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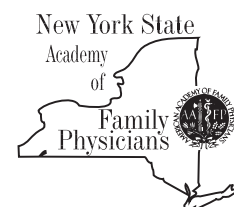
# Family Doctor

A JOURNAL OF THE NEW YORK STATE ACADEMY OF FAMILY PHYSICIANS



## FEATURE ARTICLES:

- Climate Change and the Physician: 2020
- Climate Change, Pesticides and Health Consequences
- Northeastern Climate is a Bullseye for Lyme Disease
- Diets, Climate and the Environment



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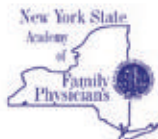
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<sup>1</sup>U.S. Department of Agriculture Economic Research Service, Household Food Security in the United States in 2015

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## From the Editors:

***At the time this issue goes to press, we are all immersed in the global public health crisis that is the COVID-19 pandemic.*** Public

attention has been and is focused on the public health response to it and public health's preeminent role in assessing and responding to global threats to health. Though we could not have known this particular crisis would happen, the editors of Family Doctor chose "climate change and its impact on health care" as the theme for this issue knowing that the public health message it would convey is that preparation is better than procrastination, and prevention is better than cure. COVID-19 has made that perfectly clear.

In 2015, the NYSAFP Congress of Delegates passed climate change resolution 15-04 which said that the Academy resolved to: "... support public policies in NY that limit and monitor the use of fossil fuels and the production of pollutants therefrom which contribute to climate change..." Thus, it became NYSAFP policy.

Methane is known to be more than 80 times more potent than CO<sub>2</sub> as a "greenhouse gas." In his 2019 study, Howarth et al. have shown through carbon isotope analysis that the bulk of methane is from fossil fuel extraction.<sup>1</sup> The combination of methane and CO<sub>2</sub> work together to bring about the extreme climate effects we are observing. On a positive note, Howarth is quoted as saying, "If we can stop pouring methane into the atmosphere, it will dissipate." It was prescient of the NYSAFP to adopt a position more than a decade ago advocating that NYS not engage in natural gas extraction by fracking methodology due to unresolved concerns about the public's health.

Flooding of communities, extreme temperatures, deterioration of infrastructure (such as sanitation and water supplies) and other climate effects are experienced differently in different regions of our country and in different countries of our world. As resources to cope vary, responses will also vary. When a people's very survival is brought into question, their response may also become as "extreme" as the climate. International conflict, and outright war are sometimes used as tools to achieve a solution when diplomacy and humanitarian pleas seem to have no response. We are all too familiar with the health outcomes of conflict. In extreme circumstances, nuclear materials in the wrong hands or in the hands of nuclear nations, might become tools of

negotiation which if actually detonated would bring about their own health outcomes such as those described by Physicians for Social Responsibility in their study: "Two Billion at Risk".

In their article in this issue (Climate Change and the Physician: 2020), Rublee, and Lemery take us through several categories of climate change effects and detail examples of health repercussions. As they say, "Human health is inexorably connected to our environment... and perturbations to these environments contribute to a myriad of direct and indirect adverse health effects."

In other articles our authors bring us up to date on the specifics regarding the changes being observed in the life cycle of the tick and the disease it carries, pesticides and the way climate change affects their use and toxicity. We feature articles on repercussions for our nutrition, and on air pollution per se.

No matter what your belief is regarding the extent of the role that human behavior plays in bringing about climate change, most of us believe it is occurring. With each passing year we physicians are becoming more impressed at the varied and profound ways it will influence the health of our patients, our communities, our nation and our world. It is in hopes that this issue of Family Doctor will expose us to impacts that we had never thought of before when we chose this theme. Such knowledge will, perhaps, cause us to be motivated to redouble our efforts to prevent further deterioration in that precious, thin layer of life sustaining atmosphere that envelops this pale blue dot that we call home. Perhaps we will inform our patients in what manner climate change will influence their health. Perhaps we will advocate for and join in efforts to prepare for that which it is too late to avoid.

As Rublee and Lemery observe: "Physicians are trusted community leaders, educators and patient advocates. We prevent, recognize and treat illnesses, serving as bridges to communicating health risks." Let us, then, communicate.

For the Editorial Board  
William Klepack, MD

### Endnote

- 1 Howarth, R. W.: Ideas and perspectives: is shale gas a major driver of recent increase in global atmospheric methane?, Biogeosciences, 16, 3033–3046, <https://doi.org/10.5194/bg-16-3033-2019>, 2019)



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## From the Executive Vice President

By Vito Grasso, MPA, CAE

**H**ealth care reform has been a major and unresolved issue for more than a decade at both the national and state levels. Clearly, reliance upon insurance to pay for health care services is embedded in our system of health care delivery even though the interests of insurance plans are frequently in conflict with the interests of patients and with the general public interest.

The cost of health care services continues to increase. This situation is exacerbated by the development of new and more expensive products to diagnose and treat disease, especially genetically caused conditions. Furthermore, the administrative policies and procedures imposed by insurance plans to avoid paying for care which they feel is unnecessary delays care and wastes time and money. It is estimated that 25-30% of our annual national spending on health care is consumed by administrative costs.

Discussion of the merits of a single payer system are muddled by the specter of socialized medicine and anti-capitalism from those whose pecuniary interests are inevitably tied to perpetuation of the status quo. In such circumstances greater regulation of health insurance plans may be the only feasible and politically practical way of achieving consistency in how plans operate, thereby reducing waste caused by redundancy and duplication among medical practices and other providers of health care in order to obtain approval to provide care and to receive payment for care provided.

In New York, regulation of insurance companies is the responsibility of the Department of Financial Services (DFS). The Superintendent of DFS has the authority to approve premiums for health insurance plans. That authority is potentially a vehicle for asserting public interests and compelling plan behavior to conform to standards and principles which enhance patient access to care and empower providers to act primarily in their patients' interests. The premium review process could be conducted through public hearings. These hearings would include discussion of how plans would serve specific public interests such as providing coverage in rural areas, supporting maintenance of an adequate health care workforce throughout the plan's service area, facilitating the

introduction of new therapies into clinical application, addressing social determinants of health and providing payment that is sufficient to sustain medical practices and community hospitals and clinics in medically underserved areas. There are other public benefits that could also be included.

Furthermore, the Consumer Protection Board (CPB) could be authorized to participate in all hearings to approve health plan premiums. The CPB already represents the public interest in rate hearings before the Public Service Commission for public utility companies. It would be necessary to increase the budgets of both the DFS and the CPB to reflect the additional costs of conducting such hearings.


Public participation in the hearings could be accommodated to the extent practical and organizations which represent physicians, hospitals, pharmacists, labs, nursing homes and home health care agencies should have standing to participate as determined by the Superintendent. This is important because many policies and procedures by plans are imposed without consideration of the practical effect on providers of specific services. The DFS and consumer advocates should hear from providers on these matters before authorizing premiums which may include use of prior authorization policies which have no actual clinical purpose.

Our own advocacy for single payer over the years has consistently included well established and credible evidence that a single payer system would dramatically reduce costs, improve access to care and enhance the practice experience for physicians and patients. Fear of change compounded by intense resistance from the insurance industry has successfully distorted the debate over health care system reform. If political reality is that we are stuck with insurance plan dominance of health care for the foreseeable future, then it may be time to consider reshaping the insurance model through more robust regulation including actual participation in the premium setting process by a public advocate.



## President's Post

By Barbara Keber, MD, FAAFP

 Happy Spring! That said, this has been one of the warmest winters on record in the northeastern United States, and one with the smallest amounts of snow, especially in the NYC area. This issue of our journal is dedicated to the effects of climate change on our population. Climate change is a real thing which is impacting people all over the world. We see those global effects in places like Puerto Rico, where they are still feeling the effects of the most recent of five category 5 hurricanes over the last several years. Many places throughout the island still remain without power. The Bahamas likewise have seen severe economic and devastating reductions in services including running water, food sources, housing and electricity following another category 5 hurricane. The wild fires in California last year, also created by climate change caused tremendous loss of housing, food sources and clean water supplies. The air pollution related to the smoke created by the fires also created increased rates of pulmonary and cardiac disease exacerbations.

It is clear that climate change will inevitably effect the health of the entire global population. So what can we, as family physicians do to reduce climate change and reduce these effects on the health of the population? We can all work towards reducing our own carbon footprint. We can and should also

continue to advocate at the state and national levels for policies which reduce our carbon footprint. We in New York State have been doing this for some time now. We must continue to work through our public health commission and our advocacy commission to put forward ideas such as legislation in New York State regarding the elimination of fracking. This is just one example of climate related legislation for which we have successfully advocated.

Our members are seeing the most vulnerable populations among us. These populations are impacted more severely when homes are damaged by floods or fires, when food becomes scarce or when water supplies are impure or reduced. They have medical needs which are not able to be attended to when there is short supply of food, water, electricity or shelter. They do not have the means to recover from these events. I urge all our members to remain active locally, regionally in our State and nationally to reduce the effects of climate change through legislation and advocacy.

Thank you to all the family physicians of New York State for all you do for those among us who require our support and care on a daily basis.

Barbara Keber MD, FAAFP  
President NYSAFP 2019-2020

*It is clear that climate change will inevitably effect the health of the entire global population.*

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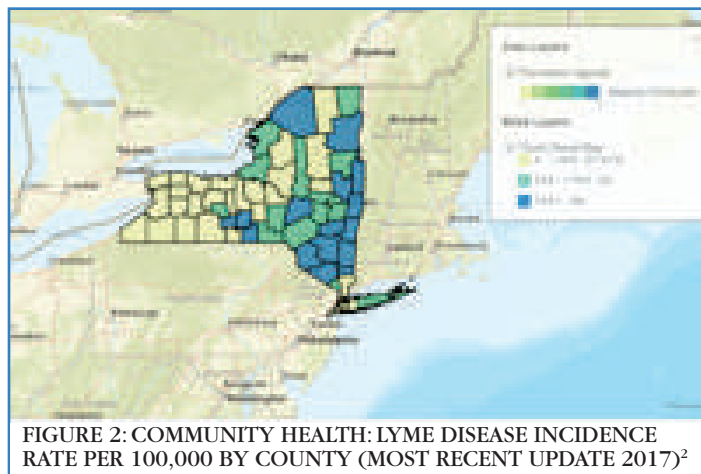
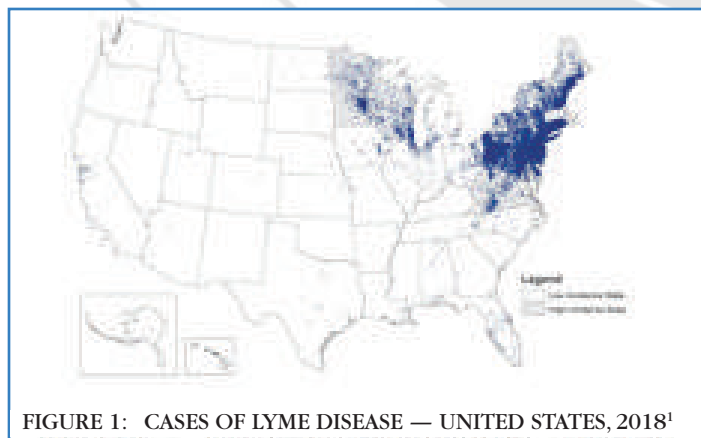


# Northeastern Climate is Bullseye for Lyme Disease

By Moshe Bressler; Patricia Happel, DO; William Blazey, DO; Orit Markowitz, MD and Emily Senay, MD, MPH

## Background, Incidence and Climate Change

With spring upon us and after a record warm winter, this is a good time to review the manifestations, treatments, and drivers of Lyme disease (LD) – the most common vector-borne disease in the United States (US). New York family physicians are on the front line of this growing threat as the highest incidence of LD is found in the American Northeast corridor, including the states of New York, Connecticut, and Pennsylvania (Figure 1).<sup>1</sup>

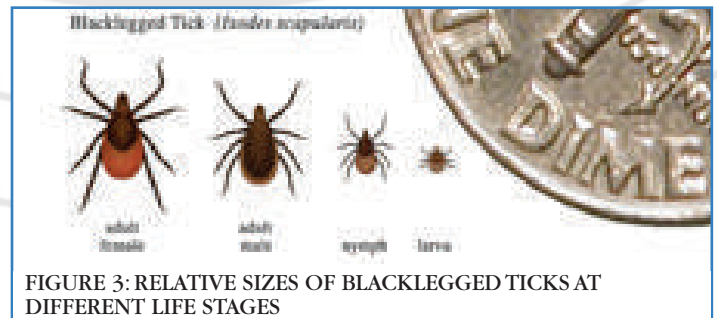


Over the past few decades, New York has seen substantial growth in Lyme cases (> 400% between 2012-17 in some parts of the state<sup>2</sup>), and the incidence is projected to continue rising. In 2018, there were 2886 confirmed or suspected LD cases in New York State (NYS) and 752 in New York City.<sup>3</sup> NYS community health data show wide variability in incidence by county.<sup>4</sup> (Figure 2)<sup>2</sup>

Despite mandatory reporting in NYS,<sup>5</sup> it is believed only a fraction of cases are reported to public health authorities.<sup>6</sup> Nationally, the CDC estimates less than 10% of cases are reported;<sup>7</sup> therefore, the actual incidence of LD in NYS and nationally is unknown, with total US cases

estimated to be as high as 300,000 per year. Despite limitations related to reporting, it is clear that cases of LD have steadily risen over the past two decades.<sup>8</sup>

LD is caused by the bacterium *Borrelia burgdorferi*, which is carried by *Ixodes scapularis*, the blacklegged tick,<sup>9</sup> also known as the deer tick. The lifecycle of blacklegged ticks requires three different vertebrate hosts, including the white-footed mouse, the most common reservoir for *Borrelia burgdorferi*. While black-legged ticks feed on deer in the adult stage, deer are not reservoirs of the borrelia bacterium.<sup>10</sup> Most humans are infected via immature nymph ticks primarily because their small size makes them harder to detect and remove before the bacteria can be transmitted which takes 36 to 48 hours.<sup>8,10</sup> (Figure 3)<sup>10</sup>



Many factors can influence the distribution, transmission, and incidence of LD. Evidence points to climate change, especially warming temperatures and increased humidity,<sup>11</sup> as an important factor in the range expansion northward into areas where the *Ixodes scapularis* tick was previously unable to survive.<sup>12</sup> Because tick activity depends on temperatures above a certain minimum, shorter winters can also lengthen the period ticks are active and able to infect humans.<sup>8</sup> Other ecosystem disturbances such as changes in host populations of deer and white-footed mice<sup>11</sup> as well as human proximity to ticks can increase or decrease LD cases.<sup>8</sup>

## Lyme Disease Presentation

Early localized disease presents with the pathognomonic bullseye rash otherwise known as erythema migrans (EM), developing in 70-80%<sup>13</sup> of patients with LD, at the site of the tick bite in the following days-weeks after initial inoculation.<sup>14</sup> Removing attached ticks and species identification is described later in this article.

Physicians should examine the patient's entire body; recent studies show up to 23% of patients with EM are initially missed.<sup>15</sup> Lesions typically develop at the tick bite site,<sup>16</sup> especially on the lower legs and upper trunk.<sup>17</sup> EM typically develops on the trunk, groin, intertriginous region, and head and neck in children.<sup>18</sup> Multiple smaller EM lesions are the earliest sign of disseminated disease.<sup>18</sup>

continued on page 10

EM presents as “bullseye” rash with a central clearing and large steady expansion in the following days, which differentiates from an allergic reaction to bug bites, presenting as annular edematous papules with a central hemorrhagic punctum.<sup>19</sup> The most common co-presenting symptoms are fatigue (54%), myalgias (44%), arthralgias (44%), headache (42%), and neck stiffness (35%).<sup>20</sup> Upper respiratory symptoms and gastrointestinal symptoms point to an alternative etiology.<sup>21</sup> LD should be considered in patients presenting with a “summertime cold.”

Early disseminated disease is a result of the spirochete migrating throughout the host causing acute reactions in multiple organs.<sup>14</sup> Symptoms develop in weeks to months and include meningitis, unilateral or bilateral Bell’s Palsy, radiculopathies, ocular manifestations, carditis, 3rd-degree heart block, multiple EM lesions, and migratory arthralgias.<sup>14</sup>

Late disease develops in months to years in untreated cases. Similar to other tertiary spirochete syndromes, symptoms include intermittent or chronic arthritis, neurological disease, and \*cutaneous involvement (\*only in European variant) usually presenting in a unilateral distribution.<sup>14</sup> Arthritis, especially in the knee, is the most common presentation for late LD.<sup>14</sup>

## Up-to-date Diagnosis of Lyme

### Clinical Workup:

In early localized LD with EM, the diagnosis is clinical, if the exposure was in an endemic area.<sup>22</sup> Serological testing is not recommended in early cases since it will take 2-4 weeks of untreated LD to develop sufficient antibody levels. Only 20%-40% of patients at this stage will be seropositive.<sup>23</sup> Testing after treatment is not recommended either since patients treated with antibiotics early in the disease course will not develop an antibody response.

