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Letter writers must include their full professional titles and affiliations, complete preferred mailing address, day and evening telephone numbers, fax numbers, and e-mail address. In addition, writers are responsible for disclosing financial associations and other conflicts of interest.

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## Environmental Reform Needed to Decrease Costs of Health Care

*To the Editor:*

Another presidential election is here, and the candidates are busy discussing the future of our country. One of the topics of discussion is health care, including the need to decrease costs. The direct costs of health care are known and seem to be steadily rising. Among factors often cited as being associated with the high costs are innovations in medicine (eg, new medical technology, new medications), the

increasing elderly population, and the underserved poor population. However, the association between environmental pollution and health care costs has not been thoroughly assessed.

Water and air pollution have major impacts on our health. Although the US Environmental Protection Agency (EPA) continues efforts to limit exposure to pollutants, the health risks of pollutants remain high. Because air pollutants are most concentrated in the inner cities, I propose that they are a clinically significant problem for underserved populations. The effects of these pollutants could explain increased respiratory problems, poor car-

diovascular outcomes, and more aggressive cancers among inner-city populations.<sup>1-6</sup> The most effective ways to contain air pollution include the use of water and air filters at the sources (eg, automobiles, manufacturing and agricultural facilities). Rather than investing money in environmental monitoring of individual chemicals, the government would do better—in terms of both health benefits and saving money—to require effective filters for these sources.

Given our current economic woes, every effort must be made to limit federal government spending—but without compromising the health of the US population. During the past decade, investment has increased on primary prevention and health maintenance in the United States, reflecting the recognition that such spending saves money on a long-term basis.

In certain other countries, environmental influences on health care expenditures—which may not appear to be as investment worthy as primary prevention or health maintenance—are being examined.<sup>7,8</sup> In a recent study by Haucke and Bruckner,<sup>8</sup> the annual costs of environmental health disturbances in Germany were found to be 15 billion to 62 billion euros. These costs accounted for 4% to 15% of total health care expenditures in Germany, equivalent to 0.75% to 2% of that nation's gross domestic product.<sup>2</sup> However, that study addressed only some of the known pollutants and their effects on known diseases, grossly underestimating the true effects of pollution on health.

There are likely many harmful environmental pollutants that remain unknown. Studies investigating such elusive pollutants and their possible effects on health are needed. The United States, which has long been a champion in innovation, should take the lead in such research.

Americans are exposed to several air pollutants every day, including ozone, particulate matter, nitrogen dioxide, sulfur dioxide, and volatile organic compounds. The effects of these substances on health are considered additive and, at times, synergistic in causing diseases, including cardiopulmonary diseases and cancers.<sup>9</sup>

Studying these chemicals individually may underestimate their actual impact on health. Thus, their effects should be evaluated in combination in future studies.<sup>9</sup>

An estimated 800,000 premature deaths occur worldwide each year as a result of particulate matter pollution, according to the World Health Organization.<sup>10</sup> This particulate matter exposure is linked to respiratory and cerebrovascular morbidity, as well as premature mortality.<sup>10</sup> In the 1990s, amendments to the Clean Air Act provided new requirements for industry regarding particulates and other air pollutants.<sup>11</sup>

In 1989, industry reports estimated that more than 2.7 billion pounds of toxic air pollutants were produced each year in the United States, accounting for at least 300 to 1500 cancer-related fatalities annually.<sup>11</sup> Industry reports at that time listed more than 300 chemical compounds as potentially toxic or carcinogenic, and another 16 compounds were added to the list in 2010.<sup>11</sup> As I previously suggested, the chemicals in particulate matter are more concentrated in inner cities as a result of high levels of vehicular traffic and the location of many industrial facilities. Recent studies have found that rates of premature births and asthma are higher, and cancer outcomes are worse, in inner cities than in other communities.<sup>1-6</sup> Pollution likely plays a substantial role in health discrepancies between inner-city and suburban populations. Studies on health outcomes of environmental pollution are difficult to conduct because there are a multitude of chemical pollutants, some of which may have synergistic effects in causing diseases at concentrations lower than that mandated by the EPA. In addition, the duration of exposure needed to cause disease may be difficult to assess for many chemicals. Although further studies are necessary to focus on environmental causes of health problems, waiting for these studies should not delay reforms to improve the quality of our water and air.

