New Insights into Preventing Diabetic Foot Disease: Part 2

Here are some new solutions to these challenges, along with updated guidelines.

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Author’s Note: This is part 2 of a 2-part article (part 1 appeared in November ’17). Part 1 dealt with the challenges of preventing diabetic foot disease; part 2 focuses on the solutions, culminating in updated guidelines.

The Wisdom of Dr. Brand

To start our discussion offering solutions to the hurdles that need to be overcome while traversing this muddled and enormously rocky pathway to prevention of foot problems in the person with diabetes, let’s recount some of the wisdom of Dr. Paul Brand (Figure 1), who dedicated his life to research and treatment of the neuropathic and insensitive hand and foot in diabetes and leprosy. He was a pioneer in the psychology, techniques and treatment regimens we use today to deal with the problems associated with these conditions. Dr. Brand offers some very convincing discourse illuminating the psychological makeup that influences non-compliant and non-adherent behavior.

He describes people coming to his leprosy clinic in India who were running barefoot with deep, infected and open ulcers on the bottom of their feet, throwing their crutches away, merely to have a chance at being seen and treated by the visiting medical practitioners, who came to their village only very rarely. Dr. Brand describes their running so hard and for such a distance that their tibia became disconnected from their foot, which became entrenched with the gravel from the surface they were running on, as if they were not aware and did not care about their diseased foot. They were not and they did not—but that’s only the surface of the story!

In diabetes and in leprosy, people lose their instruments of sensation and therefore its connections to the brain. If nothing comes from the brain, the brain shuts down. Our life is in the brain and our brain is informed by our senses. We are flooded with information from the senses all the time; and according to Dr. Brand, this is the pillar of life, without which life becomes meaningless. We are therefore dependent entirely on our senses. Because life is in the brain and not in the hands or feet, if we are not informed of something through our senses, to us that thing does not exist. Accordingly, if we do not feel our feet because of this insensate problem, those feet do not exist in our minds, and then we do not bother to take care of them. This is the crux of the reason, according to Dr. Brand, that the diabetic patient with loss of sensation appears non-compliant and non-adherent.

Further, touch is our most important validating sense, the sense that ensures us that things are real. We learn to trust our eyes only when we validate what we see with other senses, especially with touch. What we trust more than anything else is touch, because touch means you have made contact with that something. Touch makes it real, and therefore, according to experts, is more fundamental than sight.

Consequently, if we see something, but cannot validate that, we feel deceived; and once we are deceived our life changes. Hence the non-compliant and non-adherent be-

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behavior ascribed to the person who has diabetes with a threshold loss of sensation.

In amputations people trust their phantom feeling and body image more than they trust what they see. The most profound deception in the world is when this touch is deceived.

Those who have diabetes with peripheral neuropathy and a fully-developed insensitive foot are actually experiencing what providers for patients that suffer from insensitive feet call reverse phantom syndrome. That person does have a foot; but there is no body image, as expressed through touch, that confirms and reinforces that. They admit they have a useful instrument to walk on but it doesn’t feel like the feet are actually part of them.

It is interesting to note that when asked to draw themselves, people with insensitive feet will invariably draw themselves without a foot. In fact, there are research studies as described by Dr. Brand1 that demonstrate that rats who do not have sensation in their feet will eat them, as they would any other extraneous piece of meat.

Another root of non-compliant

trained in the management of the insensitive patient, sees how this person treats their own feet, they then would look askance at this person with disdain, as being complacent, ignorant and uncaring about their life and limb. Dr. Brand speaks of the person who suffers from a limb-threatening foot ulcer to which the healthcare professional has painstakingly applied a series of plaster casts for offloading. When the wound is finally and totally healed, the professional instructs the patient, in no uncertain terms, stressing time and

part of their body, especially the limbs, is real to them; and the body, then, naturally becomes the center of their perception of themselves, and therefore factors into every decision that is made regarding their health.

Therefore, the heart of the compliance and adherence issues with the insensitive person, according to Dr. Brand, is that they do not regard their perceived-to-be-disgusting foot as actually being part of themselves. He states emphatically that the health care provider for these patients has the power to reverse the course of this unhealthful, self-destructive pathological pattern, and is indeed obligated to do so.

Dr. Brand puts forward a solution pathway. In addition to all the good medical attention that is expected from any healthcare provider who’s committed to quality care, such as appropriate education and counseling, encouraging optimum medical care, good shoes and inserts, healthful diet, blood sugar control, exercise, etc., this healthcare professional must focus on his and the patient’s attitude and perceptions. The most salient feature of the doctor-patient relationship must be that the doctor needs to tune in to the mind of the patient. Doing this requires showing absolute respect for the patient, and being able to demonstrate that in a rather vociferous way. He advocates the provider making it obvious that he knows how good the foot still is, even though the patient

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non-adherent behavior in the person with insensitive limbs, according to Dr. Brand, stems from when they’re adversely affected by the negative regard with which they perceive other people treating them. The insensitive person senses disgust in other’s faces when these people look at their ulcerated feet; and subsequently this makes the insensitive person feel that they’re offensive in some way. People then become ashamed of their ulcerated feet, even after the wounds have healed, not only because of the factors previously discussed surrounding loss of sensation, but also for the reason that they feel that other-time again the absolute importance of wearing appropriate properly-fitting shoes—and avoiding going barefoot lest they get another ulcer and put themselves at risk for possible loss of limb. He custom-makes expensive prescription shoes for them and conscientiously educates them on their use as well as any other preventive measures. All this, only to bump in to them on the street, and see them wearing tight, pointed or high-heeled shoes.

