lead to micro-trauma with every step. After many steps, cartilage will degenerate, depleting the bone's protective surface, leading to long term strain and eventual arthritis.

Often trauma starts the path to arthritis. It could be a fracture, cartilage (meniscus) tear or tendon injury. These generally heal with some degree of calcium deposition and stiffening. This is good for bones, but not tendons, menisci or muscles. When one leg fractures, we shift our weight, with some tilt, to the other, putting additional strain on that knee. A muscle pull will lead to an imbalance of leg muscles, which alters the load balance on the knee. Angular stress or a twisting injury may damage cartilage, causing asymmetry that puts more stress on one surface of the knee than another. All of these contribute to the high rate of knee arthritis in skiers and football and soccer players, whose movements are necessarily lateral and angled, even without being clipped or tackled.

I believe that marathoners self-select, based on an ability to run long miles without injury. High volume training magnifies even slight biomechanical asymmetry. Take a few micro-traumatic steps and you won't notice the injury, but thousands of them and running becomes a repetitive-use injury waiting to happen. Only those with excellent body symmetry, enough (but not too much) flexibility, balanced muscles (the ideal quad to hamstring strength ratio is 3:2) and appropriate technique survive year after year of high-mileage running without injury.

Runners often show more findings on xray consistent with osteoarthritis than do non-runners, in spite of fewer symptoms. Xrays 'see' calcium, which shows up as white, vs. air (black) or fat or muscle (hazy white). The reaction to long-term micro-trauma or healing an acute injury involves laying down calcium on the injured surface. This is why tendons, which are usually invisible on xray, show up with calcium on xray after injury. A person with injury-induced calcification seen on xrays may not feel any pain.

Usually greater muscular strength increases shock-absorbing capabilities, protecting the knee joint by reducing knee load and trauma. But in some cases more muscle mass contributes to knee arthritis if unbalanced muscle strength (for example strong quadriceps and weak hamstrings) or poor flexibility destabilizes the knee on landing.

So run, walk, move to stay healthy. Unless you intend to race, do it in moderate doses, say 15-21 miles per week. And fix any asymmetries, foot problems and postural inadequacies before you start, to prevent injury and arthritis.