In early disseminated and late Lyme disease, the diagnosis is made with serological testing *only in the context of clinical symptoms*<sup>24</sup> (figure 4) since IgM and IgG levels can persist for years after initial infection and false-positives on serology are common.

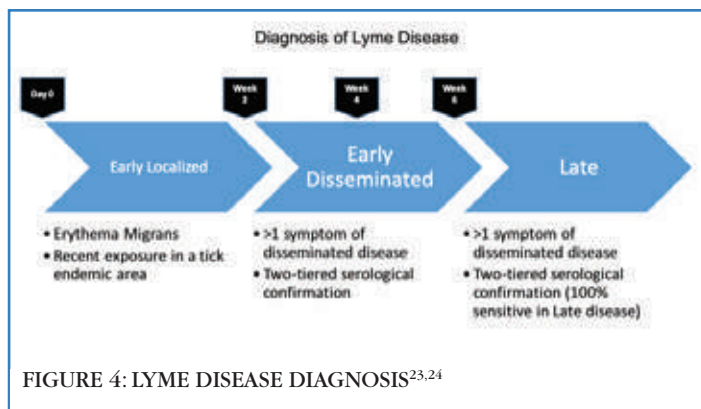


FIGURE 4: LYME DISEASE DIAGNOSIS<sup>23,24</sup>

Serology will be positive in all patients with LD arthritis.<sup>24</sup> Synovial fluid arthrocentesis is not recommended, but if performed, will show many white blood cells (WBC) ranging from 10,000-25,000.<sup>24</sup> Culture is difficult and not recommended. Diagnosis is made via serological testing taken from the serum.

In severe cases of neurologic involvement where encephalitis or meningitis is suspected, lumbar puncture is mandatory to rule out other more dangerous pathogens. Analysis of cerebral spinal fluid (CSF) will show moderate pleocytosis of lymphocytes/monocytes in the several hundred /microL, moderately elevated protein (up to 300 mg/dL), and glucose within normal range.<sup>25</sup> Interestingly this profile is similar to multiple myeloma; thus, clinical correlation and environmental exposure are essential to clinical workup. CSF can be tested for antibodies against *B. burgdorferi*, however sensitivity is low and a negative test does not rule out disease.<sup>26</sup>

### Laboratory Workup:

Diagnosing LD uses a two-tiered approach and starts with a sensitive enzyme immunoassay (EIA) or immunofluorescence assay (IFA) followed by a Western blot. As of 2019, the CDC approved EIA as an option for the confirming step.<sup>27</sup> Most laboratories still use western blot as the confirm step.

Reflex testing is available by labs such as Quest Diagnostics (test number 6646<sup>28</sup>) and Labcorp (test number 258004<sup>29</sup>) which requires one lab draw and confirms via western blot reflexively only if the initial test is positive. Testing for multiple tick-borne illnesses simultaneously via PCR is also available from select laboratories; Accutix, offered by Imugen, tests the pathogens prevalent in specific regions.<sup>30</sup>

### Types of Tests:

EIAs include ELISA (enzyme-linked immunosorbent assay) which test for IgG and IgM antibodies to specific proteins from *Borrelia burgdorferi*. The antibody tests listed require 1-2 mL of serum; clinicians should draw 2.5 times the requested amount, allow blood to coagulate for 60 minutes and centrifuge.<sup>31</sup> The specimen should be transported at room temperature, and there is an estimated 1-4 day turnaround; the costs range from \$55 to \$200 USD.<sup>32</sup>

- *Whole-cell ELISA*: highly sensitive but false positives are common (5% of US population will test positive).<sup>23</sup>
- *VisE C6 ELISA*: sensitive with fewer cross-reactants. See chart below (figure 5<sup>23</sup>) for comparison.
- *Immunofluorescence assay (IEA)*: sensitive for screening patients with LD however poor specificity has resulted in decreased utilization.<sup>33</sup>
- *Western blot (or immunoblot)*: detects a multitude of different antibodies and is highly specific. Reading western blot results requires skill and training, limiting its use. Additionally, indeterminate results are common.<sup>33</sup>

### Tests Not Recommended:

The CDC does not recommend using capture assay for urine antigens, testing synovial fluid for borrelia antibodies, or in-house criteria for immunoblot interpretation; as these tests are non-specific and unreliable.<sup>34</sup> Culture is extremely lengthy, difficult, and usually unavailable.<sup>23</sup>

Species confirmation of removed ticks is helpful in clinically managing LD,<sup>35</sup> however testing ticks for *B. Burgdorferi* is not recommended as it will not guide treatment; <36 hours will not

clinical presentation.<sup>24</sup> This workup additionally applies to previously vaccinated patients and may show false positives on serology.<sup>24</sup>

Post-Lyme Disease Syndrome (PLDS), or post-Lyme arthritis, will display high IgM and IgG titers during the manifestation of disease; these may circulate for years after the symptoms resolve. It is believed these antibodies offer protection to reinfection, therefore clinical manifestations should steer clinicians to diagnosis.<sup>26</sup> Current tests may confuse other tick-borne illnesses such as STARI or *Borrelia miyamotoi*<sup>38</sup> however both are treated similarly to LD (see table 1).

### Current Treatment for Lyme and Post Exposure Prophylaxis\*

Tick bite prophylaxis is warranted (see table 1) if all the following criteria are met: (a) nymph attachment is >36 hours but less than 72 hours (b) the tick can be identified as *Ixodes Scapularis* (c) LD is common in the region of exposure (CT, DE, DC, MA, MD, ME, MN, NH, NJ, NY, PA, RI, VA, VT, WI, WV).<sup>24, 39</sup>

The CDC considers the following three scenarios confirmed cases of Lyme Disease:<sup>22</sup>

1. EM with recent tick exposure (<30 days) in a high incidence state (see above).
2. EM with confirmed laboratory evidence (with 2 tier algorithm).
3. At least one late manifestation and confirmed laboratory evidence.

### Common Co-infections, Post Lyme Disease Syndrome

Post Lyme Disease Syndrome (PLDS) is the development of headache, neurocognitive difficulties, fatigue, or diffuse pain lasting >6 months following treatment of *confirmed* Lyme disease by two-tiered serological testing or documented EM by a qualified health professional.<sup>40</sup> Important

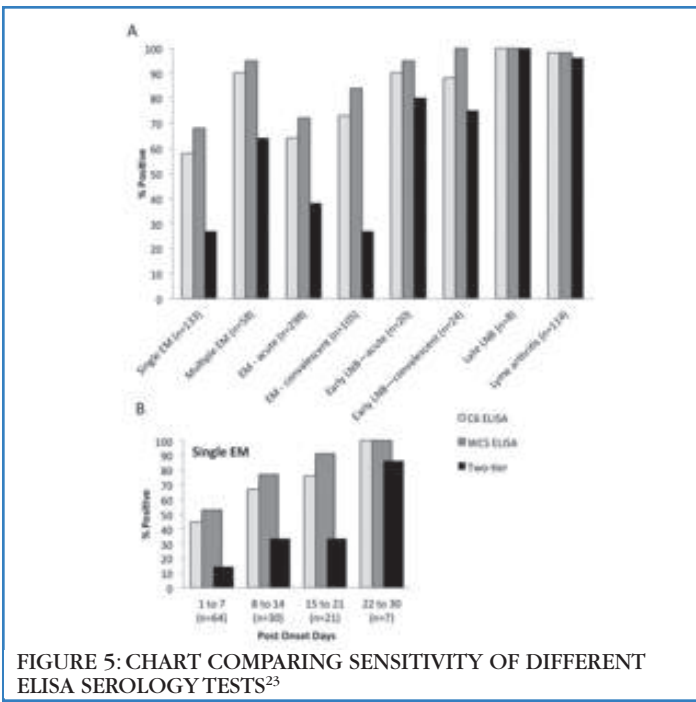


FIGURE 5: CHART COMPARING SENSITIVITY OF DIFFERENT ELISA SEROLOGY TESTS<sup>23</sup>

transfer disease, >36 hours warrants empiric treatment and testing will only delay treatment.<sup>36</sup>

#### Limits of Testing:

Due to high rates of false positives, laboratory testing alone should not guide treatment, only symptomatic patients (either EM or late disease manifestation) are considered to have LD.<sup>22</sup> Routine annual laboratory testing for LD is *not* recommended, as per the CDC.<sup>37</sup>

Previously infected patients may test positive for years after clearing infection, and in these cases, the diagnosis should be made based on

Table 1: Lyme Disease Treatment Indications<sup>24,40,41</sup>

Disease State	Treatment*	Duration (days)	
n/a	<b>Prophylaxis</b>		
Adults: single dose of Doxycycline, 200mg; children > 8 years old single dose Doxycycline 4.4 mg/kg	n/a		
Early Localized	<b>Erythema Migrans</b>	Oral regiment	14** (14-21)
Early Disseminated	<b>Carditis</b>	Oral regiment	14 (14-21)
	<b>Isolated Nerve Palsies</b>	Oral regiment	14 (14-21)
	<b>Meningitis or Radiculopathy</b>	Parenteral therapy	14 (10-28)
	<b>Severe Carditis or Heart Block</b>	Parenteral therapy	14 (14-21)
Late Disseminated	<b>Lyme Arthritis</b>	Oral regiment	28
	<b>Persistent Lyme Arthritis Despite Oral Antibiotic Treatment</b>	Alternative oral regiment or parenteral therapy	28
	<b>Central Nervous System Disease</b>	Parenteral therapy	14 (14-28)
Post Treatment	<b>Post-Lyme Disease Syndrome</b>	No antibiotics	

\*See table 2 for recommended adult and children therapies.

\*\*Recent studies suggest the efficacy of shorter treatment courses in early Lyme disease<sup>39</sup>.

**Table 2: Recommended Antibiotics (in decreasing order of superiority)<sup>24,41,42</sup>**

	Adults	Children
<b>Oral Treatment</b>	Doxycycline, 100 mg PO, BID	Doxycycline, 4.4 mg/kg per day, orally, divided into 2 doses (max 200 mg/day)
	OR	OR
	Amoxicillin, 500 mg PO, TID	Amoxicillin, 50 mg/kg per day, orally, divided into 3 doses (max 1.5 g/day)
	OR	OR
	Cefuroxime axetil (Ceftin), 500 mg PO, BID	Cefuroxime, 30 mg/kg per day, orally, in 2 divided doses (max 1000 mg/day or 1 g/day)
	OR	OR
	Azithromycin (Zithromax), 500 mg PO QD	for a patient unable to take a beta-lactam or doxycycline, Azithromycin, 10 mg/kg/day, orally, once daily
<b>Parental Therapy</b>	Ceftriaxone (Rocephin), 2 g intravenously per day	Ceftriaxone, 50 to 75 mg per kg intravenously per day, single dose
	OR	
	Cefotaxime (Claforan), 2 g intravenously every eight hours	
<b>Abbreviations:</b> PO: By mouth; QD- once daily; BID- twice daily; TID- thrice daily		

to note, this syndrome is *not* a manifestation of ongoing Lyme disease, and the term “chronic Lyme disease” is a false and misleading misnomer.<sup>16</sup> While patients may self-attribute neurological conditions and diffuse pain to PLDS, conversely, PLDS is a diagnosis of exclusion. Patients presenting with such symptoms should be evaluated for other neurological diseases such as multiple sclerosis or underlying malignancies.<sup>16</sup> This condition can also be a manifestation of fibromyalgia.<sup>43</sup> Serology is often positive due to prior infection.<sup>40</sup>

PLDS, by definition, is a confirmed case of LD, which has already been treated with appropriate drug therapies, and additional rounds of these medications should not be offered as treatment.<sup>16</sup> This topic is of significant controversy due to public misinformation. Patient advocacy groups have formed to promote raising awareness for ‘chronic Lyme’ and self-refer to self-proclaimed Lyme specialists who offer unnecessary lengthy treatments of IV antibiotics, creating unnecessary risks and costs.<sup>16</sup> PLDS tends to ebb and flow in severity and a long-term treatment plan should be formalized. Physicians should address patients with a team-building agenda and offer to combat misinformation with compassion.

European strains of *Borrelia* consist of a variety of strains and tend to have greater severity of initial presenting illness. Immunity to American LD is not protective against European LD and vice versa. Field scientists spending long durations of time in tick-infested woodlands have noted immunity to tick attachment<sup>44</sup> however this is not a recommended prevention method.

LD can present with other comorbid tick-borne illnesses, including *Borrelia miyamotoi*, babesiosis, and anaplasmosis. Many of these are also carried by the blacklegged tick and treatment of LD with doxycycline covers all of these pathogens, making it the preferred treatment for tick-borne illnesses.<sup>45</sup> Southern tick-associated rash

illness (STARI) can also co-present with LD and is carried by the lone star tick which used to be isolated to the Southeastern US. Habitat expansion is favoring a northern migration and several cases have been reported in NYS residents.<sup>38</sup> Of most alarm, STARI can induce an allergic reaction which induces permanent red-meat allergy.<sup>38</sup>

NIAID-funded researchers recently published on a multiplex serological platform that can simultaneously detect up to eight tick-borne diseases from a single patient sample at the point-of-care.<sup>46</sup> This test is currently under development and will a valuable tool for physicians once made readily available.

### Prevention, Tick Management, and Reporting Disease to Health Officials

A vaccine to prevent Lyme Disease is being developed, however it will not likely be available until after 2022.<sup>47</sup> The only other current methods of prevention include wearing preventative clothing, using insect repellants, early tick removal, and proper patient education. Hikers should cover up with long sleeve shirts and long pants tucked into socks. Insect repellents are a safe and easy option that can be applied both on skin and clothing. The CDC and EPA recommend products with >20% DEET<sup>48</sup> or Picaridin [Cutter Advanced™]. Care should be given to avoid ingestion, and repellents should not be sprayed near the eyes, nose, or mouth. When applying on children, repellent should be first sprayed on adult hands and then rubbed on children’s faces. Toxicity is rare and typically occurs with ingesting insecticide. Commercial insecticide sprays are an inexpensive and safe option, especially when compared to “DIY homemade insect repellent sprays,” which usually consist of lemon eucalyptus oil or other essential oils;<sup>49</sup> these can cause adverse skin reactions especially in young children.<sup>41</sup> Insect repellent sprays typically require reapplication every 4-6 hours, and more dedicated outdoor enthusiasts can consider permethrin-treated clothing, which offers constant protection but

requires strict adherence to instructions before initial use. Treated clothing will offer protection for up to 70 laundry cycles.<sup>49</sup>

Tick removal can be performed in-office or at home. Lidocaine can be applied directly to the tick to weaken its attachment.<sup>35</sup> Using fine-tipped forceps, the tick should be grasped delicately close to the skin, where the tick is latched (see figure 5). Steady even pressure in an upward motion will remove the tick. Take care to avoid crushing the tick as *B. burgdorferi* may be lurking inside.<sup>36</sup> Preserve the tick in 70% alcohol in a well-sealed container so the species can be identified later with a dermatoscope or microscope.<sup>35</sup>



FIGURE 6: MANUAL TICK REMOVAL ILLUSTRATION (IMAGE SOURCE: CONSUMER REPORTS)

Lyme disease surveillance and epidemiological data have been limited by underreporting of cases. Not only is Lyme disease a mandated reportable illness, doing so will spur public health efforts forward. LD is a reportable disease, as outlined by the CDC's case definition.<sup>22</sup> Cases should be reported to the local health department [forms, directory, and other helpful reporting links can be accessed via the NYS Department of Health website<sup>5</sup>]. We earlier mentioned the CDC outlines mandated reporting for confirmed cases, defined by EM with recent tick exposure (<30 days) in high incidence state (NY, NJ, CN, and PA are all high incidence states), EM with laboratory evidence, or late manifestation of disease with laboratory evidence.<sup>22</sup>

## Conclusion

Physicians should be ready to recognize and treat Lyme appropriately and to educate patients about tick-borne illnesses, especially with pet owners or outdoor enthusiasts living in tick-infested regions (see sample in supplement 1).<sup>48</sup> Misinformation tends to be highly infectious and can cause more widespread devastation than the actual disease.