The worldwide health effects of air pollution are substantial, but so are the health effects of water pollution. In China, more than 190 million people become ill and more than 60,000 die each year as a

result of water pollution.<sup>12</sup> The government of China is planning to spend billions of dollars in attempts to clean up only a small portion of its contaminated waters.<sup>12</sup> In the United States, more than 19.5 million illnesses per year have been attributed to water-borne pathogens.<sup>13</sup> Several chemical compounds in water are associated with multiple human diseases, from elevated cholesterol levels to various cancers.<sup>14</sup>

A cost-benefit analysis regarding public health and government regulation via the Safe Drinking Water Act was described by Raucher.<sup>15</sup> In the study,<sup>15</sup> potential estimated health risks per population were compared with costs needed to contain and monitor pollutants. Raucher<sup>15</sup> concluded that if the cost of intervention is less than the anticipated benefits for a population, the chemical should be regulated at higher levels or not at all. However, the limitations of such a conservative regulatory approach include a lack of consideration of the concentrating effects of chemicals in the food chain, of the cumulative exposure to chemicals over several years, and of the health effects on more susceptible populations (eg, infants, pregnant women). Furthermore, most chemical compounds and other pollutants in water cannot be properly monitored or assessed at the present time because of inadequate knowledge regarding potentially harmful effects or high costs of implementing monitoring programs.

Meanwhile, US oil corporations are attempting to gain access to drilling in the Arctic Ocean.<sup>16</sup> An oil spill—including the release of such toxic compounds as benzene, toluene, ethylbenzene, and xylene—could be as devastating for Arctic communities and ecosystems as was the sinking of the Deepwater Horizon oil rig on Atlantic Ocean ecosystems in 2011. Another major problem with drilling in the Arctic is that there is no proven method of effectively cleaning up oil spills.<sup>16</sup> Chemical pollution from the drill rigs, as well as particulate matter in associated air pollution, could threaten the health of the native populations and ecosystems of Alaska.<sup>16</sup> Congressional efforts to permit oil drilling in the Arctic are among several ongoing legislative

moves with high pollution potential.

The health effects of pollution are real for millions of people worldwide, including in the United States. Pollution also affects the cost of health care in the United States. The presidential candidates seem to be well aware of the need for change in US energy policy, and both support increased efforts for such energy alternatives as fuel cells in cars, solar power, and wind turbines. Until such alternatives become more widespread, there is an urgent need to develop air and water filters to decrease the industrial release of carcinogens and other harmful chemicals, and to develop other safer practices and controls for pollutants. The EPA needs increased funding to provide us with the protection we deserve. More widespread filter installation and advances in muffler design for automobiles could further benefit public health as we wait for more health-friendly cars to be developed.

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## Osteopathic Manipulative Medicine for Carpal Tunnel Syndrome

To the Editor:

I read the article by Gilbert Siu and colleagues<sup>1</sup> in the March issue with great interest, and I was delighted to see that the authors presented such a comprehensive review of the approaches of osteopathic manipulative medicine (OMM) to carpal tunnel syndrome (CTS). I commend them for this work, including the wonderful photographs used to demonstrate the various palpatory and manipulative techniques. However, I have a few comments and corrections regarding their interpretations or descriptions of my previous work and of diagnostic ultrasonography (US).

My recent studies<sup>2,3</sup> of CTS have led to a broader understanding of the causes of this condition, which include thenar muscle hypertrophy and protrusion into the carpal tunnel during hand activity, leading to median nerve compression between the flexor tendons dorsally and the muscle mass ventrally. Siu et al<sup>1</sup> pre-

sent an oversimplified view of the carpal tunnel in *Figure 2* on page 128 of their article, with the median nerve appearing to float in an open space. This representation does not allow the reader to appreciate how closely the flexor tendons approximate the median nerve. Likewise, it does not allow the reader to visualize how the transverse carpal ligament (TCL) contacts and impresses upon the median nerve as the thenar muscle mass (attached to the TCL) contracts and squeezes downward, sandwiching the nerve between tendon and muscle.

Interestingly, osteopathic manipulative treatment (OMT) techniques can decompress the median nerve—not simply by elongating the TCL, but also by elongating the thenar muscles, thereby eliminating mounding and intrusion of muscle upon nerve. In addition, the flexor tendons are stretched by OMT techniques, so they are not as thick and tight against the nerve. As a result, when median nerve adhesions are released, the nerve has more mobility, allowing it to slide out of harm's way as the muscle and tendon begin to impinge it.<sup>2,3</sup>

I have no way of confirming which component is more clinically significant—the alleviation of pressure by TCL elongation, the release of median nerve adhesions, or the effects on the thenar muscles and flexor tendons. Nevertheless, all of these factors appear contributory and are impacted positively with OMM.

