

# Occupational Medicine Clinical Update

Occupational Health Clinics for Ontario Workers Inc, Sarnia-Lambton

*A newsletter by physicians,  
for physicians, dealing  
with issues related to  
occupational medicine*



## The Joint That Gets No Respect

There seems to be a lot of attention paid to occupational musculoskeletal disorders involving the neck, upper extremities and back. Yet, there is relatively little paid to the knees. Considering our dependency on healthy knees for such mundane but necessary tasks as walking, transferring, and climbing stairs, it is surprising the knees get so little attention.

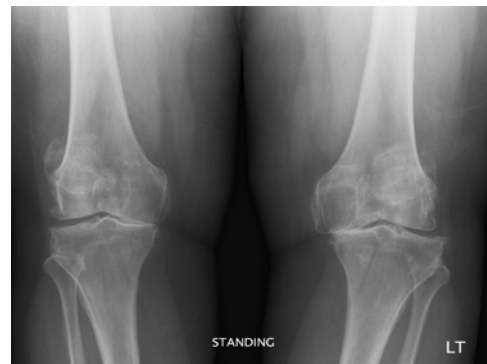
Furthermore, the societal cost of osteoarthritis (OA) of the knees is significant. With an aging society (especially all those baby boomers taking part in knee-unfriendly sports) those costs may take on an even greater significance.

It would seem reasonable, therefore, to focus on what is known to affect the longevity of this highly underrated joint.

### The evidence for occupational knee OA

Research on occupational correlates of knee OA has been accumulating since the 1950's.

Building on studies of miners and users of pneumatic tools, the 1988 U.S. National Health and Nutrition Examination Survey (HANES I) found an association between knee-bending demands and OA of the knee [Anderson, 1988].



*X-ray courtesy of Diane Cadieux, MRT, Bluewater Health (formerly Lambton Hospitals Group)*

For males the odds ratio was 2.5 (95% CI = 1.2-4.9) and for females it was 3.5 (95% CI = 1.2-10.5). The attributable risk of OA of the knees from occupation was estimated at 32%.

Data from the Framingham study was used by Felson et al [1991] to prospectively evaluate the contribution of occupation to knee OA. The authors adjusted for age, body mass, history of knee injury, smoking and educational level. Numbers of women with exposure to significant physical demands were too small in this study to reach any conclusions. Men with jobs

*(Continued on page 2)*

**"Be kind to your knees.  
You'll miss them when  
they're gone."**

**- Mary Schmich**

**Table 1: Summary of risk factors, effect of risk, and strategy for the prevention of knee OA (reproduced, with permission from David Hunter, MBBS, FRACP, Clinical Epidemiology Research and Training Unit, Boston University School of Medicine)**

| Risk factor  | Effect of risk  | Range of odds ratio     | Suggested Intervention |
|--------------|---|-------------------------|------------------------|
| Occupation   | Knee bending, heavy lifting ↑ risk of incident knee OA  | 1.7 - 3.4               | Joint protection       |
| Exercise     | Low impact, no ↑ risk. High impact, elite athletes ↑ risk of incident and progressive knee OA | Insufficient evidence   | Insufficient evidence  |
| Joint injury | Ligament/meniscal injury ↑ risk of incident knee OA   | 5.2 - 14.0              | Injury prevention      |
| Obesity      | ↑ Risk of incident and progressive knee OA  | 1.4 for 1 unit ↑ in BMI | Weight reduction       |
| Diet         | Low vitamin C & D ↑ risk of progressive knee OA   | Low Vit D 2.9           | Insufficient evidence  |
| Sex hormones | Insufficient evidence   | Insufficient evidence   | Insufficient evidence  |
| Bone density | High BMD ↑ risk of incident and progressive knee OA   | Insufficient evidence   | Insufficient evidence  |

requiring knee bending and at least medium physical demands had higher rates of later radiographic OA than men whose jobs required neither (OR = 2.2, 95% CI = 1.4-3.6).