## Endnotes

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## Lyme and Tick Prevention

By Dr. Orit Markowitz MD

The best way to prevent Lyme disease is to avoid areas where deer ticks live, especially wooded, bushy areas with long grass. You can decrease your risk of getting Lyme disease with some simple precautions:

- **Protect yourself.** When in wooded or grassy areas, wear shoes, long pants tucked into your socks, a long-sleeved shirt, a hat and gloves. Walk in the center of trails and avoid walking through tall bushes or other vegetation. Keep your dog on a leash.
- **Use insect repellents.** Apply insect repellent with a 20 percent or higher concentration of DEET to your outer clothing or skin. Avoid spraying in your eyes and mouth.
- **Shower right away.** Ticks often remain on your skin for hours before attaching themselves. A tick usually must be attached for greater than 24 hours to successfully infect you with Lyme Disease.
- **Do your best to tick-proof your yard.** Clear brush and leaves where ticks live. Mow your lawn regularly. Stack wood neatly in dry, sunny areas to discourage rodents that carry ticks.
- **Check: yourself, your family and your pets for ticks.** Be especially vigilant after spending time in wooded or grassy areas. Deer ticks are often no bigger than the head of a pin, so you might not discover them unless you search carefully.
- **Remove a tick as soon as possible with tweezers.** (or go to an urgent care for professional removal)
- **Be alert for fever or rash.** Even if you don't remember being bitten by a tick. An unexpected summer fever or odd rash may be the first signs of Lyme disease, particularly if you've been in tick habitat. Contact your dermatologist or general practitioner immediately.
- **Don't assume you're immune.** You can get Lyme disease more than once.

## SUPPLEMENT 1: HANDOUT USED IN THE AUTHOR'S DERMATOLOGY CLINIC

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## War is Bad for our Health

As a family physician working in under-resourced communities in New York City for more than 30 years I have seen the effects of war on my patients, families and communities: the middle-aged woman who came for her routine visit whose deepest concern was fear of losing her son who was deployed to the Middle East; the young Yemeni man who won the immigration lottery, left his entire family and law school with only one year remaining, and presented complaining of back pain due to his new manual labor job in a corner store lifting heavy boxes, as well as sleeping on the floor in a one-room apartment shared with seven immigrant men from the Middle East. With the current drumbeat toward war with Iran I fear the continued cycle of endless war and the suffering, preventable illness and death it brings in its wake. I urge family physicians and AAFP to speak up and act to prevent war with Iran.

Family physicians have long been advocates for socio-political solutions to illness and health disparities.<sup>1-5</sup> We have role models in abolitionists, the civil rights movement, anti-nuclear physician organization, single-payer healthcare, and the list goes on to include women's rights, LGBTQ rights, gun violence prevention, advocates for other vulnerable populations, and more. AAFP's Family Medicine PAC "established principles to serve as a guide for Congress to improve both individual health and the collective health care system in the U.S."<sup>6-12</sup>

The \$738 billion defense budget approved by Congress all but precludes investment in research, strategies and programs to improve health outcomes, many of which are advocated for by family physicians. Brown University's Costs of War Project<sup>13</sup> documents a more than \$6.4 trillion price tag for post-9/11 wars. "Over 801,000 people have died due to direct war violence, and several times as many indirectly. Over 335,000 civilians have been killed as a result of the fighting. We have created 21 million war refugees and displaced persons. The U.S. government is conducting counter-terror activities in 80 countries. The wars have been accompanied by violations of human rights and civil liberties in the U.S. and abroad."<sup>13</sup> "The U.S. Department of

Defense is the single largest producer of greenhouse gases in the world."<sup>13</sup> As we march toward war with Iran and toward a forever war-based economy, we also march toward more suffering, preventable illness and death.

By reclaiming its Constitutional authority over war decisions, Congress has the opportunity right now to stop this downward spiral. Both houses have current and upcoming votes on war powers legislation as well as legislation to withhold funding for unconstitutional war with Iran, and repeal outdated 2001 and 2002 Authorizations for Use of Military Force. As New Yorkers we are fortunate to have Senator Gillibrand as a legislative partner in reclaiming congressional authority over the weighty decision to go to war,<sup>14</sup> and to have Senator Schumer as Senate Minority Leader support these measures. I urge New York State family physicians to join me in asking AAFP and Family Medicine PAC to include and prioritize in their legislative agenda prevention of war with Iran. Our hope lies in Congress tilting our future toward a peace-based economy. Only then can we have a moral budget, one that focuses our resources on wellness rather than promoting suffering, preventable illness and death.

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### Endnotes

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### VIEW ONE

#### FAMILY MEDICINE FIGHTING TICKBORNE DISEASE IN NY – EXPERTS ANSWER YOUR QUESTIONS

By Kristin L. Mack, DO, MS and  
Ron Rouse, MPA

**F**or the most part, we don't have earthquakes, hurricanes, or tornadoes in the Adirondacks. So, what's not to love about living here? The ticks.

It was not always this way, so why are ticks such a large problem now? The answer is climate change and it gets worse. Ticks carry numerous transmissible diseases that are sometimes difficult to diagnose. The diseases ticks transmit manifest with non-specific symptoms similar to what you would see with a virus that resolves with only supportive care.

Even though I have spent all of my medical career in tick endemic areas, I still have questions. Part of the problem is that there is an enormous amount of terrible information available about tickborne illness. Armed with bad information, some doctors end up offering dangerous treatments, only to fuel public misconceptions and hysteria. As family physicians, we need to practice what we know, honestly evaluate what we do not know, and formulate important questions to drive quality research in the field of tickborne illness.

One evening last September, I attended a lecture called "A Ticking Time Bomb." It was sponsored by Hudson Headwaters Health Network in Ticonderoga -- my new home. The evening featured a panel of three experts who provided our community members with some answers. I have followed up with these experts to ask professional-level advice for family medicine physicians on the front lines.

#### Our panel members:

*Susan Lopez Allott, RN, MS is the Director of Preventive Services in the Public Health Unit of the Essex County Health Department.*

*Lee Ann Sporn, PhD is a professor in biology and also Coordinator of Human Health and the Environment at Paul Smith's College.*

*Keith Collins, MD is an infectious disease specialist at University of Vermont Health Network's Champlain Valley Physicians Hospital in Plattsburgh, NY.*

#### Question: What is the "standard of care" for detecting tickborne illnesses and providing treatments?

##### Identification

"Be suspicious," says Dr. Collins. "If it is the right season, the right symptoms, and the exposure history is plausible, be suspicious!" A patient doesn't have to see a tick for exposure to be possible. They could simply have been outdoors to have plausible exposure. Remember that most patients will not actually see a tick, but do have

continued on next page

### VIEW TWO

#### REDUCING PATIENT TICK EXPOSURE IN A CHANGING CLIMATE

By Sheila Ramanathan, DO

**C**limate change has been a growing concern for decades. It has touched seemingly every facet of life, and opening discussions to previously unheard of environmental threats. Medicine has not been spared from this examination. Infectious disease from tick borne illness has increased dramatically from 1991, with Lyme disease cases have nearly tripled during this time.<sup>1</sup> Climate change is opening previously uninhabitable regions for ticks that are resulting in increasing tick reproduction, transmission of illness, and shortening incubation periods. This holds particular interest to New Yorkers who are at increasing risk over time with exposure to tick infested environments. *Ixodes scapularis* is influenced primarily by climate conditions<sup>2</sup> with temperature regulation and water availability heavily impacting tick populations. Due to a prolonged overall warming regionally, distribution as well as incidence has increased substantially. Lyme disease is a clear example of disease occurrence directly correlating to environmental factors. It is so consistent that the Environmental Protection Agency is using rate of infection as a climate change indicator.<sup>3</sup>

*Borrelia burgdorferi* reservoirs consist of birds and small mammals such as white footed mice. White-tailed deer are not a host for the spirochete however are integral to *Ixodes scapularis*. The life cycle of the tick consists of three developmental stages of larva, nymph, and adult ticks. Eggs are laid in May which hatch in the spring where the resultant larvae feed on birds and small rodents. Transmission of *B. burgdorferi* from infected mice to larval ticks occur at this stage. Ticks enter dormancy during winter months and then with warming weather enter the second stage of life as a nymph. Nymphs primarily are responsible for human Lyme infection. Once the nymph has a blood meal via a large mammal like a deer or human, it advances to adulthood to lay eggs.

Ticks and mammalian hosts must be thriving for Lyme to successfully transmit to humans. Prevalence of Lyme disease was initiated during the 1970s as a result of reforestation and resulting thriving deer populations. A study from Canada however, indicated increasing population of *I. scapularis* despite deforestation.<sup>3</sup> Nymph activity is possible in a lab setting at temperatures as low as 39.5 degrees Fahrenheit.<sup>3</sup> Educating patients and clinicians regarding nymph activity during traditionally off-season times helps place Lyme back on the differential when patients present with acute Lyme symptoms. Due to warming and humidity, populations in regions less traditionally associated with Lyme should be educated regarding pathogenesis for effective identification and subsequent treatment.

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to have plausible exposure, meaning that they go outdoors and are not homebound without pets.

**Take home message: Be suspicious.**

#### Diagnosis

You also can pick up on tickborne illnesses in abnormal serology. Pay attention to leukopenia, elevated liver function tests, and thrombocytopenia which may indicate anaplasmosis. Pay attention to anemia and elevated LDH indicating a hemolytic anemia seen in babesiosis. Dr. Collins suggests having a low threshold for getting an electrocardiogram on a patient with any cardiac symptoms. “Those with Lyme carditis can go from having a normal QRS to a heart block in seconds.”

**Take home message: Make your diagnosis early based on clinical presentation.**

#### Treatment

The CDC Guidelines are the standard of care for treating. *Tickborne Diseases of the United States: A Reference Manual for Healthcare Providers* is available in electronic and paper form by visiting <https://www.cdc.gov/ticks/tickbornediseases/TickborneDiseases-P.pdf>. Dr. Collins endorses its content. He recommends that you use this as a resource, even if you already have a comfort level with treatment. Seasoned physicians may find surprises with some of the guidelines, such as “Use doxycycline as first-line treatment for suspected anaplasmosis in patients of all ages” (page 8). You may also be motivated to learn about “new” pathogens such as Powassan virus disease (page 30). He suggests those with early disseminated Lyme and any cardiac symptoms be hospitalized. Lyme meningitis patients should be hospitalized also, but the treatment is largely changing over to doxycycline as well.

**Take home message: Think doxycycline.**

#### **Question: What do I do if my patient still has symptoms after completing treatment?**

While the standard course of doxycycline cures Lyme, Lyme arthritis may be the exception and relapse is possible, according to Dr. Collins. It is not fully understood. Occasionally, he will provide a repeat course of doxycycline. He does not change the antibiotic. “If that doesn’t resolve it, it’s probably something else. Searching for a more accurate diagnosis may be necessary and family medicine physicians are the best equipped to take on this investigation.” NSAIDs for resulting inflammation after a Lyme arthritis are being investigated for effectiveness. “Don’t miss HIV!” implores Dr. Collins. He encourages broad testing for HIV in patients especially in these circumstances.

**Take home message: Try to find a specific diagnosis for patients with non-specific symptoms despite negative diagnostics/serologies or persisting symptoms, but be careful not to dismiss or overtreat.**

#### Prevention

The CDC guidelines also address the sometimes controversial idea of prophylaxis for Lyme disease (page 49). The current recommendation is to provide a one-time, 200mg dose of doxycycline to non-pregnant persons over age eight who meet criteria AND live in a Lyme endemic area. Importantly, Lyme prophylaxis is not perfect. It is not indicated

for any other tickborne illness. Make sure you give proper advice when prescribing prophylaxis. It is imperative for keeping the patient vigilant and your own clinician’s antennae up.

#### **Question: What do I need to know about co-infection?**

Dr. Sporn collects ticks from the environment and tests them for research purposes, however, there is no clinical indication for tick testing in primary care. She states, “there are certainly ticks that carry multiple pathogens.” This means that physicians need to be aware of possible co-infection. “The good news,” says Dr. Collins, “is that most are treated the same way. If you have given doxycycline, you have treated what you can, except for *Babesia*.” If available, Dr. Collins recommends using PCR testing for *Anaplasma* and *Babesia*. Powassan virus, for which there is no current curative treatment, requires testing through the department of health. Contact your county department of health if you are suspicious.

#### **Question: Should I report tickborne illnesses?**

Ms. Allott urges all physicians in NY state to familiarize themselves with the DOH 389 form for reporting communicable diseases. “Report even if there is no confirmatory blood work done.” The link below provides access to forms and information on filling them out. <https://www.health.ny.gov/professionals/diseases/reporting/communicable/>

Lyme diagnosed clinically with a classical erythema migrans rash can be reported even without bloodwork. Doctors sometimes rely on our labs to report on their behalf. Since most tickborne illnesses are voluntarily reported, find out if your lab reports to DOH or ask the lab to do so. For those diagnoses made without lab results, be sure to have a workflow that includes reporting. Maintaining human-surveillance data is not easy and doctors can help drive further research by having these numbers accurately reflect their population.

#### **Question: What is the prevalence of tickborne illness in my area and what diseases are the ticks carrying here?**

As you strive to learn about tickborne illness, knowing what is in your area may make the breadth of information less overwhelming. Some colleges and universities are doing the research like Dr. Sporn, who works in partnership with the Vector Ecology Laboratory of the Bureau of Communicable Disease Control, NYS Department of Health. This partnership ensures that testing is accurate and that results are interpreted and communicated consistently and responsibly. Be wary of labs that will check ticks for a fee, as results are unreliable, false negatives may cloud your clinical judgment, and the labs typically lack validation methods. Testing of individual ticks for pathogens is not recommended for either clinical purposes or local research. Leave that to the experts like Dr. Sporn who shares her findings with the New York State Department of Health databases. (See below)

For active tick surveillance in your area, there are valid New York State Department of Health websites to visit with interactive county maps. Some counties keep their own data. Susan Lopez Allott says it is the local health department’s role to track human surveillance and promote awareness and prevention.

<https://health.data.ny.gov/Health/Access-Adult-Deer-Tick-Collection-Data-by-County-E/fkdr-6a5t> <https://health.data.ny.gov/Health/Deer-Tick-Surveillance-Adults-Oct-to-Dec-excluding/vzbp-i2d4>

### Question: What do I tell my patient who is engaged in care with a self-proclaimed, "Lyme literate" group?

Dr. Collins has a unique perspective on this, as he was once in primary care before he went back to train in infectious disease. "These conversations take time, they just will." Because of the amount of information out there and the lack of specificity of symptoms, listening to your patient and encouraging a full workup to find the appropriate cause for their symptoms is a better approach than dismissing them. "Don't be judgmental," he tells physicians, and to his patients, he says, "Two wrongs don't make a right. Let's get a real diagnosis." Meaning, a wrong diagnosis and wrong treatment won't make a patient feel right. In fact, he warns of the dangers of overtreatment. There are tragic cases when a patient dies secondary to unnecessary treatment. He recalls a past case where a patient pursued unnecessary antibiotic treatment even after diagnosis with *c. difficile* diarrhea and ultimately died.

**Take home message: Treat with what we know – practicing standard of care may prevent harm in complex patients.**

### Question: What does the future hold?

Dr. Collins believes things will get worse before they get better. Since climate change leads to increased prevalence of ticks, so will the rate of disease transmission to humans in more geographic areas. On a more positive note, there is a hopeful Lyme vaccine in development. There is no current evidence of antibiotic resistance to doxycycline. There are also new efforts to control tick populations. One research institution is working on biological control of ticks using a fungus, and also using permethrin treatment of small mammals to prevent ticks from feeding.

### Question: What research would you like to see done to address our questions surrounding tickborne illness?

Dr. Collins would like to see research done into tick-attachment duration and the transmission rate of disease pathogens. "We know it takes less time to transmit *Anaplasma*, but not much else." Another pressing question is the effectiveness of prophylaxis and, also if doxycycline can prevent anaplasmosis? Dr. Collins feels more research like what Dr. Sporn is doing is extremely helpful. It is key to understanding the extent of the problem and is unfortunately currently undervalued in today's research.

Dr. Sporn says, "So much research needs to be done. Of course early diagnosis and treatment for whatever is going on in many patients who suffer long term effects of Lyme despite proper treatment, ranks first and foremost." She also has observed a seeming paradox while doing her research. "I am very interested in human risk in emergent areas where there is little outreach and education and where tick densities may be quite low, yet risk to people and pets seems unusually high. Are strains of Lyme and other tickborne diseases particularly virulent in these emergent areas?"

Susan Lopez Allott finds it alarming that human anaplasmosis cases in Essex County have steadily risen from 5 cases in 2015 to 52 cases in 2019. Community awareness and education of risk and preventive measures are paramount to tackling tick-borne diseases and their potential long term sequelae.