Palpatory assessment of restriction about the carpal tunnel is discussed on page 130 by Siu et al<sup>1</sup>: “First, the carpal tunnel contents should be examined using modified range-of-motion procedures reported by Sucher.” In the cited article<sup>4</sup> as well as in another article,<sup>3</sup> I may have implied that the actual contents of the carpal tunnel could be examined by these maneuvers, but my primary intention was to note the use of the maneuvers for assessing the status of restricted motion about the exterior of the carpal tunnel—specifically the TCL and its various muscle attachments. In addition, my own clinical observations demonstrated that palpatory predictability of CTS could be achieved to a high degree of sensitivity (92%) and reasonable specificity (75%), as reported in a published series of 60 cases.<sup>5</sup> I have found even greater sensitivity (95%) in an unpublished series of 100 cases.

I also want to correct the authors regarding their comments about the use of diagnostic US for CTS, which they discuss on pages 129 and 130.<sup>1</sup> Neuromuscular US, a subset of musculoskeletal ultrasonography, can be used to demonstrate lumbrical or sublimis muscle intrusion into the carpal tunnel during finger flexion and extension.<sup>6</sup> Patients can observe this effect in real-time as the physician obtains the neuromuscular US images. This visual information is helpful in advising patients to modify hand activity that is creating median nerve compression. In fact, using neuromuscular US as a teaching tool for patients with CTS has become a vital component of case management, further improving outcomes in these patients. The “higher cost” mentioned by the authors<sup>1</sup> does not apply to neuromuscular US—at least not relative to the cost of electrodiagnosis or the cost according to the added value toward more effective management.

Finally, in the authors' discussion of the Opponens roll maneuver on page 134,<sup>1</sup> they omitted an essential aspect of this technique—that it not only stretches the TCL but simultaneously elevates the TCL off the median nerve.<sup>4</sup> Because of this elevation of the TCL, the Opponens roll maneuver is safer than other manipulative techniques to use in more advanced cases of CTS (ie, it is less likely to irritate or further injure the median nerve). The photograph shown in the article as *Figure 10B* illustrates the Opponens roll maneuver accurately, but the text states, “The physician gradually pulls the patient's thenar area laterally while simultaneously moving the thumb into extension to create traction.”<sup>1</sup> This description fails to add the final essential element involving rotating the thumb laterally (the maneuver that lifts the TCL up and off the nerve).

The article by Dr Siu and his coauthors<sup>1</sup> is a good review of the literature, albeit not quite complete. New technological advances, such as neuromuscular US, are helping us to better understand the pathophysiologic mechanisms involved in CTS. In future studies, researchers should consider investigating neuromuscular US-guided use of OMT in patients with CTS, which may provide even more insight into effective management of this highly prevalent disorder.

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**Response**

We appreciate Dr Sucher's excellent comments and clarifications regarding our review article on using osteopathic manipulative medicine (OMM) for treating patients with carpal tunnel syndrome (CTS).<sup>1</sup> Dr Sucher's CTS research in this area was pioneering for the osteopathic medical profession and led us to review the current literature, including his research.

Dr Sucher rightfully notes that *Figure 2* in our article<sup>1</sup> is oversimplified. We illustrated the cross-section of the carpal tunnel for the purpose of demonstrating the close proximity of carpal tunnel structures. We had no intention of misleading the readers.

We also agree with Dr Sucher on the importance of musculoskeletal ultrasonography (US) in diagnosing CTS, with its benefits of noninvasiveness and short examination times being demonstrated within the past decade. Musculoskeletal US has shown its effectiveness in confirming and excluding cases of CTS, as well as in demonstrating anatomic lesions. However, a recent meta-analysis demonstrated the diagnostic sensitivity and specificity of musculoskeletal US for CTS to be 78% and 87%, respectively, while the sen-

sitivity and specificity of electrodiagnostic studies are 85% and 95%, respectively.<sup>2,3</sup> In comparison to electrodiagnostic studies, musculoskeletal US cannot grade the severity of CTS, which can lead to consideration of invasive or more aggressive treatment options, such as surgical intervention.<sup>4,5</sup> Furthermore, this approach can result in a "higher cost," because if musculoskeletal US is used as a first-line diagnostic tool, electrodiagnostic studies will most likely need to be conducted for confirmation and classification of CTS severity.