Numerous case-control studies have resulted in similar findings for both men and women. Consistently, studies are showing that jobs involving kneeling, squatting, and heavy lifting are significant contributors to OA of the knees.

**Table 2: Occupations with increased risk of knee OA**

|                      |
|----------------------|
| Carpenters           |
| Miners               |
| Carpet/floorlayers   |
| Construction workers |
| Firefighters         |
| Welders              |
| Pipefitters/plumbers |
| Farmers              |

This makes sense when we consider the forces on the knees in various positions. When standing, the weight on either knee is about 40% of body weight. Kneeling puts 70% of the body weight on a few cubic centimeters of patella and tibia [Jensen 1996].

Not surprisingly, there are occupational groups that have been identified at higher risk of knee OA, consistent with the types of mechanical stressors noted above (see Table 2).

### Non-occupational risk factors for knee OA

As can be seen from Table 1 (page 1), there are a number of risk factors for knee OA other than occupation. These include obesity, exercise, joint injury, diet, sex hormones and bone density. The greatest modifiable risk, apart from changes in ergonomics, appears to be from obesity.

There has been fairly consistent findings from numerous studies that obesity increases risk of knee OA, in a dose-dependent fashion. Furthermore, at least one study has shown that certain occupational activities, combined with obesity, raise the risk of knee OA multiplicatively [Coggon et al 2000]. This study showed that for workers with a BMI > 30 kg/m<sup>2</sup> whose work involved prolonged kneeling or squatting, the risk was 14.7 (95% CI = 7.2-30.2) compared with those with BMI < 25 kg/m<sup>2</sup> without occupational kneeling or squatting.

Ligamentous and/or meniscal injury, not surprisingly is associated with relatively high risk of subsequent OA. Such injuries can also be occupational in origin.

### Erratum

The July/August 2003 (Volume 2:6) issue of the *Update* dealt with the topic of reporting requirements for designated substances. It was stated that workers are required to submit for medical exam and testing when a control program is in place.

While it is mandatory for the **employer** to have the control program in place, **worker** participation is *voluntary*. We regret any confusion this may have caused and thank Dr. Kathy Wakely for pointing out the error.

### Case Study - Be Careful When You Move 'The Fridge'

Even non-football followers will likely remember the 350+lb Chicago Bears lineman known as William 'The Fridge' Perry. After retiring from pro football in 1995 he was featured in this July 2000 article in *Sports Illustrated*.

It turned out the Super Bowl winner had been busy, "laying brick and mortar ever since he pulled down the curtain on his football career..."

Ironically, the Fridge has acknowledged that he has to be kinder to his knees. When asked on his hobby of hunting whether he prefers 'stand, drive or still' he responded, "Strictly stand. After 10 years of professional football, I'm not going to punish my knees anymore. That's just one of the things you've got to learn to live with."

We may send him a copy of this newsletter to help him pass the time while hunting. Between his weight, his past as an elite athlete, and his current occupation, he may want to consider another career change. Prolonged kneeling and squatting, carrying heavy loads up ladders and scaffolding are not likely to be 'kind to his knees'. Hopefully the cover title above, "Where are they now?" isn't referring to his knees.



Used with permission

### Conclusion

As we have seen, there is a lot more contributing to OA of the knees than simply 'old age'. Managing a patient's weight is one important intervention a physician can make. Similarly, asking about a person's work duties may also lead to modifications in the workplace that can prolong the service life of this important joint. This can improve the patient's quality of life, and may also be an important intervention on a public health level. OHCOW has a multidisciplinary team that would be pleased to assist physicians with these interventions.

#### References

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 Coggon D, Croft P, Kellingray S, Barrett D, McLaren M, Cooper C. Occupational physical activities and osteoarthritis of the knee. *Arthritis Rheum.* 2000 Jul;43(7):1443-9.  
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 Additional references available on request.

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