**Take home message: There are things we don't know. Drive research questions with engagement and proper reporting of tickborne illness.**

*Note to Reader: Addressing Tick-Borne Diseases is a high priority for the NYS Academy of Family Physicians. The Academy approved a resolution in 2018 that advocates greater federal and private-sector funding to (1) reduce the risk of tickborne diseases/infection through prevention and environmental measures, (2) develop reliable diagnostic tests for tickborne diseases, and (3) conduct research to produce a hold-harmless vaccine that will block a tick's ability to transmit disease, and meet appropriate standards regarding efficacy, cost, and safety including safety for children and adults. If you want to become more involved, contact NYSAFP. This article was written with support from members of the NYSAFP Public Health Commission.*

*Note to Reader: University of Vermont Health Network's Champlain Valley Physicians Hospital has a CME course online on tickborne infections that is available with archived video sessions under "Schedule" heading at website: [https://www.cvph.org/Departments-and-Programs/Project-ECHO/Project\\_ECHO\\_Tickborne\\_Infections](https://www.cvph.org/Departments-and-Programs/Project-ECHO/Project_ECHO_Tickborne_Infections)*

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*Ron Rouse, MPA has been a health care consultant for about 25 years. Prior to consulting he directed the policy division for the NYS Department of Health and developed health and human services legislation for the NYS Assembly.*

## view two, continued (Reducing Patient Tick Exposure)

Since the vaccination for Lyme disease was discontinued in 2002, preventative measures have focused on personal protection. As such, protective clothing was found to be forty percent effective and tick repellents were found to be twenty percent effective.<sup>4</sup> There was substantial variability as DEET (N,N-diethyl-3-methylbenzamide) concentrations vary by product in addition to exposure time. A more recent study found DEET and picaridin based products to be between ninety-two percent and eighty-six percent effective against *I. scapularis*.<sup>6</sup> Application should not be combined with sunscreen as DEET lasts longer than sunscreen application and can cause a toxicity. Ideal concentration of DEET would be 25% concentration as that would provide up to five hours of protection in adults and in children ages two and up. Plant based deterrents are almost entirely devoted to avoidance of mosquitos and have not been adequately studied as to effectiveness against ticks and are therefore not recommended for use. Body tick checks and spraying private property with pesticides are not shown to be effective. Lighter colored clothing has not been studied and tucking pant legs into socks has not found to be effective as pinhead sized ticks can burrow past socks to the skin. However, lighter colored clothing does make it easier to spot the tick. Children under ten are at greatest likelihood of developing Lyme as outdoor play is considered a risk.<sup>6</sup> Unattached ticks can result in later subsequent infection as nymphal ticks can survive with appropriate humidity. Most ticks can survive in a washing machine, however cannot tolerate one hour in a dryer.

Area wide pesticides were found to be effective however are not a popular option among the general public, and generally application must be for at least six to eight weeks. Unfortunately pesticide preparations tend to also eradicate native bee populations. Furthermore, caution should be taken if applying near a wetland or body of water due to concerns of runoff.

Host targeted methods are a more popular and effective option. Feeder stations for deer with application of acaricides at the stations also known as the “four poster method,” reduced nymph concentration by sixty- nine percent.<sup>5</sup> Deer reduction or elimination from an environment is very effective in disrupting tick lifecycle and reduces spread of Lyme disease. This was done on Monhegan Island, Maine. White-tailed deer were eradicated from the island by 2000, and within four years no immature *I. scapularis* could be found on rodents inhabiting the island. Rodent-specific oral vaccinations against *B. burgdorferi* are still in testing phase and are not yet accessible to the general public. Rodent targeted antibiotic bait is also being tested at this time.

Landscape management is an eco-friendly option for most patients and can create long term results. Encouraging tick safe zones is an important part of landscaping. Two percent of ticks are found in lawns as opposed to the eighty- two percent found within three yards of the perimeter of a lawn, particularly when attached to a woodlot. Part of creating a tick safe zone is avoiding leaf litter, moisture collection, or ground cover that may harbor ticks within the lawn. Incorporating vegetation that is a deer deterrent is also helpful. A steric lawn is not the only option for tick mitigation. Rather, butterfly

gardens as well as a native wildflower garden are reasonable options to reduce tick populations and are naturally deer resistant. Patients should be educated concerning mechanisms to reduce exposure to ticks and what to do after an exposure.

An integrated management approach involving personal protection, landscaping, and host targeting can help mitigate the risk of Lyme disease. Unfortunately, Lyme infections are likely to continue increasing with the current warming climate and a concerted approach to risk reduction must be adopted through patient education.

### Endnotes

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- 2 Stafford KC 3rd. Survival of immature Ixodes scapularis (Acari: Ixodidae) at different relative humidities. J Med Entomol. 1994 Mar; 31(2):310-4.
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- 5 Piesman J. Strategies for reducing the risk of lyme borreliosis in North America. Int J Med Microbiol 2006 May ;296 Suppl 40:17-22.
- 6 Stafford Kirby C. Tick Management Handbook: an integrated guide for homeowner, pest control operators, and public health officials for the prevention of tick associated disease. The Connecticut Agricultural Experiment Station. Fall 2007

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## Upcoming Events

### 2020

**June 13-14**  
**Congress of Delegates**  
The Desmond, Albany  
or virtual

**August 8-9**  
**Summer Cluster**  
Buffalo, NY

**November 8**  
**Fall Cluster Board only**  
Albany, NY

### 2021

**Jan 21-24**  
**Winter Weekend**  
Location: TBA

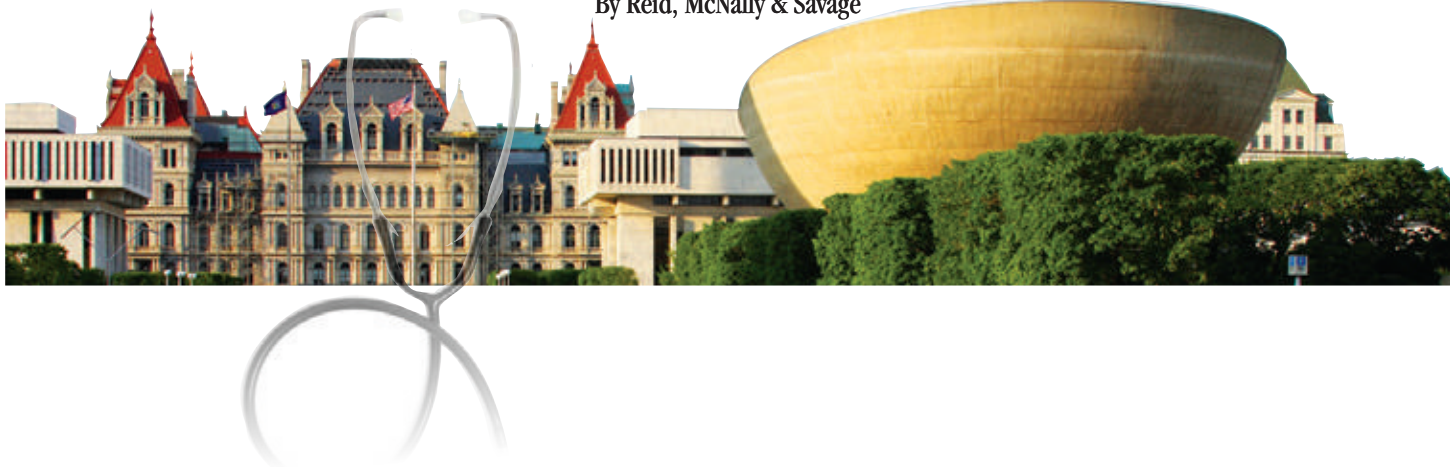
**February 28**  
**Winter Cluster**  
Renaissance Albany

**March 1**  
**Lobby Day**  
Renaissance Albany  
and Capitol

For updates or registration information for these events go to [www.nysafp.org](http://www.nysafp.org)

## Albany Report

By Reid, McNally & Savage



### 2020 Legislative Session Report – March 2020

With the 2020 legislative session in full swing, NYSAFP held its first virtual lobby day where members contacted State Senators and Assembly members the week of March 16th to advocate for budget and legislative priorities of importance to family medicine and your patients. While members usually travel to Albany for in-person meetings, NYSAFP leadership thought it prudent to make this year's lobby day a virtual event due to the Coronavirus and the state of emergency that Governor Cuomo declared for New York.

While NYSAFP has a number of budget items and bills that we are working on this session, two lobby day priorities focus on NYSAFP's support for measures to reform current insurance practices in our State.

### NY Single Payer Legislation

For a number of years, NYSAFP has been supporting a major overhaul to our insurance system in NYS, advocating for a single payer or "Medicare for all" model. In fact, the Academy was the first physician specialty society to support the measure. The legislation is sponsored by the Senate and Assembly Health Committee Chairs, Senator Rivera and Assembly member Gottfried. The bill, S.3577/A.5248, creates the *New York Health Act* and would use a progressively-graduated payroll tax while also pooling Medicaid, Child Health Plus, Medicare and other existing health funding to pay for it. In doing so, individuals would no longer be paying premiums, copays or other coinsurance. Similar to education, funding for the program would be part of the tax base.

NYSAFP is supportive of the legislation for a number of key reasons:

- It will ensure that all New Yorkers have access to high quality health care regardless of age, income, employment or other characteristics.
- It will eliminate the varying administrative practices of multiple health insurance plans, which add costs, and frustration to providers and patients, while delaying or denying needed care.
- It would limit the use of prior authorization to only instances where the federal Medicare program imposes it.
- It creates a board of trustees, which includes physician organization representation, along with regional advisory councils to work with the State on the creation, implementation and regulations of the Single Payer.
- It affords physicians, for the first time, the right to collectively bargain with the Single Payer related to the terms, conditions and payments to providers under the program. It expressly states that the program *shall engage in good faith negotiations with health care providers' representatives, including but not limited to, in relation to rates of payment and payment methodologies, as detailed below.*

#### *Collective Negotiation Authorized by Single Payer Bill*

S.3577/A.5248 expressly authorizes health care providers to meet and communicate for the purpose of collectively negotiating with the *New York Health* program. While neither strikes or an alteration of the terms of the internal and external review procedures currently in law would not be authorized, the bill sets forth a number of rights for providers in this regard, including:

- Communications between health care providers regarding the terms and conditions to be negotiated with the program;
- The ability to communicate with health care providers' representatives authorized to negotiate with the program on behalf of providers as a group.

Health care providers would be bound by the terms and conditions negotiated by the providers' representatives. Also the program is entitled to offer and provide different terms and conditions to competing health care providers. In the event the Commissioner of Health determines that an impasse exists in negotiations, the Commissioner shall assist the parties in trying to affect a voluntary resolution by appointing a mediator mutually acceptable to both parties. If unsuccessful, a fact-finding board would be appointed which would transmit findings and recommendations on the dispute to the Commissioner to make a determination.

Finally, the legislation states that no health care providers' representative shall negotiate any agreement that excludes, limits the participation or reimbursement of, or otherwise limits the scope of services to be provided by any health care group or provider. Each person who acts as the representative of negotiating parties shall pay a fee to the Department of Health, as set forth in regulation to cover the costs of the process.

While NYSAFP has been supporting this measure, at the same time we remind legislators of the need for medical liability reform to bring fairness to the health care system. Further, while we hoped the bill would be moved by both houses once the Senate leadership changed following the 2018 election cycle, there has been frustration in its inertia due to concerns that it would not be granted federal approval. The bill remains in committee in both houses. At the same time however, the need for significant insurance reforms has only grown more acute. For this reason, NYSAFP is also supporting a comprehensive bill to bring about prior authorization and other changes to improve patient access to care and remove barriers and red tape to such care.

## NY Prior Authorization Reform

Another major NYSAFP priority is legislation S.2847 (Breslin)/A.3038(Gottfried) to limit the effects of prior authorization in delaying patient access to timely and necessary care.

Utilization management programs such as prior authorization creates significant barriers for patients by delaying the start or continuation of necessary treatment and negatively affecting patient health outcomes. The time-consuming processes used in these programs burden providers and divert valuable resources away from direct patient care.

This legislation would enact several principles outlined in a report authored by the American Medical Association, the American Academy of Family Physicians and over one hundred state and national health and patient advocacy associations titled "*Prior Authorization and Utilization Management Reform Principles.*" NYSAFP helped to develop this legislation, which would:

- Assure that utilization review criteria used by insurers are evidence-based;
- Require utilization review determinations involving health care services which require pre-authorization to be provided within 48 hours (or 24 hours in an emergency);
- Prohibit midyear drug formulary changes;
- Assure that once a prior authorization is received it will not need to be repeated and is valid for the duration of treatment; and
- Require that the health plan shall cover a service that was prior authorized with eligibility determined on the date of service and prohibit the denial of a claim on the basis that the patient's coverage was terminated retroactively.

Patient centered care is often cited as a major goal of health care reform. Empowering patients to actively participate in the development of personalized treatment to meet their unique health care needs, can increase patient satisfaction and improve treatment quality and outcomes. Unfortunately, physicians and patients currently face significant obstacles in realizing this concept. Utilization management such as prior authorization is routinely used by payers to protect their financial interests. Such programs delay and frequently prevent access to vital services. The time consuming procedures necessary to conform to prior authorization divert clinical resources from patient care.

This legislation was advanced to the Senate floor last session. We are now working closely with NYSAFP and its other provider and patient partners to get it advanced by both houses to bring much-needed reform and relief to physicians and the patients you care for prior to the session's adjournment in early June.

Please look for NYSAFP Action Alerts and other opportunities to participate in the Academy's advocacy efforts around these and other priorities of importance to family medicine in New York State.

# EXPERIENCING HURRICANE MARIA: Highlighting the Role of Family Medicine in the Age of Climate Change

By Julián Salomé-Correa, MD and Maureen Grissom, PhD

*The wind was roaring, breaking trees and power lines, ripping metal roofs across the island. The date was September 20, 2017. The place was San Juan, Puerto Rico. The makeshift wooden protections we had constructed to protect Hospital del Maestro's windows, barely withstood the strain of the 155-mph winds. Rain and debris flooded the streets around the hospital, trapping the six medical interns who remained on call for the next two days. I was one of them, caring for all the hospital's patients not healthy enough to be safely discharged before Hurricane Maria made landfall. At 2 AM, the power went out and we quickly ran to check on our ICU patients on ventilators. We waited expectantly for the generators to kick in, watching the old batteries of the ventilators running out with each mechanical breath. We prepared ourselves, with bag-valve masks in hand. The longest 45 minutes of our lives ended when the ventilator stopped beeping and a lamp in the corner of the room turned on; the technicians had managed to start the generators. My fellow interns and I looked at each other, my headlamp illuminating a collective nervous smile. Thankfully our hospital suffered no casualties that night. Over the*

*coming days, with barely enough electricity to power the essentials and after long hours volunteering at the hospital, I started to think about the power of nature. I pondered how the impact of human pollution likely contributed to the power of the storm that would cripple Puerto Rico for months to come.... The days without power would become weeks without water, gasoline or fresh food. This would be followed by months of reconstruction and by thousands of deaths in hospitals across the island.*

## The Basics of Climate Change

Focus on the issue of climate change has intensified across the past few decades as research on the topic has increased and its impacts have become more apparent across the world. The United States (Puerto Rico included) has experienced an increase in extreme weather events, forest fires, diseases transmitted through food, water, mosquitoes and ticks as well as decreased air quality.<sup>1</sup>

The definition of climate change, according to the U.S. Environmental Protection Agency (EPA) is "any substantial change in measures of climate (such as temperatures or precipitation) lasting for an extended period (decades or longer)."<sup>2</sup> Consensus among the academic

community is that climate change is influenced by human behavior on a global scale. The emission of greenhouse gases via consumption of fossil fuels for energy and the exploitation of the planetary resources (e.g., deforestation), increase the amount of heat that is captured by the earth's atmosphere from the sun's radiation. As more heat becomes trapped, patterns of global air and water currents, water evaporation and rainfall continue to change, affecting the planet's ecosystem and the populations existing in such ecosystems.<sup>1</sup>

Although debate continues in the general public, both the AAFP and the American College of Physicians (ACP) have taken positions consistent with the EPA, that climate change is real and an urgent concern for the global population. Climate change holds implications for human health and will impact all parts of the globe, especially vulnerable populations and developing countries with limited ways to buffer such changes.<sup>3</sup>

### How Climate Change Affects Health

As the health of our planet changes, there are many potential downstream effects of climate change on human health. Although described as separate categories, changes can interact with one another in surprising ways (See Figure 1). As with the personal example above, increasing temperatures may increase the number of storms and flooding events with many types of consequences: vectors of disease that thrive in stagnant water such as mosquitoes and molds, heat-related illnesses and lack of electricity to maintain treatments for chronic conditions, bodily injury, death and emotional trauma for displaced individuals and first responders.<sup>1</sup>