We thank Dr Sucher for his correction and description of the Opponens roll maneuver. Interestingly, our own studies have shown that an individual with CTS can self-administer the Opponens roll maneuver with improvement of CTS symptoms (unpublished data).

With the increasing incidence of CTS, further research is warranted in investigating the use of OMM for patients with CTS.<sup>6</sup> We agree with Dr Sucher that research in musculoskeletal US will play an important future role in the application of OMM for such patients.

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## Thanks but No Thanks: How Denial of Osteopathic Service in the World Wars Shaped the Profession

*To the Editor:*

As I read the story of the history of the osteopathic medical profession during and after the Second World War in the February issue of *JAOA—The Journal of the American Osteopathic Association* (Silver SA. "Thanks, but no thanks: how denial of osteopathic service in World War I and World War II shaped the profession." 2012;112[2]:93-97), I reflected on 2 very important but forgotten players in that history. Before I share my memories, first let me say that I am an osteopathic physician (ie, DO) mostly because of them—I was rescued from an allopathic career at the University of Iowa by their influence.

The first individual was my godfather, Harold (Jefferson) Davis Hutt, DO, who graduated from Kirksville College of Osteopathy and Surgery in 1933 and started practice in Holly, Michigan. Harold became the president of the Michigan Osteopathic Association in I believe the mid-1940s. His wife, Thelma, was my mother's college classmate and friend at what is now Eastern Michigan University, where I also graduated in 1959. Like Harold, I too graduated from Kirksville College of Osteopathy and Surgery in 1963. The second and most influential person to me was Thomas Edmund Dewey, who was a lawyer from Owosso, Michigan. He married Harold's sister Frances, who was also my mother's roommate in college. In addition to having a profound effect on my life, these individuals affected the lives of many others, including the whole osteopathic medical profession.

Dewey became attorney general of New York State. During his service, he fought and convicted many notorious mobsters, including Charlie "Lucky"

Luciano. Dewey was elected governor of New York, and in 1944, the Republican Party ran him against Franklin D. Roosevelt for president of the United States. Dewey knew, as did many insiders, that Roosevelt was near death and that the American government had broken the Japanese secret codes, but he used neither in his campaign. Dewey lost that election, but in 1948, he again ran for president against Harry S. Truman. In that famous election, Dewey won—until the next morning, when the votes showed that Truman had managed to pull off the election. Had Dewey won, Harold Hutt, DO, would have been the president's personal physician.

Dewey continued to be a leader in the Republican Party, and he recruited Dwight D. Eisenhower to run for president in 1952 and Richard Nixon later. Dewey remained active in the party until his death in 1970. His sons John and Tom continue their father's involvement. Dewey had a roll in the recruitment of Robert McNamara, a Republican and defense secretary who also was from Michigan. McNamara's ties to Dewey and Michigan probably influenced his decision to instruct the Armed Forces to accept DOs into service in Vietnam.

In the early 1960s, I carried on the political tradition by joining a kitchen cab-

inet formed by Earl Congdon, DO, and several other colleagues, including J. Vincent Murphy, DO, and Al Silverton, DO. Together we lobbied for an osteopathic medical school at Michigan State University. Genesee County, Michigan, is largely democratic, and I had Sen Jerry Dunn and Speaker of the House of Representatives Bobby Crim—both Democrats—as patients. (Earl made me a Democrat.) As a result of our lobbying, we got a DO school in Michigan. The trade-off was that Michigan State University would have an allopathic medical school as well.

During all of these years, I believe that I have influenced more than 30 students to become physicians, most of

whom became DOs. I am still politically active to carry on the heritage given me, with Sen John J. Gleason of Michigan, whose brother Tim became an osteopathic anesthesiologist, and many other politicians.

The history of osteopathic medicine is replete with individuals who have had an impact on the profession. The *JAOA* article on the wartime involvement of DOs prompted me to add this little bit of additional history to the mix.

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### Correction

The *JAOA* regrets an error that appeared in the following article:

**Snider KT, Seffinger MA, Ferrill HP, Gish EE. Trainer-to-student ratios for teaching psychomotor skills in health care fields, as applied to osteopathic manipulative medicine. *J Am Osteopath Assoc.* 2012;112(4):182-187.**

In the table on page 184, the published instructor-to-student ratio given for "nursing, pediatric provider" appears as "1:60 max." The ratio should have appeared as "1:6 max."

This correction will be made to both the full text and PDF versions of the article online.