Testimony of Dr. Mark LeChevallier
House Health and Human Services Committee – June 17, 2010

My name is Dr. Mark LeChevalllier and I am the Director of Innovation and Environmental Stewardship for American Water. American Water is the parent company of Pennsylvania American Water. I have been involved in chloramine research and have authored several guidance documents dealing with the implementation of chloramination at water treatment plants. I am attaching my biography which will provide additional information.

The use of chloramine is not new to the water industry. In fact, chloramine has been used for almost 90 years in drinking water treatment. EPA estimates that more than 68 million people drink and use chloraminated water every day in the United States.

Chloramination is practiced in supplying water for major cities in the United States: San Francisco, Indianapolis, Philadelphia, Washington D.C., Dallas, Boston, Miami and Denver. Within Pennsylvania, four million people rely on tap water treated with chloramine for drinking, cooking, cleaning, bathing and other typical uses. That's one out of every three people.

Water utilities using this safe, effective disinfection method include York Water Company, which has been using chloramine treatment since 1942. The City of Philadelphia has been adding chloramine since the 1970s. Aqua Pennsylvania's main division in suburban Philadelphia, which serves more than one million people in Montgomery, Delaware, Chester and Bucks counties, including Bensalem and Bristol, uses chloramine. The City of Lebanon's water system adds chloramine, and the Chester Water Authority in Delaware County also uses chloramine.

American Water has extensive experience with chloramine disinfection. We own and operate approximately 30 water systems across the country, including seven systems in Pennsylvania, that use chloramination.

Water suppliers use chloramine to comply with new, more stringent EPA regulations regarding disinfection byproducts. Pennsylvania American Water's West Shore (Mechanicsburg) system needs to transition the water disinfection process from free chlorine to chloramine. This change is necessary to reduce the levels of disinfection byproducts (DBPs) that EPA has found to have known health risks.

Pennsylvania American Water evaluated various treatment options for the reduction of DBPs in its Mechanicsburg system. Chloramine was chosen since it is the best, proven, most cost-effective method to reduce the DBP levels in the distribution system. Pennsylvania American Water applied to the DEP for all permits to allow chloramine treatment to be used; all permits were received in 2006.

Compared to chlorine, chloramine produces substantially lower concentrations of the disinfection byproducts that the EPA has found to have known health risks. The new federal regulation is in effect now, and we are taking a proactive approach to ensure that our water meets all public health standards.

The EPA has reviewed the safety of chloramine application and has established a maximum level that can be applied by water suppliers. The standard is set a level where no human health effects are expected to occur. Based on peer-reviewed and validated research, the EPA, Pennsylvania DEP, Pennsylvania Department of Health and other credible health institutions continue to recognize chloramine as a safe, effective disinfectant.

Every water source – and the quality of the source water – is different, which is why disinfectants, treatment processes and byproduct issues must be addressed differently at every plant.

One of the most important regulations pertaining to safe drinking water is EPA's Lead and Copper Rule. Proper corrosion control is essential to reducing the risk of lead leaching, and Pennsylvania American Water has extensive experience in this area. Pennsylvania American Water's West Shore treatment plants have used a phosphate-based inhibitor since 1992, so no new corrosion control additives are necessary for the transition. The system has been compliant with the existing Lead/Copper regulation since it became effective in the early 1990s. Chloramine will not create lead-related issues on the West Shore.

The Washington D.C. water system had issues with lead due to a lack of proper corrosion control with chlorine – before it made the transition to chloramine. EPA called American Water to help resolve the issue. We assisted Washington D.C. officials in developing the solution – a phosphate-based corrosion inhibitor.

In closing, I would like to reiterate that chloramine has been used for nearly 90 years as a safe and effective disinfectant. Large U.S. cities have been applying chloramine for many years -- including Philadelphia and suburbs and York, with no clinical documentation of adverse health effects.

American Water is a strong supporter of ongoing research. If EPA conduct further studies, it is unknown how long such research would take, and what, if any, changes EPA would make. In the meantime, new federal regulations are currently in effect to address known health risks, and we believe in taking a prudent, proactive approach to ensure that our water meets all public health standards.

Dr. Mark LeChevallier
Director of Innovation & Environmental Stewardship at the American Water
Biography

Dr. Mark LeChevallier received his Bachelor of Science and Masters degrees in Microbiology from Oregon State University in 1978 and 1980. He worked as a Research Associate at Montana State University where he received his Ph.D. in Microbiology in 1985. Since 1985 he has worked for American Water, a water utility operating in 32 states, and Canada; serving over 16 million people. Dr. LeChevallier is currently the Director of Innovation & Environmental Stewardship at the American Water Corporate Center in Voorhees, NJ. In this capacity he directs a staff of 18 for both the research and environmental compliance programs.