*Without electricity, the insulin for our diabetic patients began to spoil. We didn't have enough electricity to perform x-rays, much less CT scans; our lights would flicker if the EKG was turned on. Without modern tools, my colleagues and I needed to rely on clinical suspicion and observation to diagnose and treat patients. We couldn't transport people due to the lack of communications and debris over the roads. For three days, we had almost no communication with the outside world. On the fourth day, came a glimmer of hope when we heard on the radio that the Navy was sending helicopters with supplies and manpower for reconstruction. Even so, some places would not have electrical power for months. The regional hospital of Bayamon had to be evacuated due to water damage. My former medical school suspended classes for about six weeks. . .*

### Storms, Flooding and Stagnant Water

As noted above, storms and floods bring water, debris, and stagnant water. This may increase the risk of water-borne illness and vector-borne illnesses.<sup>4,5</sup> Infectious diseases (e.g., dengue fever, chikungunya, Zika, cholera, dysentery) and bacteria and parasites thrive in such environments.<sup>4,5</sup> In the US, rising temperatures along with extreme weather events have influenced the rate of mosquito transmitted diseases (e.g. West Nile virus).<sup>6</sup> In the Northeast, we have experienced a lengthier tick season and a significant increase in number and distribution of Lyme disease infections.<sup>6</sup> Furthermore, mold and dampness associated with flooding can increase risk for those with asthma and allergies.<sup>7</sup>

*I also saw an increase in children becoming sick with rashes and diarrhea after playing in stagnant water. In Puerto Rico, it is common to have electric stoves, which remained nonfunctional for months in some places. For these families, boiling water became an impossibility without the risk of a fire. . .*

### Fires, Air Quality and Increasing Temperatures

Increased temperatures and changing wind patterns bring the possibility of a rise the number of droughts and fires, as has been observed on the west coast of the US as well as Australia, Brazil and Africa. In addition to deaths and economic damage directly attributable to fires, air quality is a concern for individuals with pulmonary conditions. Changes in air quality (i.e., increased smog) has been demonstrated to increase allergies and asthma severity in children, particularly those living near inner cities and highways.<sup>7</sup> In addition, extreme heat events and droughts might bring heatstroke, hunger and malnutrition to entire countries, creating refugees of climate change in need of medical help.<sup>6</sup>

*Soon after the hurricane passed, a combination of heat and increased humidity made temperatures unbearable. On one occasion, I had to pry open several windows in the hospital to get some relief for myself and patients. On another occasion, a floor full of children with respiratory issues and their families were clamoring for A/C. I worked with our hospital technicians to restart the floor's 220V powerline, unsuccessfully. . . the electrical generators simply didn't have enough power to start the A/C. Asthma attacks and COPD exacerbations became common as people began to use diesel-powered electrical generators to prevent food from spoiling. . .*

### Food, Sustainability and Nutrition

Food distribution (linked to both spoilage and availability) may be affected by extreme weather events.<sup>1</sup> A 2015 report concluded that "climate change is very likely to affect global, regional and local food security by disrupting food availability, decreasing access to food and making utilization more difficult."<sup>8</sup> For instance, warmer temperatures make food spoilage more likely. Earlier in the food chain, the nutritional value of food and the likelihood of parasites and microbes may be influenced by rising levels of carbon dioxide in the atmosphere. This may be met with increased use of pesticides, which in turn may also affect food safety and risk the possibility of increased antibiotic resistance.<sup>9</sup> These risks may increase the incidence of foodborne illness and likely require additional practices to safeguard foods. Changes in the nutritional content of food hold implications for human health (e.g., obesity, and nutritional deficiencies) and child development.<sup>1</sup> Additionally, increased exposure to chemical contaminants, such as mercury in seafood, may result from increased sea surface temperatures.<sup>9</sup>

*Sometimes the freshest food we could muster came from the unlikeliest of places. The Burger King near our hospital became an oasis for our community, as it was the only place with big enough generators and refrigerators to keep a steady supply of "fresh" food. The lines were long and after a few days, the cashiers knew me by name. Not surprisingly, under a steady diet of canned food with high salt content and early morning burgers, more and more patients began arriving with hypertensive emergencies, strokes and myocardial infarctions. Patients with chronic heart failure and renal failure exacerbation were experiencing pulmonary edema ("enbarcados con agua" as we had to explain to them). It was not uncommon to see blood sugars that were unreadable by glucometers, while a patient was holding a fast food bag. Who could blame them? It was*

continued on page 24

*the only food around and we knew it. I am still grateful at the meals ready to eat (MREs), water filters and food cans that the army and FEMA started to distribute. However, these weren't without consequences. The news reported cases of suspected leptospirosis, perhaps from cans contaminated by rodent urine.*

**Behavioral Health Issues**

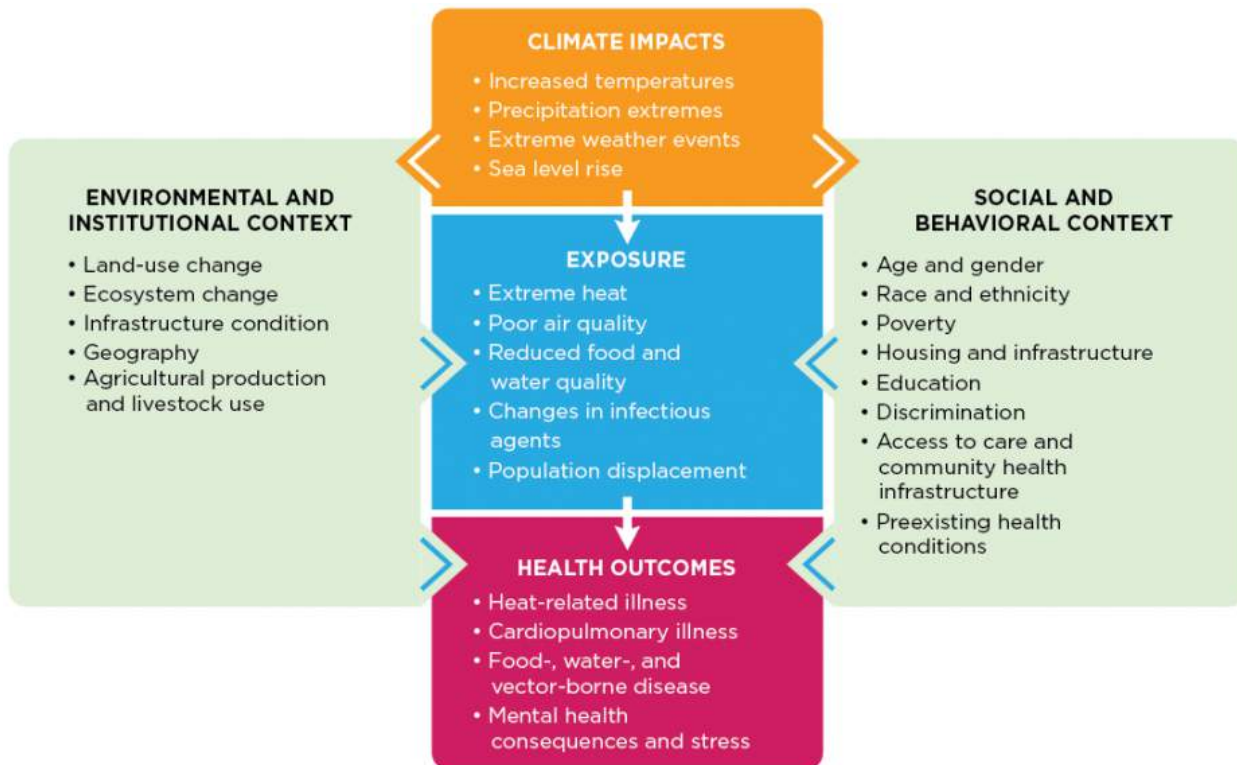
According to a 2016 report by the US Global Change Research Program (USGRP), exposure to natural disasters and some of the other consequences of climate change noted above (or even concern over the *expected* effects of climate change) may result in increased stress, risk of anxiety and depression, and (particularly following weather-related disasters) post-traumatic stress disorder (PTSD).<sup>10</sup> These effects are more likely for communities that are heavily dependent on the environment and those that are at the greatest risk for climate change events (e.g., coastal communities or flood zones). Other groups at increased risk for mental health consequences include people with pre-existing mental health issues, first responders, the homeless, people with lower socioeconomic status (SES), children, the elderly and women (particularly those who are pregnant or have recently given birth). From a mental health perspective, seeking support and engaging in activities such as journaling and meditation can help with stress, anxiety and depression.<sup>1</sup>

*I needed a change of mindset to survive such catastrophe... I started to consider MREs as the meal of an astronaut exploring a different planet. Every time I would treat a patient affected by the surrounding*

*disaster, I would picture myself as a warrior medic on the front lines, saving people with my extremely limited resources. I would return every night to camp in my little cave/apartment illuminated by candlelight, just like my cave dwelling ancestors once did, long ago... We all needed strategies to keep our sanity, my imagination and my chronicles of a survivor became my way to maintain valor in the months yet to come. Rather than fall into depression and despair, my resilience in adversity transformed me into a stronger man.*

*The best of humanity began to shine in adversity. Neighbors helped pick up debris off the street and each other's houses. Medical professionals went up into the mountains of Borinquen to help the most affected communities. The kindness of strangers wiped away tears from people who had lost everything overnight. Families shared what little food they had with others. Children ran and played ball in the carless streets. At night, we gathered around candles, playing card games and dominoes to pass the time. People sat outside in the darkened streets watching the stars and listening to the coquis sing. It was a time of unity and resilience in the face of adversity. Even as crime and economic decline increased, people sang, commemorating the event that changed our lives. I admired all the people that went through this catastrophe with me, I will never forget them, as we all became survivors "del temporal."*

**Figure 1. Understanding the Connections between Climate Change and Human Health\***



\*Figure from U.S. Environmental Protection Agency. 2016. Climate change indicators in the United States, 2016. Fourth edition. EPA 430-R-16-004. [https://urldefense.proofpoint.com/v2/url?u=http-3A\\_\\_www.epa.gov\\_climate-2Dindicators&d=DwlGaQ&c=vq5m7Kktb9l80A\\_wDJ5D-g&r=jjNE--vHpSO0JQcAlaTR1BGvGga0iQVLz2c9uUT7RF0&m=XFu14TTcBM\\_5zmD4c6arZYHwmDn-MglED1wiOls1ugg&s=e4Ws1Blaue6o\\_IWMJRVn5YXAif92ch5UJhT8pPTDh5w&e=](https://urldefense.proofpoint.com/v2/url?u=http-3A__www.epa.gov_climate-2Dindicators&d=DwlGaQ&c=vq5m7Kktb9l80A_wDJ5D-g&r=jjNE--vHpSO0JQcAlaTR1BGvGga0iQVLz2c9uUT7RF0&m=XFu14TTcBM_5zmD4c6arZYHwmDn-MglED1wiOls1ugg&s=e4Ws1Blaue6o_IWMJRVn5YXAif92ch5UJhT8pPTDh5w&e=)



## Where Do We Go from Here?

### Family Physicians Must Advocate and Educate

**Advocacy.** The issue of climate change is frequently presented as “purely environmental, economic or political.” However, due to its impact on human health, physicians have a responsibility to raise awareness and advocate for change.<sup>3</sup> Family doctors can push for measures to address climate change, similar to those they have taken on other socio-political issues that affect their patients, such as gun violence.<sup>11</sup>

**Education of patients.** Family physicians serve as patient educators on various topics and climate change is no exception. Education may range from discussion of moving toward a plant-based diet to teaching patients how to use “cellphone apps” that provide informational weather alerts. Some apps can alert about incoming tornadoes, hurricanes, fires and even UV radiation and pollen levels. Family doctors may consider discussing preparedness for their patients and families, particularly patients with chronic diseases that may require oxygen or place them at high risk.

**Education of physicians.** According to the Senior Director of Strategic Initiatives and Partnerships at the AAMC, “All physicians, whether in training or in practice for many years, have to be able to assess for, manage, and effectively treat the health effects of climate change.”<sup>12</sup> Some medical schools have begun to address climate change in their curricula but there is more to be done. In some cases this may involve dedicated courses or electives in “climate medicine” and in other cases this may involve adopting a “climate change lens” or integrating climate change where it naturally fits in with what is already being taught (e.g., discussing air quality when covering asthma or other respiratory conditions).<sup>13</sup> Medical students are taking responsibility for this focus with about 60% of schools indicating that they had student-led educational activities focused on climate change.<sup>13</sup>

### What Can Human Beings (Physician or Lay Person) Do?

Lay people must engage in advocacy just as we suggest for family physicians. This includes supporting laws, standards and government representation that works to improve the environment. While individual behaviors such as choosing a fuel-efficient vehicle or walking or cycling in lieu of using a motor vehicle may contribute to an improved environment and decrease obesity, a true solution will require the commitment of governments and industry across the world.<sup>14,15</sup>

The current climate “disease” (i.e., change) is a human made problem. It affects all of us – every living soul on the planet—human, beast or plant. If the earth gets sick, we get sick. It is a problem created by us, and it can be solved by us. Although the challenges can be daunting, we can change the world. As a species, we have changed the world before, and we can do it again. With cooperation and dedication, human beings can achieve wonders.



For more detailed information about the effects and anticipated effects of climate change on health, go to the US Global Change Research Program

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# Diets, Climate and the Environment

By Karen LaFace, MD

Among the concepts the Commission utilized to determine appropriate sustainability goals is the “Planetary Boundaries Framework,” set forth by Rockstrom and colleagues, which attempts to define the limits of planetary environmental stress caused by humanity.<sup>4</sup> The Lancet Commission focuses the concept of planetary limits to food production, whose primary components include greenhouse gas emissions, biodiversity loss, nitrogen and phosphorus application as fertilizer, water use, and cropland use. Immediate attention to each of these areas is a priority in order to attain the goals set forth by the Commission, the UN, and the Paris Agreement.

Although the Commission focuses on food production and consumption, it recognizes that entire food systems also consist of processing, distribution and preparation of food, product marketing, political processes, lobbying entities and governments, among others. They also recognize that there exists uncertainty in defining its goals. Scientific and technological progress as well as the complex interplay among the multiple facets of the environment and social systems leads to some degree of uncertainty and the subsequent necessity to refine recommendations and goals over time. Along with goals, the Commission delineates a timeline, mechanisms for reporting progress, and guidelines for developed countries to assist less developed countries.

The EAT commission goes beyond the existing recommendations for diets to move in a healthier and environmentally sound direction by creating a specific diet framework. The scientific targets in this framework were arrived at via international consensus using the most current available data to determine the types and amounts of foods to provide the best nutrition for human health while reducing environmental damage and degradation inherent in our food systems. The result is a reference diet that is “WIN-WIN” in that it is not only healthy for human consumption, but ultimately sustainable for the earth.

## Healthy Diets

The “WIN-WIN” reference diet, based upon all available evidence, is determined to be primarily plant-based with an emphasis on whole grains, fruits, vegetables, legumes, and nuts. In contrast, current diets,

## Background

In January 2019 the EAT- Lancet Commission, an independent scientific body composed of 37 experts from 16 countries in the fields of human health, agriculture, political science, and environmental sustainability, published online in *The Lancet* their “Executive Summary on Healthy Diets from Sustainable Food Systems” with the goal of setting scientifically supported targets to maximize human health and environmental sustainability.<sup>1</sup> In addition, there is a large body of literature that supports the conclusion that the food we eat has an enormous impact on our health and the health of our planet. The EAT report is a starting place for guidance and resources for us to respond to the climate crisis via both education and advocacy.

The Commission emphasizes that their evidence-based conclusions share the objectives of the UN Sustainable Development Goals (SDG) and the Paris Agreement. The UN SDGs are a set of 17 key elements created in 2015 and agreed upon by all UN member nations to ensure an equitable, sustainable, healthy world for all people in developed and developing countries. Elimination of poverty, hunger and inequality, decreasing waste, prioritizing sustainability, and improving and protecting the environment are principle tenets of the doctrine.<sup>2</sup> The Paris Agreement is an international agenda focused on climate change. Achieving the Paris Agreement goal of limiting global warming to 1.5 to 2.0 degrees C (2.7 - 3.6 degrees F) above pre-industrial levels requires global food consumption and production to change drastically and quickly, beginning immediately.<sup>3</sup> Global food production is the largest strain on Earth’s resources, which creates a goal of transforming our food systems to avert further climate change, environmental destruction, and to reverse the explosion of chronic medical conditions caused by unhealthy diets.

in the United States and elsewhere, have become increasingly unhealthy with excessive levels of refined grains, sugars, animal sources, and fat, and insufficient fruits, vegetables and legumes. For example, fewer than 1/10 US adults consume the recommended amounts of fruits and vegetables in a given day. 6/10 young adults and 5/10 older adults consume at least one sugary drink daily.<sup>5</sup> And in addition, diets are major drivers of chronic medical conditions including diabetes, cardiovascular disease, and cancer. Morbidity and mortality from unhealthy diets outpaces the negative health consequences of unsafe sex, drug, alcohol and tobacco use combined.<sup>6-8</sup> See Table 1.

