

## HEALTH

MARK NIEUWENHUIJSEN. EPIDEMIOLOGIST AT CREAL

## Jury still out on water quality

## BRADEN PHILLIPS

● Mark Nieuwenhuijsen, an investigator with Barcelona's Centre for Research in Environmental Epidemiology (CREAL), is local coordinator of Hiwate ([www.hiwate.org](http://www.hiwate.org)), a research programme funded by the EU. Hiwate is investigating potential human health risks (such as cancer, premature births, small for gestational age, semen quality, still birth and congenital anomalies) associated with long-term exposure to low levels of disinfectants (such as chlorine) and disinfectant by-products (DBPs) occurring in water for human consumption and used in the food industry. The study will comprise risk/benefit analyses, including quantitative assessments of risk associated with microbial contamination of drinking water versus chemical risk. It will also compare alternative treatment options. The programme's goal is to create a better risk assessment and water management policy.

–Where does Barcelona's water come from?

The eastern part of the city receives water from the River Ter, and the western from the River Llobregat: in the centre of the city, the water gets mixed. The area with a mixture of waters is variable, depending on the water sources and the demand.

–What company is responsible for the city's water treatment and where does the treatment take place?

Aigües de Barcelona (partner of Agbar) is responsible for Barcelona's water. It buys water from Aigües Ter Llobregat (ATLL) depending on the demand and the availability of water. ATLL has two water treatment plants: one in Cardedeu (water from the Ter River) and another one in Abrera (water from the Llobregat River). Agbar has its own treatment plant in Sant Joan Despí, where water from the Llobregat is treated. There are also extractions of ground water from the Llobregat aquifer. Since 2004, an advanced water treatment plant treats water from the Besòs aquifer, to the east of Barcelona. The Agència Catalana de l'Aigua controls the qualitative aspects of

water and public water resources in general.

–What chemicals are used in local drinking water? Are they the same ones used in other European cities? Are they used more or less here?

In both ATLL water treatment plants, chlorine is used along with chlorine dioxide. In Sant Joan Despí, the disinfectant is chlorine and chlorine dioxide, but there is also a



Water treatment plant on Ter River; above, Mark Nieuwenhuijsen/J. CANO

treatment with ozone. In the advanced water treatment plant in Besòs, the disinfectants used in prechlorination are UV (ultraviolet) radiation and sodium bisulphite. The final disinfection is done with sodium hypochlorite. Water treatment methods vary across Europe, but in general the same chemicals are used, but the extent to which may vary.

–Have you reached any conclusions yet about local drinking water?

We have only recently started and are currently monitoring the water for the presence of disinfection by-products, but we do not have any results yet.

–What are the risks?

Recent research, including research by our organisation, has suggested that there is a small risk of developing bladder cancer as a result of exposure to disinfection by-products. This exposure does not only occur from drinking water but also during showering, bathing and swimming. Some by-products such as THMs (trihalomethanes, a by-product of the water treatment process, are formed when natural organic material, such

as the decaying vegetation commonly found in lakes and reservoirs, reacts with the chlorine used in treatment) get absorbed through the skin, and the skin is an important exposure route. We have no evidence as such that there are any effects on the skin.

–Should people be worried?

The small risks are still being outweighed by the large beneficial effects of the disinfection process. If there were no disinfection, we would suffer from microbial infections. It's also worth noting that the great majority of people drink bottled water, not tap water. But exposure pathways such as showering and bathing may be important.

–Are government authorities pursuing the best policies with respect to water quality?

In 2003 the Spanish government implemented a law on drinking water that aims to reduce contaminants in drinking water. Agbar is building a desalination plant which should be ready in 2009 and should improve the quality of water. Certainly, we should monitor any progress by measuring contaminants in water and health surveillance.



Two women play slot machines, a familiar feature of local bars/LAURA JUANOLA

## Beware the one-armed bandit

Health officials propose slot machine warnings

## CATALONIA TODAY

● In the same way that cigarette manufacturers must now warn consumers of the health risks of smoking, health officials want makers of slot machines to include warnings of the risks of gambling.

The Generalitat's departments of Health and Interior have both initiated discussions with the gambling industry about including warning signs as well as technology that would warn users when they had passed a certain limit of time or money spent.

While officials do not as yet

have any data on the prevalence or health risks of gambling or playing slot machines, more than 30,000 people, according to Minister of the Interior, Joan Saura, have asked the General Management of Gambling and Shows that they be prohibited from entering any gambling locales.

Both Saura and Minister of Health, Marina Geli, point out that they are not calling into question the existence of gambling machines or establishments, but simply putting forward the proposal of warnings against excessive use.

## Football wins the fitness fight

## CATALONIA TODAY

● A game of soccer with your mates works off more fat and builds up more muscle than jogging. Plus, soccer players feel less tired after exercising than joggers because they have more fun playing the game. This is according to research carried out by Danish scientists comparing the benefits of football with jogging. The researchers selected 37 men with similar health profiles aged 31 to 33 and split them into groups of football players, joggers and couch potatoes. It comes as no surprise that the latter group ended up in worst shape at the end of the three-month study. To measure how hard the men were working out the researchers strapped heart monitors to their chests and compared blood samples and muscle tissue before and after matches and jogging sessions.

Each session lasted one hour and took place three times a week. After 12 weeks the body fat percentage in the football



A tough 5-a-side work out./P. NOVAIS

players dropped by 3.7%, compared to 2% for joggers. The footballers also increased their muscle mass by 2.05 kilos, whereas the joggers, like those who did no exercise at all, showed no significant change. "Even though the football players were untrained, there were periods in the game that were so intense that cardiovascular levels were tested to the hilt," said study leader Dr. Peter Krustrup, head of Copenhagen University's Department of Exercise and Sports Sciences.