

# Prevention in orthopedics

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Cogent data indicate a continuous increase in the incidence of orthopedic disease and trauma. Primary and secondary preventive measures should, when

applicable, be recommended by the orthopedic profession to decision makers in the community, and should be reinforced by the health care programs.

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In "Targets for health for all in the year 2000 in Europe" by WHO, attempts have been made to predict the possible effects of already known preventive measures if they were to be implemented by governments and national health care delivery systems. Locomotor injury and disease play a small role in these predictions, but probably deserve further attention if the range of disease and health care at the turn of this century is to be seriously appreciated.

## *Society and disease pattern*

Which social phenomena will in the near future have effects on orthopedic disease and injuries?

Traffic injuries may certainly increase with increasing motor vehicular traffic; but these injuries may also, to some extent, be reduced by technical developments in vehicle and road construction, and by limitation of speed and reduced fuel supplies, as well as by increased fuel prices and taxation.

Industrial blue-collar injuries are already fairly well controlled. Hopes, however, in Sweden are small for major improvement, for the present political activity concerning this problem is not based on reality, but rather on changes in legal applications and attitudes.

The prevalence of cardiovascular disease, particularly heart and CNS casualties, has decreased in part of the world—a fact that may have several explanations, with one being a decrease in cigarette smoking, which may, in time, also result in fewer amputations and prosthesis cases. New technology for insulin administration may improve the care of diabetics; and transplantation applications may cause improvements with effects at the turn of the century.

A scientific breakthrough in rheumatoid arthritis may happen within the next 10 years—again, with effects before the year 2000.

## *Fragility fractures*

Fractures caused by bone fragility (hip fractures, vertebral compression fractures, fractures of the distal end of the forearm and proximal end of the humerus, ankle fractures and some knee fractures) have increased by a factor of 5 in the last three decades. Only recently a trend break has been observed in Scandinavia. Unless this trend of increase breaks, we can expect a doubling of these fractures at the turn of the century, taking the changes in population demography and the to date unexplained increase in age-specific risk into account.

Quantitatively, this is without doubt the most important field for prevention in orthopedics, and also a field where some preventive measures may already have had an effect in the year 2000. Obviously, the rapid change in risk—in one generation—cannot be a change in heredity, but rather an effect of environmental changes, which may be mitigated. If fragility fractures can double in risk in one generation, it may be possible to half the risk in the next.

An important factor, particularly in men, who have increased their fracture risk more than women, is possibly the increased alcohol consumption and alcohol misuse in Sweden after the ration system was abandoned in 1955. In addition to the increased risk of accidents, it is now known that alcohol has a direct toxic effect on the quality of bone.

The best documented of the factors interacting with bone mineral content and fracture risk is the level of physical activity; even modest activity seems to have beneficial effects on bone quality, and it also decreases the risk of fracture in the elderly. Therapeutic trials that have just been started will possibly have had some effect by the year 2000. Also the jogging culture trend may have had some effect by that time; the physical fitness enthusiasts invest in skeletal quality through their physical activity in their active age and, perhaps, will be able to maintain a higher than average physical activity also in their old age.

Estrogen is today given to postmenopausal women for various reasons, their use for fracture prevention is rapidly increasing. A double-blind cross-over study by Christiansen and coworkers demonstrates the fantastic effect of estrogen on bone mineral mass, and this has been verified several times. Estrogen undoubtedly increases and maintains bone mass. In addition there is evidence supporting the notion that estrogen not only increases bone mass, but also decreases the risk of hip fracture. Estrogen, even in modest doses, increases the risk of corpus uteri cancer; the risk may be lowered by the addition of gestagen. It is true that this type of cancer is usually possible to deal with successfully, but the same is true for hip fractures! Even worse, breast cancer statistically coincides with estrogen medication. This was recently demonstrated in a prospective study; women with a higher than average estrogen load—from natural or external sources—have an increased risk of breast cancer. This problem will possibly be dealt with by variation in administration methods and further epidemiologic studies. Estrogen medication will possibly have caused a significant reduction in risk of fracture by the year 2000.

Calcitonin was originally used as a treatment for osteoporosis—for old women with vertebral compression fractures—but it may be used for prevention in risk groups, such as women already suffering from fragility fractures, women with an early menopause, patients with a particularly low bone mass or a high risk of falling, and patients who have had gastric resection surgery. The definition of risk groups today is easier than the selection of preventive method.

Calcitonin, so far, must be injected or possibly given as a rather bulky snuff, and may still surprise us with unwanted side effects if used extensively.

### *Degenerative joint disease*

Excellence in fracture treatment—surgical or otherwise—is one factor that already, no doubt, has decreased the prevalence of *posttraumatic arthrosis*, and probably will do so even more in the future. Some methods of *osteosynthesis of cervical hip fractures* appear to be better than others, again possibly with future effects. Trauma prevention as mentioned above may have a preventive effect, particularly if we manage to separate pedestrians from automobiles.

Some childhood hip conditions will, no doubt, cause less *secondary arthrosis* by the year 2000. Early diagnosis and treatment of CDH has already changed the outcome of this condition, and we may, indeed, expect that this successful approach will be accepted by all by that time. In hip physiolytic—a childhood hip condition frequently causing arthrosis—the tech-

nique of treatment has, in recent years, improved to the extent that it will probably change the incidence of secondary arthrosis, whereas in Perthes' disease an ongoing multicenter study so far has not yielded results indicating a measurable effect by the year 2000. On the whole, the secondary arthrosis group, except cases resulting from rheumatoid arthritis, is fairly small.

*Primary arthrosis*—hereditary or environmental? Heredity is fairly well proven in some conditions, such as Heberden's disease and coxarthrosis. Other arthroses, such as gonarthrosis, seem to be, to a larger extent, related to environmental factors, such as repeated trauma. Except for some extremes, sports and work have not been demonstrated to cause arthrosis. A soccer player with a ligament injury and, even worse, a meniscectomy will have a slightly increased risk of contracting gonarthrosis, but playing soccer per se does not cause arthrosis to the knee but possibly to the hip.

Work load and its relationship to arthrosis has recently become a very important issue in Sweden in the face of new laws and changing implementations of workers' compensation rules. On the whole, it appears as if the correlation between work load and arthrosis is low; but in Sweden, farm workers driving tractors and professional ballet dancers have more and earlier coxarthrosis than the average person. Preventive measures appear to be farfetched; farmers will go on driving their tractors and the ballerinas will go on dancing! However, in a recent study more professions have been added to the list of risk factors.

Is there any hope in the near future? Markers of degenerative joint disease are in progress that may produce a diagnosis earlier than the radiographic examination, and perhaps even earlier than an arthroscopy; but early diagnosis will only be useful if there are preventive methods available. Secondary prevention early in the course of the disease will be, perhaps, possible in the future, for example the administration of repair signal substances or growth hormones in suitable doses. Electromagnetic fields have been suggested to improve cartilage healing, and transplantation of the cartilage or cartilage cells may be possible—therapy rather than prevention. None of the methods suggested here is, however, sufficiently advanced to have an impact on the disease pattern by the year 2000.

### **Conclusions**

Bone fragility fractures will probably increase in number and incidence, but some of the factors

mentioned above may, with any luck, result in a change of trend before the turn of the century. On the other hand, arthrosis will require resources in

relation to the proportion of elderly in the population, and will not yet have been influenced by preventive attempts at that time.