Research areas have included bacterial regrowth, disinfection of biofilms, corrosion, bacterial nutrients, AOC measurement techniques, biological treatment, *Mycobacterium*, microbial recovery and identification, modeling and impact of pressure transients on water quality, and detection, treatment and survival of *Giardia* and *Cryptosporidium*. He has authored or coauthored over 100 research papers, most in peer-reviewed journals. Several of his papers have received awards from the American Water Works Association for outstanding contributions to the science of water treatment. He was the recipient of the George Warren Fuller award in 1997 from the New Jersey section of the American Water Works Association, and is a fellow of the American Academy of Microbiology. Dr. LeChevallier has been the principal investigator or co-investigator on over 60 research grants totaling nearly $27 million from the US Environmental Protection Agency, American Water Works Association, Awwa Research Foundation, WateReuse Foundation, and State agencies. Dr. LeChevallier was named by *Public Works* magazine as a 2005 Trendsetter to "recognize leaders in the public works community who have defined policy, brought their community or an issue into the spotlight, or set the standard within the industry.

Dr. LeChevallier also directs environmental compliance programs for American Water including the development of environmental management plans for more than 1,000 operating centers, environmental audits to ensure compliance, development of a national cross connection control program for American Water, and implementation of environmental stewardship and greenhouse gas control programs. Dr. LeChevallier is a frequent speaker at regional, national and international conferences. He has provided consulting services to a number of water utilities on issues dealing with biofilms, coliform monitoring, disinfection and chloramination, *Giardia* and *Cryptosporidium*, and corrosion control.

Dr. LeChevallier currently serves as the chair of the AWWA Water Science and Research Division, and chair of the AWWA Total Coliform Rule Technical Action Workgroup (TCR TAW). He was a negotiator representing the National Association of Water Companies on the USEPA Federal Advisory Committee for revisions to the Total Coliform Rule and currently serves on the Research and Information Collection Partnership panel for research to develop the Distribution System Rule. He is the distribution system section editor for the *Journal of the American Water Works Association* and a member of the Research Advisory Committee for the WateReuse Research Foundation. He was a member of the Distribution System Committee for the National Academy of Science, National Research Council. He has served on a variety of professional committees and is the past-chair of Division Q of the American Society for Microbiology, and a past member of the *Applied and Environmental Microbiology* editorial board. He has served several terms as a member and subgroup chair of the AWWA Research Foundation Research Advisory Committee and is currently a member of the Strategic Initiative group that is directing $5 million, 5-year program on distribution system research. He is the chair of the Unsolicited Proposal Review Committee for the Water Research Foundation. He has been an active participant in a number of USEPA committees, the Disinfection By-Product Council Technical Advisory Group, the STAR peer review panel, and the Drinking Water Advisory Committee. He is a member of the American Water Works Association, the American Society for Microbiology, the World Health Organization drinking water revision committee, the International UV Association, and the International Water Quality Association.

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Heterogeneous dermatitis complaints after change in drinking water treatment: a case report

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Abstract

Background: The disinfectant monochloramine minimizes the formation of potentially hazardous and regulated byproducts, and many drinking water utilities are shifting to its use.

Case presentation: After a drinking water utility serving 2.4 million people switched to monochloramine for residual disinfection, a small number of residents complained of dermatitis reactions. We interviewed 17 people about their symptoms. Skin appearance, symptoms, and exposures were heterogeneous. Five respondents had history of hives or rash that preceded the switch to monochloramine.

Conclusion: The complaints described were heterogeneous, and many of the respondents had underlying or preexisting conditions that would offer plausible alternative explanations for their symptoms. We did not recommend further study of these complaints.

Background

Disinfection of public water supplies protects public health by inactivating microbial pathogens. Byproducts of disinfection with chlorine have been associated with bladder and rectal cancers and to adverse reproductive outcomes [1,2]. Because the disinfectant monochloramine minimizes the formation of potentially hazardous and regulated byproducts, many drinking water utilities are shifting to its use [3].

In February 2004 a water utility serving 2.4 million people in northern California replaced chlorine with monochloramine for secondary disinfection. Subsequently a small number of water customers raised concerns about skin rashes, attributing these rashes to the change in disinfection method. Skin complaints associated with water are not uncommon [4,5]. We are not aware of any previous work investigating this type of reaction as a specific response to the presence of monochloramine in the water supply. Dermatitis relating to water treatment is reported in two studies; one used a broad case definition [6], and the other revealed that the perception of change in water treatment was principally responsible for the symptoms, rather than any actual change in the water treatment [7]. Neither was specific to monochloramine.