The reference diet is designed to provide the nutritional requirements for people ages 2 years and older, is appropriate and adaptable for cuisines from different cultures and climates, and includes a broad range of food groups and caloric intake. The mean energy intake for the reference diet has been determined to be 2500 kcals a day, which is the average intake for men and woman in the US. The standard intake is calculated for a 70 kg man and 60 kg woman, which is a higher BMI than is desirable for ultimate health. A BMI of 22 kg/m<sup>2</sup> is preferable, but substantially lower than the global average BMI. Thus, the Commission opted to choose a higher average BMI.

Additional key recommendations from the Commission for the reference diet are:

- Consume carbohydrates in the form of whole grains with minimal to no intake of refined products and sugar. Consume tubers or starchy vegetables in minimal amounts.
- A minimum of five servings of fruits and vegetables daily.
- Protein should be derived primarily from plant-based sources including soy, legumes, fish and nuts with the addition of eggs and poultry as an option a few times a week. Fish is included in the reference diet because it is high in omega-3 fatty acids and essential amino acids. 28 grams a day is associated with improved cardiovascular outcomes and is therefore the amount chosen for the reference diet. Because mercury can concentrate in larger fish higher on the food chain, avoidance of swordfish, tuna, tilefish, shark and king mackerel should be avoided by pregnant and lactating women.
- Eggs are considered a high-quality protein. Eating 1.5 eggs a week, or 13 grams a day, is chosen for the reference diet. More eggs per week might be beneficial for lower income individuals and children who might not easily obtain high quality protein otherwise. Although there has been concern that eggs might increase cholesterol levels and the risk of cardiovascular disease, a study of up to 1 egg a day did not prove this, though the comparison diet was a standard American diet (low in fiber, complex carbohydrates, fruits and vegetables, and high in fat, sugar and animal sources) rather than a high-quality plant-based diet.
- Modest amounts of dairy may be consumed as an option. Evidence for the health benefits of dairy is variable. While US guidelines recommend 1000 mg of calcium daily and two to three one-cup servings, these recommendations are based upon short term studies and influenced by the dairy lobby. The World Health

Organization noted that areas with lower dairy intake had fewer fracture rates and that 500 mg a day is likely adequate. Dietary sources of calcium can be obtained from numerous non-dairy sources like soy or dark leafy greens and broccoli. After review of the available global evidence on health outcomes associated with variable intakes of dairy, the Commission chose 250 g/day of dairy and 718 mg/day of calcium for the reference diet.

- Nuts, including peanuts and tree nuts, are excellent sources of phytosterols, antioxidants, vitamins, minerals and unsaturated fatty acids. Studies of nut consumption show decreased LDL, decreased inflammation, lower insulin resistance and hyperglycemia, and lack of weight gain. In the reference diet nuts are recommended in the amount of 50 g/day.
- Like nuts, legumes are another nutrient dense food that have been shown to have numerous health benefits. Increased legume intake is associated with lower cholesterol levels and lower blood pressure. Soy in particular has high levels of polyunsaturated fat and alpha-linolenic acid. Its weak estrogenic effects likely block endogenous estrogen in the breast and intake is associated with decreased risk of premenopausal breast cancer. Thus 50 grams of legumes plus 25 daily grams of soybeans are recommended.
- Red meat is to be avoided or eaten minimally. Intake of red meat is associated with increased risk of cardiovascular disease and is considered a carcinogen by the International Agency for Research; therefore, the Commission concluded that 0 to 28 g/day of red meat is desirable and chose the midpoint, 14 g/day for the reference diet.
- Because poultry has better health outcomes than red meat, the reference diet recommendation is set slightly higher at 0 to 58 grams, with a midpoint of 29 g/day.
- Minimal fat, mostly from plant sources, should be consumed. The reference diet excludes trans fats and partially hydrogenated oils.



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## Scientific targets for a WIN-WIN 2500 kcal/day diet (Table 1)<sup>1</sup>

Food category	Macronutrients grams/day	Kcals/day
Whole grains	232	811
Tubers/starchy vegetables	50 (0-100)	39
Vegetables	300 (200-600)	78
Fruits	200 (100-300)	126
Dairy	250 (0-500)	153
<u>Protein sources</u>		
Beef, lamb, pork	14 (0-28)	30
Poultry	29 (0-58)	62
Eggs	13 (0-25)	19
Fish	28 (0-100)	40
Legumes	75 (0-100)	284
Nuts	50 (0-75)	291
<u>Added fats</u>		
Unsaturated oils	40 (20-80)	354
Saturated oils	11.8 (0-11.8)	96
Added sugars	31 (0-31)	120



## Examples of reference diet (flexitarian) meals, which are largely plant based but may contain moderate amounts of dairy, meat or fish:<sup>9</sup>

Instead of:	Try this alternative:
Donut, coffee with cream, banana	Cinnamon raisin toast with jam, coffee with plant based creamer, banana
Cereal with milk, OJ and strawberries	Cereal with soy/ rice milk, OJ, Strawberries
Scrambled eggs, home fries, toast, sausage, tea	Scrambled tofu, roasted potatoes, toast, Gimme-Lean Sausage, tea
Chicken burrito, rice, refried beans	Tofu/ sweet potato burrito w/ lettuce, tomato, onion Rice, black beans
Turkey sandwich with lettuce, tomato, mayo, yogurt, potato chips	Hummus, bean spread, lettuce/ tomato sandwich, applesauce, crackers
Chicken noodle soup, bread, green salad w/Russian dressing	Minestrone, bread, green salad, fat-free dressing
Chicken fajita, rice, refried beans	Vegetable fajita free from oil, rice, black beans
Salmon, potatoes with cheese, asparagus with hollandaise sauce	Broiled portabella mushrooms, broiled potatoes w/ spices, asparagus w/ orange sauce

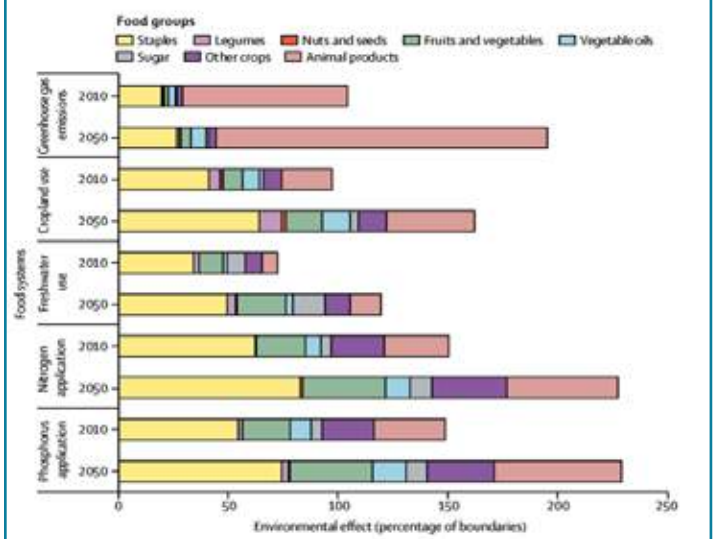
## Sustainable Food Production

In addition to consumption adaptations, changes in several areas of food production can be made to reverse the trend of worsening environmental damage. The specific areas that are affected by current food production practices are biodiversity loss, threats to animal welfare, water and land contamination, overuse of nitrogen and phosphorus in fertilizer with subsequent eutrophication of water and increases in greenhouse gases leading to increasing temperatures.

*Actions to achieve consequential positive impacts on our environment are:*

- Stop land conversion from forests and natural ecosystems to pastures and crop fields. This will combat rising agriculturally derived greenhouse gases which are (1) methane from livestock digestion, (2) nitrous oxide from soil microbes and fertilizer, and (3) carbon dioxide emissions. Deforestation and conversion of natural ecosystems also eliminates a major CO<sub>2</sub> sink.
- Avoid water waste on crops and pastures; move toward more production and consumption of foods that require less water (plants) and away from water intensive foods (meat and dairy).
- Improve nitrogen and phosphorus use as fertilizers. Excessive use in some areas leads to water and ecosystem contamination, and underuse in other areas causes lower crop yields.
- Stop biodiversity loss by protecting and re-establishing natural habitats for plant and animal life. The role of diverse plants, animals, and insects is often overlooked in terms of its benefit to the environment and all life forms.

## Environmental Effects of Different Foods:<sup>1</sup>



## How can we, as Family Physicians, Respond to the Climate Change Crisis?

Family physicians play a critical role in educating and encouraging patients and communities to make dietary changes that can improve health status while helping the environment and climate. There are several critical junctures at which nutritional counseling of patients can make a significant impact, including counseling pregnant women about their diets and their

families, at well child exams, adult annual preventative exams and while seeing patients for chronic disease management, many of which can be treated and prevented with healthy diets.

Although not directly related to food choices and production, population growth is another impactful factor for sustainability. The global population was approximately 7.6 billion in 2017 and is expected to reach 9.8 billion in 2050.<sup>10</sup> Reducing population growth is imperative to achieving a sustainable planet. Therefore, healthcare providers must continue to ensure universal family planning education and access.

## Actions for Family Physicians:

1. Get educated about healthy nutrition and environmental impacts of food. Seek out unbiased, scientifically proven continuing education on nutrition, which includes information not only about healthful diets, but the environmental impacts of our food choices. Demand that your alma mater educates medical students and residents on these topics. Recommended references may include: The Physician's Committee for Responsible Medicine ([pcrm.org](https://pcrm.org)), The T. Colin Campbell Center for Nutrition Studies (<https://nutritionstudies.org/>), The Center for Science in the Public Interest (<https://cspinet.org/>), and the Tufts newsletter (<https://www.nutritionletter.tufts.edu/>). Read the EAT Commission Summary and The Paris Agreement.
2. Educate patients and the community. One-on-one nutritional counseling to our patients at all stages of life is impactful. Engage your community by giving talks about preferable diets for their health and the planet. Write articles for your town's newspapers or give interviews on your local radio show.
3. Set an example by making healthy and environmentally sound choices yourself.
4. Engage in local activism and advocacy. Get involved with local schools, hospitals, childcare centers and community organizations to promote healthy diets. Our clinics and hospitals should promote healthy foods and set examples of the reference diet. They should offer plant-based options and not provide fast foods and other unhealthy choices. In fact, in December 2017 New York State passed a law requiring hospitals to offer plant-based meals to patients.
5. Family physicians must continue to offer patients family planning education and access to contraceptive options. Present patients with all the available forms, including long acting reversible contraception, and either provide it in the office or refer patients to a provider who can.

The time is ripe for having these discussions with patients and our communities as Americans are increasingly concerned about the climate and global warming. A recent study from the Pew Research Center determined many Americans (64%) cite the environment as a top concern for the President and Congress, nearing the portion (67%) who think the economy should be the US Government's top priority.<sup>11</sup> As family physicians it is our duty to educate and empower

ourselves, our patients and our communities to achieve the goals set forth by the EAT- Lancet Commission, a requirement if we are to survive and thrive beyond the 21st century.

## Endnotes

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# WHERE DOES IT GO WHEN YOU FLUSH?

## *Changing a Polluter of Poor Communities into a Profitable Enterprise and Reducing Global Warming*

By Bob Morrow, MD

I've always had asthma, my entire 70 years. No way around that, it's not going away.

But the last few years I've noticed the asthma getting gradually worse. But it took Alaska to start understanding probable cause. A simmering annoyance turned into a bonfire.

When my wife and I finished our family medicine residencies, we moved a few miles away from Montefiore to the northern edge of the West Bronx into downtown Yonkers. We found a nice house with a lovely backyard, in an integrated neighborhood overlooking the Hudson River, at an affordable price. What a gift. Four children, less than ten dogs, and innumerable nice neighbors and moments. We have persisted.

About 300 yards away is a sewage treatment plant, now called the Westchester Water Reclamation Plant. It spans 37 acres, and serves about 500,000 people, mostly from white Westchester. They flush into my mostly not-white neighborhood. And amazingly, when we moved in, it had no odor.

Shortly afterwards the plant was turned on. Whoa, that's what odor means!

Lucky for you, you won't have to read about decades of community organizing and protest, which got nowhere. The response has been that the odor wasn't so bad, they would upgrade their process, that all their chemical processes were approved to be safe. The EPA thought differently, but changes in measurement, political regimes, and a court settlement pretty much kept things without change.

But what about the candles? The plant produces methane [so do you], which is dealt with in the style of the 1960s, which is to say 'flare it off.' Apparently, the EPA does not look too closely, which we might get to.



Ok, let's get to that now. The plant has five candles, which are ground level and roof level apertures like the ones your gas stove uses. At optimum, they burn methane into CO<sub>2</sub> and H<sub>2</sub>O. Methane is a potent atmospheric warmer, 400 times more so than the notorious CO<sub>2</sub>.

An efficient burn, like your stove, is blue. In the swirling Hudson winds, our candles are yellow with obvious waste gas in the visible range. In the infrared, this is much more visible as demonstrated vividly in the NY Times <https://www.nytimes.com/2020/02/19/climate/methane-flaring-oil-emissions.html>

Indeed, at 100% efficiency, methane is burned [oxidized] to H<sub>2</sub>O and CO<sub>2</sub>. Carbon dioxide lasts longer but is far less a warming agent. Efficiency for candles has been estimated by the University of Alberta, in a study financed by NYSERDA and published in 2013 by the Oxford Press [which has notoriously tough editors], at 65%.

In the 1990s this was addressed in other plants by stacks with scrubbers. In the 2010s plants moved to grab that natural gas and sell it at market rates. Why not? Filter that gas and turn the pipe to go wherever you want it to be sold – the grid, the county buses, the suffering neighbors' furnaces. The burn then becomes roughly 97% efficient with a dramatic decrease in vented methane.

What is lost by using the gas commercially? Micro-particles for the surrounding dome of air. The EPA doesn't measure these particles at the candle, but in the pipe before the candle. A sample [aliquot] is taken and burned efficiently in the controlled environment of a lab. These numbers are generally accepted to not reflect what leaves the candle's flame.

The odor is present a mile away. So we might predict a large radius of effect. These 2.5 micron particles stay as an aerosol for a long time. These micro particles can slip through the tissue of the lungs and easily enter the bloodstream. Particles have been photographed in placentas, at different concentrations by researchers tracking pollution rates.

But what of Alaska! Tell us a nice story about the subarctic wilderness, you say, instead of going on about poisoned placentas.

So in the summer of 2019 my extended family traveled together to inland Alaska on holiday. We had a nice time, surely, but...

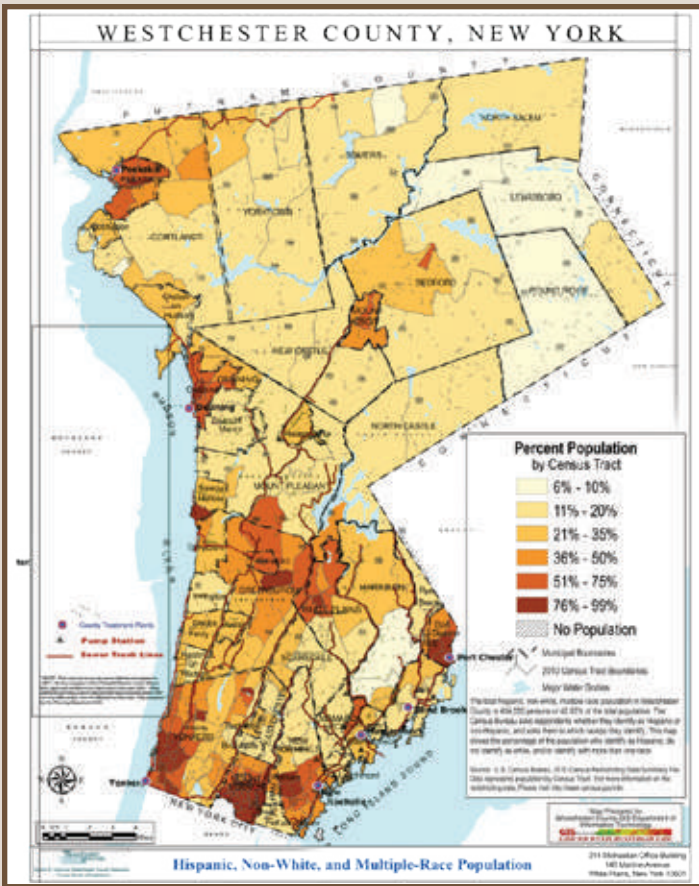
Alaska is burning! Record temperatures in Fairbanks. Much of Denali shut down. Roads to glacier trips closed due to smoke. Valleys filled midday with fog, but it's not fog, it's dense, 'can't-see-the-neighbors' wood smoke.

