
Superior Health Council (Hoge Gezondheidsraad) Recommendations related to the problems with the use of chlorine in swimming pools

In 2009, the Belgian Minister of Public Health Laurette Onkelinx was informed of the future publication of a Prof. Bernard paper which linked the attendance of chlorinated swimming pools to some respiratory risks (mainly asthma) in children. Subsequently the Minister requested her advisory body, the Superior Health Council, to formulate a detailed scientific advice on this matter. This resulted in an extended document, in which the experts of the Superior Health Council placed the problem in a larger context by not only reviewing the Bernard et al. paper(s), but also other relevant publications. The official report is available in Dutch and French through the Council's website¹.

The Euro Chlor Health WG considers this document of high value, as it was compiled by neutral and renowned scientific experts in the fields of pneumology, toxicology and child pneumology. Therefore, Euro Chlor decided to translate the Recommendations' section into English for wider use.

RECOMMENDATIONS:

The studies of Bernard and colleagues are valuable because they investigated the (scientifically plausible) toxic and pro-allergenic potential of chlorinated swimming pool environments. On the basis of their results, however, no final coherent conclusion can be drawn. In addition the Bernard et al. findings were not confirmed by other researchers.

Employees working in swimming pools and elite swimmers (children and adults) may be at risk to develop a respiratory pathology, whatever the underlying mechanism may be.

A relationship between swimming pool attendance and childhood asthma has not been confirmed, but cannot yet be excluded.

¹ <http://www.sante.belgique.be/internet2Prd/groups/public/@public/@shc/documents/ie2divers/11098441.pdf>
http://www.sante.belgique.be/internet2Prd/groups/public/@public/@shc/documents/ie2divers/11098441_fr.pdf

More information needs to be collected to reach a consensus.

- 1) Longitudinal studies are required to better define the relationship between recreational swimming and asthma in children. The follow-up of the scheduled and running cohort studies offers the opportunity to challenge the hypothesis. The results of the *ALSPAC birth cohort study* are valuable in that respect and fail to confirm an elevated asthma risk caused by chlorinated swimming water.
- 2) Before ascribing causality to recreational swimming, a clear dose-effect relationship needs to be established with sufficient knowledge on exposure:
 - a. The exposure assessment is, however, too limited since only the cumulative swimming pool attendance is questioned and the questioning is not performed in a validated way.
 - b. Irritating and potentially sensitizing disinfection by-products (DBPs), such as chloramines, were insufficiently accurately characterized and measured in the majority of the published studies.
 - c. Most European countries use the recommendations of the World Health Organisation (WHO) regarding the amounts of chlorine to be used in swimming water. The actual concentrations, however, still significantly vary from one pool to another. In order to verify whether there is a specific Belgian problem, it is desirable to meticulously compare the swimming pool conditions in Belgium with those in the surrounding member states.
 - d. It is also advised to include all possibly relevant exposure routes in the evaluation, with special attention for as well the inhalation of fumes and aerosols, as for the aspiration of swimming water.
- 3) More experimental work is required to elucidate the pathophysiological mechanism of the observed effects on the airways and to determine their clinical relevance.

The avowed advantages of physical exercise during swimming activity and the asthma patients' higher tolerance to swimming compared to other sports, are also up against the non-confirmed risk of childhood asthma. Nevertheless, one needs to consider the possibility of exacerbation of respiratory complaints in the individual asthma patient during or after swimming.

Thus an equilibrium needs to be found between the potential risk for the development of asthma by the currently used disinfection methods on the one hand and the proven negative consequences of infectious diseases by insufficient disinfection on the other hand.

With the current knowledge, chlorine and chlorinated derivatives remain the major agents of the swimming pool disinfection process. Swimming pool construction and maintenance form the key minimizing chloramine and other DBPs' concentrations.

Important points of attention are:

- 1) The insurance of the quality of the swimming water by optimization of the flow-through pattern, the purification of the suppletion water and the prevention of introduction of cleaning products.
- 2) The water temperature, especially in spas and paddling pools.
- 3) The ventilation and air recirculation, which are determinative for the pool's indoor air quality.
- 4) Sufficient training of the technical department.
- 5) Good compliance with hygiene prescriptions, as showering before swimming significantly decreases the level of chloramines.
- 6) The fact that peak loads are hard to determine in outdoor pools, especially in private settings.

Alternative disinfection processes need to be evaluated for their efficacy to inactivate pathogens and for their safety, with special attention for the DBPs formed. A follow-up of new developments in as well disinfection products as technical solutions, is certainly advised.

The Superior Health Council concludes that at this moment there is insufficient evidence to link exposure to chlorinated compounds with the development of asthma to advise children against swimming.