In this context, we identified several possible explanations for the skin complaints that we received, including the following: (1) the symptoms were the result of underlying or preexisting conditions; (2) patients developed aquagenic pruritis or aquagenic pruritus of the elderly [4] independent of the change in water treatment and patients reported their symptoms knowing about a reported change in water treatment; and/or (3) reported symptoms were

indeed the result of the change in water treatment. In order to gain insight into these hypotheses and evaluate the need for an epidemiologic investigation, local public health departments cooperated to develop a questionnaire to assess the homogeneity of the complaints. We hypothesized that homogeneity among the complaints might provide justification for a cross-sectional study of water customers; alternatively if we could not identify homogeneity, this might indicate the lack of a common cause, reducing the pressure for further investigation.

The questionnaire was administered between September 2004 and January 31 2005 to individuals who initiated calls to the health department. The public was made aware of the availability of the questionnaire through media reports and community meetings.

Case presentation

Seventeen respondents called the health department and were administered the questionnaire by telephone. The average age was 65 (range 45–87). Fourteen respondents were female. Almost half were retired or disabled (n = 8). Eight respondents lived alone; nine had two or more people living in their households.

Ten respondents said their skin problems started in February 2004, five reported an onset date of March 2004, and two reported an onset date later than April 2004. Itchiness was reported by 15 respondents. Symptoms reported included dry skin (n = 8), bumps on the skin (n = 7), burning skin (n = 7), and red skin (n = 6). Four or fewer respondents each reported hives or welts, soreness, rash, flaky skin, pins and needles or tingling sensations and purple bumps. Most respondents reported the skin problem was on the arms and legs (n = 11) and torso (n = 10); four or fewer reported the problem was on the head, eyelids, shoulders, fingers, toes, or "all over".

Seven respondents had no previous skin problems other than poison ivy, poison oak, or acne. The remaining respondents reported history of hives or rash (n = 5), shingles, eczema, cracking of skin, skin cancer, psoriasis, burning sensations, lice or scabies (three or fewer respondents each). Thirteen respondents indicated that their problems were ongoing and eight felt that they were worse after contact with water. Two respondents had taken time off from work for doctor appointments as a result of the skin problem. A total of fourteen respondents had visited their doctor because of their skin problem, none remembered being given a diagnosis. Most respondents showered at least every other day (n = 11), and had previous allergies (n = 11). There were no common (n > 3) exposures to specific brands of cosmetics, body/bath products, laundry products, or medications.

Conclusion

Our investigation indicates that the reported complaints were heterogeneous. Many of the respondents had underlying or preexisting conditions offering an alternative plausible explanation for their symptoms. Overall, results did not support the need for a wider study.

Our investigation was subject to several biases, and our findings should be interpreted with caution. The respondents were a convenience sample, and none were examined by a dermatologist as part of the investigation. The questionnaire was not validated. Most importantly, the investigation, the complaints, and speculation that these types of symptoms might be related to the change in water treatment were widely publicized in the local media.

Even with the widespread publicity, only 17 people volunteered to participate in the questionnaire in the five month period that it was open. Including seven who completed the questionnaire, a total of 48 calls from citizens with questions or complaints about chloramine were received by our health department between April 2004 and March 2006. Thirty-six of these callers were from outside of our health department jurisdiction, but within the water supply service area. The total population in the service area is 2.4 million.

This case investigation was designed to explore the complaints received by the health department. Although we recognized that the approach would not be sufficient to establish or disprove a causal relationship between the skin complaints and the presence of monochloramine in the water, we believe that our investigation was an appropriate step to determine the need for further investigation of these relationships. Nonetheless, clinicians working with populations served by utilities that are switching to monochloramine should be aware of our findings so that they are able to appropriately assess the timing, nature and alternative explanations for the symptoms.

Worldwide, many public drinking water providers are shifting to the use of monochloramine. In California, approximately 58% of the population in the 25 largest cities received water disinfected with monochloramine in 2005 [8]. Monochloramine is an effective disinfectant that minimizes the formation of trihalomethanes, for which there is strong evidence of a relationship with adverse health effects. We do not believe that the current evidence about the potential association between skin complaints and the presence of monochloramine in the water is a compelling reason to reconsider the use of monochloramine for residual water disinfection.

Competing interests

All authors are paid employees of the City and County of San Francisco Department of Public Health. Ms. Berger's and Dr. Weintraub's positions are funded under a work order from the San Francisco Public Utilities Commission, the agency that provides the drinking water discussed in this case report. However, the San Francisco Public Utilities Commission did not have any role in the design and conduct of the investigation, in the collection, analysis, and interpretation of the data, nor in the preparation, review, or approval of the manuscript.

Authors' contributions

JMW conceived the investigation, designed the questionnaire, participated in the data analysis, drafted parts of the manuscript, and critically revised the entire manuscript. MB designed and administered the questionnaire, performed the statistical analysis, drafted parts of the manuscript, and critically revised the entire manuscript. RB participated in the design of the investigation and questionnaire, and critically revised the manuscript. All authors read and approved the final manuscript.

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