I was ok if I didn't climb or run or expect to move at my usual pace. It took weeks for my breathing to improve, with low O<sub>2</sub> sats. I almost panicked on the flight home, due to the airplane's low pressurization.

I started to think about my personal exposure daily to micro-particles. I presented these issues at a local environmental activist conference, only to have a participant point out that at fracking sites, the micro-particles have volatile organic compounds on their surfaces and wrapped in nano-tubules, hitching a ride into our blood stream.

I fumed, and that's ironic, sure, but I became fired up about the flares poisoning me and my neighbors.

The plant receives more than 65% of Westchester's sewage. Westchester, one of the richest and whitest counties in the US, has routinely flushed sewage into poorer communities of color. According



to Westchester County, our southwest Yonkers area is 70-90% African American and Hispanic. African Americans in southwest Yonkers are hospitalized for asthma at 6 times the rates of county whites, as noted above. Rates of maternal death, prematurity, and miscarriage are similarly above the average.

What to do? Time to confer with local community organizations and environmentalists! But can we actually make a change after 40 years? First, whacking our heads on a fiscal wall was a loser. Politicians reflexively say no, no money, no way.

**Next Stop - Solutions:**

We decided early on that pointing fingers doesn't really help. Education, coalitions, and politicians seem to be part of the strategic approach. And then an idea arose from the health care industry:

**TURN A COST CENTER INTO A PROFIT CENTER!!** What terrific irony – grab the financial high ground!

So let's spin some gold out of, well, poop. Here's the plan:  
 Divert the methane flares for uses such as local heating, running municipal fleets, etc., increasing the burn efficiency from 65% to 97% with virtual full capture of volatiles and micro particles, as is done now world wide. In other words, sell the natural gas by putting it into the pipeline, rather than burning it in the open air.

Install 37 acres of solar arrays on top of the plant to generate power and income. Finance with NYS incentives and a public-private partnership. Replace purchased extractive fuel use and sell the electricity.

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Use these funds to cover the plant and turn the land adjacent into a public riverfront park, not a school bus parking lot.

So we turn sewage into clean power, we contain odors with the profits from the bonds to do the task, and we protect the neighbors – thousands of them – from odors and measured health hazards. And no longer pay \$4 million annually for electricity to the plant. Gold from poop! Maybe my airways will relax.

I recommend excellent but understandable articles in *Science News*, especially

<https://www.sciencenews.org/article/fossil-fuel-use-may-emit-more-methane-than-thought>

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**Erie - Gowanda CF**  
(Hudson River Valley beauty)

**Franklin\* - Franklin & Upstate CFs**  
(North Country, 1 hour to Montreal)

**Livingston\* - Groveland CF**  
(State Parks, hiking, fishing)

**Oneida - Mohawk CF**  
(Cooperstown, breweries)

**Queens - Queensboro CF**  
(world food destination, museums, parks)

**Seneca\* - Five Points CF**  
(heart of wine country)

**St. Lawrence - Riverview CF**  
(hiking, boating, museums)

**Sullivan - Woodbourne CF**  
(mountains, outlets, entertainment)

**Ulster - Shawangunk CF**  
(sporting and recreational outlets)

**Washington - Great Meadow CF**  
(hiking, boating, skiing, snowboarding)

**Westchester - Bedford Hills CF**  
(less than 1 hour from NYC)

**Wyoming - Wyoming CF**  
(waterfalls, natural beauty)



# Climate Change and the Physician:

# 2020

By Caitlin Rublee, MD, MPH and Jay Lemery, MD

## Climate Change Overview

Human health is inexorably connected to our environment, and our existence in turn has never had a greater impact on our surroundings. An ideal environment offers community and provides inhabitants with the key ingredients necessary for health – clean water, food, air, and shelter. Perturbations to these environments contribute to a myriad of direct and indirect adverse health effects. As examples, consider a young child with diarrheal illness after drinking contaminated water or an older adult with emphysema suffering an exacerbation during a warm, high ozone and high allergy day. As normal balances shift, we cease to be able to optimize our health, exposing vulnerable populations who are disproportionately impacted due to underlying medical or social conditions.

This is exactly the health threat from climate change. On a global level, the planet's ecosystems are stressed from centuries of human industrialization, driving atmospheric greenhouse gases to record levels. These gases, primarily made of carbon dioxide, affect earth systems through warming temperatures, melting glacial ice with sea level rise, altering the chemical composition of seawater, and energizing weather systems to the extreme. The Intergovernmental Panel on Climate Change (IPCC) is the leading scientific body under the auspices of the United Nations and is one of the most well-referenced and well-respected repositories of peer-reviewed climate science. They have published reports since 1990, most recently the 5th Assessment Report (AR5) in 2014 followed by special issues on land, oceans and cryosphere in 2019. There is resounding, irrefutable evidence that the earth has and will continue to change in ways that threaten the health of people on every continent. Our patients, families, and communities are all at-risk.

Physicians are trusted community leaders, educators and patient advocates. We prevent, recognize and treat illnesses, serving as bridges to communicating health risks. Herein, we will explore the health and infrastructure impacts of global climate change as they pertain to practicing clinicians.

## Health Effects

Adverse health effects develop from four main environmental stressors: rising temperatures, extreme weather events, rising sea level, and increased atmospheric carbon dioxide.<sup>1</sup> Some of these effects manifest with acute stressors while others are exacerbated over time.

### *Increasing extreme heat events*

The past decade was the warmest on record and 2019 was the second hottest year according to the National Oceanic and Atmospheric Administration (NOAA). By future climate scenarios, the earth is projected to warm to 1.5° Celsius above pre-industrial levels with

dangerously high heat index days in many cities of the country.<sup>2,3</sup> While seemingly a small change from the current 1° Celsius level, the consequences to human health at such a scale will be significant as increased ambient heat will drive pathophysiologic heat stress, and in the most severe cases, heat stroke, multi-organ failure, and death. On average in the United States, there are at least 618 known deaths associated with excessive heat exposure annually.<sup>4</sup> Positive associations have been made with extreme heat and cardiovascular disease, respiratory disease exacerbations, mental health effects, increased aggression, adverse birth outcomes, renal disease, and cerebrovascular diseases.<sup>5</sup>

Specific risk factors make populations more vulnerable to the effects of heat including extremes of age, underlying chronic diseases, medications, substance use disorders, social and environmental factors.<sup>6,7</sup> Outdoor workers represent one group at heightened risk due to increased exposure and often limited adaptability. City dwellers are particularly vulnerable from the urban heat island effect. The phenomenon occurs as a result of increased heat generation from people, pavement, and other industrial processes with heat lingering into the night compared with rural areas with fewer people and more green spaces to dissipate heat. A summer heat wave across four states highlights this vulnerability with 32 deaths reported, mostly in homes, and a median age of 65 years old.<sup>8</sup> The European heat wave of 2003 had at least 35,000 additional deaths compared with prior years over a two week period.<sup>9</sup> With current greenhouse gas emissions, extreme heat events similar to these heat waves are projected to increase one hundred-fold in the next twenty years.<sup>10</sup>

### *Increasing vector-borne diseases*

Warming temperatures are expanding the geographic range and optimal conditions for vectors to thrive. The diseases that mosquitos, ticks, and fleas carry collectively tripled in the United States between 2004 and 2016.<sup>11</sup> Mosquitos species in particular have prolonged breeding seasons, enhanced reproduction rates, and increased feeding frequency contributing to disease transmission in warmer temperatures.<sup>12</sup> In addition, extreme downpour flooding events contribute to standing water pools, further influencing mosquito life cycles and disease transmission opportunities.<sup>13</sup>

The illnesses inflicted by these vectors including West Nile virus (WNV), Zika, Lyme, dengue, chikungunya, and malaria manifest in many ways. Signs and symptoms are often mild but may be severe in some cases. Dengue hemorrhagic fever and dengue shock syndrome represent two life-threatening forms of disease with widespread coagulopathies and end-organ damage. WNV has a neuroinvasive

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form that causes encephalitis or paralysis. In 2018, 2,647 cases of WNV were reported across 48 states, 63% of which were neuroinvasive; this was a 25% increase in reported neuroinvasive cases of WNV compared with the median incidence in previous years.<sup>14</sup> Zika can infect pregnant women and cause devastating birth defects in unborn children. Ease of global transportation, growing global population, animal and human intersections, drug and insecticide resistance, mass migration, and war-torn areas increase concerns for vector-borne disease transmission in a changing climate.<sup>15</sup>

### **Air degradation**

Particulate matter (PM) and ground ozone are two significant air pollutants susceptible to changes in climate. PM and ozone are derived from industrial processes, wildfires, and construction and influence hazardous secondary particles through reactions with other chemicals. Many toxins and natural products such as pollen are also mixed with PM. PM<sub>2.5</sub> is frequently used as a sentinel measure due to its fine size and ability to penetrate bronchioles and alveoli as compared with coarse PM. PM has been associated with cardiopulmonary diseases including acute on chronic disease exacerbations, cancers and increased mortality.<sup>16,17,18,19,20</sup> Ground ozone is a mixture of volatile organic compounds and nitrogen oxides that undergo chemical reactions augmented by sunlight. It contributes to premature deaths independently of PM.<sup>21</sup> Acute and chronic ozone exposure causes inflammatory changes in the respiratory tract which increases susceptibility to infection, acute on chronic respiratory exacerbations, and health care utilization.<sup>21</sup> Other climate-driven environmental factors influence PM and ozone. Wildfires (exacerbated by climate change) represent one example where wildfire smoke from Canada is carried long distances into the northeastern United States with commensurate increases in both PM and ozone concentrations.<sup>22,23</sup>

### **Increasing allergens**

Pollen and mold are two common environmental allergens that can initiate a cascade of inflammatory changes in airways or other mucous membranes when inhaled in sensitive individuals. Pollen counts are projected to double in the next twenty years<sup>24</sup> with carbon dioxide and temperature contributing to these increases.<sup>25</sup> In North America, pollen season is expected to be prolonged up to four weeks, particularly in the most northern latitudes.<sup>26</sup> The classic triad of allergic rhinitis,

asthma, and eczema are worsened by such allergens. Extreme weather events also influence rupture of inhalational pollen grains into the air. Standing water from floods and hurricanes create environments where dangerous levels of mold grow inside flooded buildings.

### **Food security**

Nutritious, accessible and affordable food is likewise under threat. Extreme weather events cause excessive heat, drought, and floods which impact fields and ecosystem balances. Foods are grown with fewer nutrients, and unpredictable weather conditions impact crop yields. Plants, fertilizers, and other toxins are contributing to changing plant and animal pathogens. Invasive pests and weeds are just two examples that destroy agriculture used for both human and animal consumption.<sup>27,28</sup> Aquatic ecosystems and fisheries are increasingly stressed with fluctuating water acidity and salinity, loss of biodiversity, and unstable food chains. The human population continues to grow with estimates of 8.5 billion people by 2030 relying on sustenance. Undernutrition is already causing more than one-third of deaths in children less than five years old with short and long-term consequences in growth stature, intellectual abilities, and disease risks.<sup>29</sup>

### **Infrastructure Impacts**

Extreme weather events affect essential infrastructure for water and waste management. Traditional public health measures maintain separation of elements for sanitation and to preserve clean water. During heavy downpours, there is a higher risk of water sanitation measures becoming overwhelmed, with a resultant slurry mix of water, pathogens, and debris in a combined sewer overflow (CSO) event. CSO's can cause diarrheal illness,<sup>30</sup> contaminate drinking water sources, close beaches and adversely affect fish ecosystems. New York had 376 reported untreated CSO events in 2014.<sup>31</sup> While not the worst state, the example highlights weakened infrastructure contributing to less adaptive capacity and increased health hazards despite likely increasing precipitation events in the future.

Climate change is directly and indirectly influencing the health care facilities in which we work. Extreme weather events such as hurricanes, wildfires, heat, and floods impact health care access for patients and delivery of health care services. Direct damage to buildings, transportation route disruptions for patients and employees, supply chain disturbances, and increased energy demands are a few



ways operations are impacted. When Superstorm Sandy landed in 2012, multiple hospitals were shut down. The New York University Langone Medical Center's 12-foot flood protection proved to be inadequate. Fifteen million gallons of water flooded its facilities, power was lost, hundreds of patients were evacuated, and the emergency department was closed for 18 months.<sup>32</sup> Disasters such as Superstorm Sandy demonstrate potential consequences of infrastructure failures in safely sheltering patients and employees.

### What is the Physician's Role?

Climate change will increasingly inflict acute and chronic stressors that adversely impact patients, especially those with climate-sensitive conditions, calling upon physician leaders as educators, advocates, and healers. Knowing and understanding environmental and social determinants of health, we are uniquely positioned to not only prepare and educate patients on these threats but respond to them at the bedside and beyond. We recognize the need for resilient health care facilities and strong infrastructure. We can build capacity now as educators and advocates, advancing climate justice and integrating climate action into our profession as one more way to protect the health and well-being of our communities.

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# Climate Change, Pesticides and Health Consequences

By Jennifer Kessmann, MD, ABFM, FAAFP, IFMCP and Afsha Rais, MD, ABFM

## Introduction

Pesticides are commonly used throughout the United States in homes, businesses, and in farming and agriculture.<sup>1-2</sup> Climate change will bring about higher temperatures and droughts that may increase the need to control pest infestations.<sup>3</sup> Over 80,000 chemicals are now manufactured and contribute to the overwhelming toxic burden for our health and environment.<sup>4</sup> In fact, over 1 billion pounds of pesticides are used annually in the United States alone.<sup>4</sup> These compounds include over 20,000 different insecticides, anthelmintics, fungicides and herbicides and are often organophosphate derived chemicals.<sup>1-5</sup> Damage to the delicate ecosystem providing our agricultural resources is a concern and has longstanding unresolvable consequences. Pesticides are rated by the Stockholm Convention of Persistent Organic Pollutants as ten of the most dangerous and persistent chemicals in our world.<sup>1</sup> Furthermore, the CDC report of 2005 found that over 50 different pesticides were found in representative blood samples of the U.S. population.<sup>6</sup>

Pesticide exposures can cause many untoward health effects, and complications are well documented in the literature.<sup>1-2,7-8</sup> Many of these chemicals take several decades to degrade and bioaccumulation is an issue for both humans and animals. Dichlorodiphenyltrichloroethane (DDT) has a half-life of over 30 years and even though it was banned in the US in 1972, metabolites are still found in over 50% of the US population blood samples.<sup>1,6</sup> Often users apply repeat applications indiscriminately and accumulations of these toxins may develop in higher concentrations than necessary. Due to the harmful health consequences related to pesticides, family physicians should be encouraged to recommend avoidance and protection for their patients and families.

## Mechanisms of Action

Pesticides can harm through both acute and chronic exposure through several different mechanisms.<sup>2</sup> There are many types of pesticides, as seen in **Table 1**, with the majority being derivatives of organophosphate that can lead to high mammalian toxicity.<sup>5</sup>

**Table 1. Pesticides Categories and Commonly Used Organophosphates**

Category	Types
Herbicides	Glyphosate, glufosinate
Insecticides	Arsenic, Malathion, fenitrothion, pirimiphos-methyl, Naled, diazinon, chlorpyrifos
Flame Retardants	Tri-dichloro-2-propyl phosphate (TDCPP), tricresyl phosphate (TCP)
Fungicides	Iprobenfos, edifenphos
Highly Toxic Nerve Gases	Sarin, soman, tabun, VX
Bactericidal Cleaning Agents	Formaldehyde, chlorhexidene, Hydrochloric acid

Sources: Toxicology,<sup>2</sup> Toxicology Research<sup>5</sup>

Mechanisms of harm include acetylcholinesterase inhibition, increased oxidative stress, axonal transport deficits, neuroinflammation and autoimmunity.<sup>2-5</sup> Acute toxicities can occur through binding to acetylcholinesterase enzymes and inhibiting them to contribute to increased parasympathetic nerve activity. Additionally, both nicotinic and muscarinic receptors may be activated to turn on the autonomic nervous response.<sup>2</sup> These acute symptoms can manifest in a variety of presentations as seen in **Table 2**. Pesticides also act on other nerve receptors including the voltage-gated chloride and calcium channels, and the gamma-amino butyric acid receptor, causing a wide variety of symptoms and effects.<sup>5</sup>

**Table 2. Symptoms of Acute Organophosphate Insecticide Exposure**

Cholinergic Toxidrome: Symptoms from Activation of Autonomic Nervous System
Bradycardia/tachycardia
Bronchorrhea
Bronchospasm
Confusion
Diarrhea/defecation
Hypertension/hypotension
Increased salivation
Increased tear production
Insomnia
Miosis
Muscle fasciculation
Muscle tremors
Peripheral neuropathy
Prolonged QT intervals
Psychosis
Pulmonary edema
Seizures
ST wave changes
Sweating
Urination
Vomiting

Sources: BMJ Clin Evid<sup>9</sup>, StatPearls Publishing<sup>10</sup>

Chronic exposure to these substances causes problematic health effects. Some patients have genetic mutations that may make it difficult to eliminate these substances from their cellular environment. Many of these mutations are known to be associated with Parkinson's such as the PON1 mutation.<sup>2,11-16</sup> Pesticides can also create foreign body recognition by the immune system triggering autoimmune diseases and cancer.<sup>1,17-19</sup> Another mechanism of harm is through increasing oxidative stress causing mitochondrial damage, apoptosis and cell death.<sup>2</sup>

Due to the high burden of these substances in our environment, it is essential that we understand how to limit our exposure and prevent indiscriminate use of these toxins. With impending climate change events, it will be advantageous to establish safer means to control pests that do not cause damage to health and the environment.<sup>5</sup>

## Exposure

Exposures to pesticides can occur through food, water, air or direct contact with the skin and mucous membranes.<sup>2,8</sup> The substances are fat-soluble and can accumulate in our system over time. These chemicals are easily absorbed through the gut, skin and delicate respiratory lining. Insecticides target nerve tissue in our most important lipophilic tissues including the brain and other organ systems. Chronic exposure is one of the known causes for Parkinson's disease.<sup>11-16</sup> Family physicians may often be dealing with pesticide poisoning as the acute symptoms can mimic many common conditions such as allergies, migraine syndromes or viral infections.<sup>2,20</sup> We will review some common health consequences from both acute and chronic pesticide exposure as well as how to limit their use.

## Pesticides and Health Consequences – Acute and Chronic

Comprehensive discussion of health consequences related to pesticides is extensive; therefore, the goal is to focus on the more common issues that can arise from exposures. Urine testing is available for metabolites of pesticides from specialized labs for both pesticides and certain herbicides. Research demonstrates an association between pesticides and health consequences, as seen in **Table 3**, which shows the long-term health consequences related to organ systems.<sup>1,11-16</sup> Parkinson's is a known consequence of organochlorine exposures and avoidance of pesticides can help to prevent this disease in those genetically susceptible with detoxification issues. Many of the neurologic diseases such as Alzheimer's dementia and amyotrophic lateral sclerosis (ALS) can also be found to be associated with exposure to these agents.<sup>21</sup> Research into the incidence of cancer and exposure identifies pesticide exposures with leukemia and lymphoma, brain, kidney, breast, prostate, pancreas, liver, lung and skin cancers.<sup>1-2,15,22</sup> Exposure during critical periods of gestation is also known to increase risk of acute lymphocytic leukemia, Wilms tumor and brain cancer in offspring.<sup>1</sup>

**Table 3. Possible Long-term Health Consequences of Pesticide Exposure**

Organ system	Health consequences	
<b>Brain</b>	Parkinson's disease Dementia Neuropathy Tics Autism Neuroinflammation/ neurotoxicity	Tremors Seizures Migraine/headaches Brain cell cancer Reductions in IQ
<b>Cardiovascular</b>	Arrhythmias	Coronary artery disease
<b>Gastrointestinal</b>	Stomach cancer	Pancreatic cancer
<b>Reproductive</b>	Infertility Endocrine disrupting chemicals	Decreased birth weight
<b>Respiratory</b>	Asthma Allergic rhinitis	Obstructive lung disease
<b>Endocrine</b>	Gynecomastia Diabetes mellitus	Endocrine disrupting chemicals Obesity
<b>Genitourinary</b>	Renal cell carcinoma	Prostate cell cancer
<b>Psychiatric</b>	Depression Anxiety Panic disorder	Schizophrenia Possible contribution to autism
<b>Hematologic</b>	Leukemia Non-Hodgkin's lymphoma	Acute lymphocytic lymphoma

Sources: Toxicology;<sup>2</sup> American Academy of Pediatrics;<sup>20</sup> and National Academies of Science<sup>23</sup>

## Prevention for Patients

In general, family physicians should focus on disease control and prevention by recommending decreasing pesticide exposure. Emergency treatments will not be discussed here. More involved therapy for

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long-term accumulation is difficult and involves limiting exposures as a primary step. There are numerous ways to approach this matter, including encouraging patients to limit exposure to pesticides as listed in **Table 4**. Using online resources such as the environmental working group (EWG.org) can be a helpful way to identify some of the most heavily sprayed conventional foods. This is a simple way for patients to shop healthier and be aware of the consequences of exposure. Home gardening is also an effective way to prevent unknown exposures and decrease the emissions from transporting products long distances. Decreasing use and improving farming strategies can be a longer-term goal to help prevent further damage to health and our environment. Furthermore, decreasing chemical exposures in our environment may help decrease the consequences of global warming and reestablish more natural ways to control pests.

**Table 4. Methods for Decreasing Exposure to Pesticides**

Limit or do not use pesticides indoors
Use bait type method rather than sprays
Pick safer methods such as diatomaceous earth, boric acid, barrier protection/ traps in attics
Use organic methods to prevent weeds and pests <ul style="list-style-type: none"> <li>• Spread dry molasses in spring to prevent ants in yards</li> <li>• Dry grits can be applied on any ant mounds</li> <li>• Diatomaceous earth around weep holes and foundation outdoors</li> <li>• Nematode application in spring to prevent fleas/ants/roaches</li> <li>• Corn gluten meal in spring and fall to prevent weed germination</li> <li>• Sticky traps in closets and bait for pests in attics</li> </ul>
Use EWG.org to identify more contaminated produce <ul style="list-style-type: none"> <li>• Buy the dirty dozen organic, if possible</li> <li>• Use the clean 15 to identify safer/less contaminated produce</li> </ul>
Drink filtered water
Purchase organic grass-fed meats
Use safer skin protectant for mosquito bite prevention

Sources: AAP, EWG.org

## Conclusion

Family physicians should encourage avoidance of pesticide use in the home by opting for safer methods of pest control. Due to the above-mentioned health consequences, family physicians should consider including pesticide and other environmental exposures in patient assessments and recommend avoidance whenever possible. This will allow for early intervention, promote healthier living environments and decrease adverse health events in adults and their offspring. Working together to limit exposure to pesticides and controlling climate change can be beneficial for patients and their families.

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**Jennifer Kessmann MD, ABFM, FAAFP, IFMCP** is a lifelong advocate of healthier living and lifestyle. Graduating Magna Cum Laude from Texas A and M University as a nutrition major, she began learning of consequences from the environment early on. Utilizing her experience with environmental medicine and integrative/functional medicine, she continues to be an advocate for the natural ways to improve and decrease exposures for a healthy life.

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**Afsha Rais, MD** is a board-certified family physician focusing on various aspects of family health practices. She graduated from Saint James School of Medicine in 2016 and completed her residency at The University of Arkansas for Medical Sciences Regional Programs – Texarkana in 2019. She also completed a fellowship in academic medicine at the University of North Texas Health Science Center/Texas College of Osteopathic Medicine in 2019 and believes academic medicine not only provides a way for her a way to pursue her research interest but also fosters her love of teaching.



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## *Our Sincere Thanks*

Back in February, when our authors and editors were working on copy for this issue, we couldn't have imagined how profoundly our day to day lives were about to change, or how quickly the priorities of our dedicated members would shift.

We are deeply grateful to all of our writers who, in spite of all they are facing on the front lines and in their practices, found time to finish their pieces for this issue of Family Doctor.

— The Family Doctor Editorial Team





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**TO: NYSAFP Members**  
**FROM: Raymond Ebarb, MD - Secretary**  
**RE: Official Notice of NYSAFP Congress of Delegates**  
**DATE: April 6, 2020**

### Introduction

We are grateful to our members for your incredible response to the COVID-19 emergency and for your dedication to patients and your professionalism in coping with the extreme and stressful conditions imposed by the situation. Thank you for providing comfort and care for your patients and communities.

Emergency guidelines issued by the State and Federal governments regarding large gatherings compel us to have a back-up plan to conduct our Congress as a virtual event should it be necessary for us to cancel the live meeting.

In the event the Congress cannot be held as a live event it will occur as a virtual event using a video conferencing platform yet to be determined and emergency rules of procedure necessary to accommodate a virtual meeting. The Desmond will hold our meeting space and room block until June 1st. We must, therefore, decide before June 1st if we will conduct the Congress as a virtual meeting or as a live event. We understand that much of the benefit and inclusiveness of our Congress is contingent upon personal interaction and co-location of members. Unfortunately, we will not be able to conduct a live meeting if travel restrictions and other emergency provisions remain in effect on June 1st. We understand the inconvenience imposed by uncertainty, but we cannot definitively say at this time whether the Congress will occur as a live event or via a virtual format. We have, however, developed a plan to conduct the Congress as a virtual event pursuant to the timeline established and available online.

### Notice

Notice is hereby given that the 72nd Congress of Delegates (COD) of the New York State Academy of Family Physicians will convene on Saturday, June 13th at 8:00 AM at the Desmond Hotel in Albany, NY. In the event the Congress cannot occur as a live event it will be conducted as a virtual meeting. We are still reviewing various on-line platforms. In order to conduct the Congress as a virtual event it will be necessary to complete as much work as possible prior to publication and consideration of reference committee reports. Consequently, if necessary, a virtual Congress will convene at 8:00 AM on Saturday, June 6th, at which time, resolutions will be published, and instructions will be provided regarding how members may comment on resolutions electronically. Comments will be accepted until 5:00 PM on Friday, June 12th. Further details regarding conduct of a virtual Congress are available online.

Registration and all COD files will be available and updated as warranted:  
<http://www.nysafp.org/Member/Governance/Congress>

Write a resolution.  
Template and instructions available at [www.nysafp.org](http://www.nysafp.org)

## Degree of Fellow

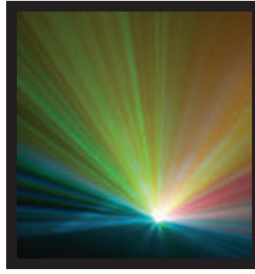
The Degree of Fellow recognizes AAFP members who have distinguished themselves among their colleagues, as well as in their communities, by their service to family medicine, by their advancement of health care to the American people, and by their professional development through medical education and research. Fellows of the AAFP are recognized as champions of family medicine. They are the physicians who make family medicine the premier specialty in service to their community and profession. From a personal perspective, being a Fellow signifies not only 'tenure' but one's additional work in your community, within organized medicine, within teaching, and a greater commitment to continuing professional development and/or research.

### Application Requirements

Any Active, Life or Inactive member, with dues and re-elections in good standing, may, upon application to the American Academy of Family Physicians, be elected to receive the Degree of Fellow upon fulfilling the following requirements:

1. Member must have held Active membership for six years, or held a combination of Resident and Active membership for a total of six years.
2. Accrue a grand total of 100 points as defined by this application. Cite experiences and activities in the following areas: Life-Long Learning, Practice Quality and Improvement, Volunteer Teaching, Public Service, Publishing and Research, and Service to the Specialty.
3. Submit a one-time fee of \$210. (Note: Credit card will be charged at the time the application is submitted. If the application is rejected, a full refund will be issued.)

<https://www.aafp.org/membership/involve/fellow.html>



**The NYSAFP recently lost a valued colleague and friend with the loss of Dr. Russell Perry in January. His colleagues shared the following memories of him during the 2020 Winter Weekend:**

Dr. Perry was an energetic bundle of spirit and light. He shared that light with all whom he worked and all the patients for whom he cared as a family physician.

Dr. Perry just pulls you in and inevitably inspires and teaches you. Sixteen years ago as a third year medical student while Dr. Perry taught me about treating Hepatitis C, and while I taught him power point, he also taught me about love and respect and caring for patients that much of society valued less due to their identity, their history or their illness.

The New York State Academy of Family Physicians has been very lucky to have Dr. Perry as one of our active members, leaders, Board members and Chair of our Education Commission. Our Executive Vice-President, President, President Elect, Vice President, and Past-President have been thinking of Dr. Perry and his family. We are all so grateful for his service to the Academy. They said “Russ is such a wonderful person and great friend.” And “Russ has been a wonderful colleague, well-respected peer and an energetic family physician.” And send much more love and thoughts to you at this difficult time.

My own husband, Dr. James Mumford served as Program Director at the Bronx Lebanon Hospital Family Medicine Residency Program while Dr. Perry served as the Medical Director of the Residency Clinic for nearly 7 years. He has countless warm memories of times with Dr. Perry but he says none capture him better than all the students and residents he has seen inspired by Dr. Perry through his infectious passion and enthusiasm for family medicine. Clinically he leaves medicine a better place having been on the forefront of the care of HIV and Hepatitis C treatment and teaching such to generations of physicians to follow. You and Dr. Perry will remain in our thoughts.

*Thank you,*  
– Sarah & James

For my colleague, mentor, sometime co-author, often mischievous instigator, and friend- with a sharp intellect who showed me, alongside me in clinic, how to guide patients, staff, students, residents and friends- whose diamond-like mind could serve as a beacon for those suffering from or alongside dementia diagnoses.  
– Lisa Morrow, DNP, FNP, LAc

I was fortunate to serve on several commissions and on the NYSAFP Board of Directors with Russ for a number of years. He always offered good insights, thoughtful advice and a unique perspective in discussions. Russ was chair of the Education Commission and provided for ample open conversations. He made himself available, listened and was will to challenge closed points of view. He will be very missed by the Academy. – *Mark Josefski, MD*

I knew Russ through the NYSAFP and often sat next to him during meetings. What an amazing advocate for his patients and our state!  
– *Heather Palladine, MD*

I also knew Russ through the NYSAFP. He was a devoted family doc to both his patients and students. He cared about both and brought many new faces to the Academy. He will be missed by all.  
– *Barbara Keber, MD*

I served as chair of the Membership Commission and was Speaker of the COD. Russ has served on the commission and he also was chair of a reference committee. He was very helpful to me in offering insight and help in getting our work done. He was a kind person. I will miss him. – *Andrew Symons, MD*

I remember Russ’ enthusiasm for teaching, especially with Hepatitis and seeing him at the state meetings always talking rapidly about the latest in how important this was for family docs. I really remember him scribbling notes furiously during our board meetings, always taking his role seriously. He was a great colleague and somebody I will sincerely miss. – *Jason Matuszak, MD*

Russ and I joined the NYSAFP Board together. What a pleasure it was to work with him! He was always thoughtful and expressed himself in a caring way. I will miss him. – *Wayne Strouse, MD*

I know Russ as a kind, enthusiastic physician who was a pleasure to work with. He was a true advocate for patients. I am privileged to know him and have worked with him. I will miss him. – *Ray Ebarb, MD*



**Thank you – thank you very much!**

A big thank you to Dr. Robert Bobrow, who retired from the Family Doctor Editorial Review Board with the publication of our winter issue. Dr. Bobrow served the journal well since its inception in 2012 and his leadership and experience have contributed greatly to the growth and success of Family Doctor. We wish you many happy edits to come!



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- Support of family medicine residency & fellowship training programs
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- Hosting of relevant and interactive CME workshops
- Hosting of ALSO instructor and provider courses
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- Timely access to current events of Academy via social media (NYSAFP Facebook | NYSAFP Twitter)

#### Maximizing the Values of our Dues

- Sponsorship of students and residents to Academy meetings (Winter Weekend, Regional Family Medicine) and the Congress of Delegates
- Cultivation of the next generation of family physicians by offering scholarships and awards to pre-medical students, medical students, and residents to participate in family medicine conferences and programs
- Support of residents and new physicians in development of leadership skills and practice opportunities

#### AAFP Member Services: <http://www.aafp.org/online/en/home/membership/resources.html>

- A list of the AAFP professional resources
- A list of the AAFP "Member Advantage"
- Additional Partnerships: <http://www.nysafp.org/index/resources-6/partner-programs-106.html>
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