With his characteristic intuitive instincts, Dr. Brand encourages the healthcare professional to look at this person from another point of view.

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doesn’t think so. It is important to show that there is still a healthy part of the foot, and that this part is precious and wonderful.

He recommends the provider never examining the foot without finding something to praise and showing appreciation for, telling his patients things such as: “Look at how your wound is healing and how wonderful it is that your body has the power to do that.” He advocates that the provider demonstrates to the patient that the foot is real by touching it and pointing out things such as—even though they may have lost some nerves—it still has blood vessels that provide the ability to heal. Show them the healing cells and emphasize that the body is working well in order to produce them. All this while pointing out that it’s still a good functional foot and that it will last for years to come.

One major point Dr. Brand emphasizes is that people who are healing need to feel that they’re not alone in their disease, that someone is in on this mission with them and cares about the outcome as if they were close family (Figure 2). That is exactly why, as research shows, people with a close family structure and support do much better in the healing arena.2

Dietary and Nutritional Recommendations

In addition to the aforementioned issues, it is vitally important to discuss updated dietary and nutritional recommendations. The American Diabetes Association has replaced its nutrition therapy recommendations published in 2008 with newer ones published in 2013.3 It calls for all adults diagnosed with diabetes to eat a variety of nutrient-dense foods. It is advised that these be consumed in appropriate portions and can be consistent with a person’s cultural, traditional and personal preferences and metabolic goals. The rationale is that a person is more likely to be nutritionally more compliant if his/her overall dietary construct is consistent with previous customs, patterns and religious beliefs.

Further updated recommendations for people with diabetes include:

1) Carbohydrates should come from vegetables, whole grains, fruits, legumes and dairy products and should not be in the form of a processed sugar, but be accompanied by its native fiber, which improves its metabolic processing.

2) Fat quality is more important than quantity. Selecting monounsaturated and polyunsaturated fats, while avoiding trans fats and saturated fats is critical to nutritional success. Please note that individuals working to manage their weight should, however, still eat even healthy fats in moderation.

3) Avoidance or limitation of any added sugars and syrups to foods and beverages, sugar-sweet-
Recent data elucidates the pathways in which hyperglycemia induces the functional and morphologic changes that describe diabetic complications.

The salient outcome of this research is that a single unifying mechanism of action responsible for the damage involved in all diabetic complications, including diabetic foot disease, has been identified. It is through preventing the activation of these three pathways that we can halt the injury to tissues and therefore the complications of diabetes mellitus. Pharmacological research is developing inhibitors to these reactions, but also one must consider the fundamental importance of any lifestyle change that will allow the body to circumvent these pathways, such as dietary and nutritional compliance, stress management, development of healthy sleep patterns, acquiring a suitable and consistent exercise regime, among a host of other possible healthful solutions.

In patients with insulin-dependent diabetes mellitus (IDDM)
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**THE DIABETIC FOOT**

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closely related relevant finding from this research clearly indicates that intensive insulin treatment effectively delays the onset and slows the progression of long-term diabetic complications, including those which are associated with diabetic foot disease. It can be concluded therefore that, along with lifestyle improvements, in persons with insulin dependent diabetes that tight glycemic control has been found to be the most effective way of preventing or decreasing these pathologic consequences.

Any discussion of diabetic foot disease would have to include recognition and acknowledgment of the proximate cause of any lower extremity amputation. The subject of prevention should incorporate prevention of diabetes itself, then consider prevention of any complication, especially in the light of the information brought out in this paper, that all sequelae of diabetes have a unifying mechanism of etiology, and then address prevention of foot disease itself. Prevention strategies should be incorporated at any and every step along the progression pathway. In any event, the immutable question is: “Are we in touch with the proximate cause of the foot disease or amputation?” For instance, if a person has sensory neuropathy, are we dealing with the psychological component of losing our validating sense, as written extensively by Dr. Paul Brand? He stated that we tend to disown and neglect parts of the

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**FIGURE 3:**

**Unifying Factors Causing Damage to Tissues in Diabetes**

- **Diabetes**
  - **Hyperglycemia**
    - **Increased ROS**
      - **P. Kinase C**
      - **Increased A.G.E.**
      - **Increased A.R. Pathway**

*REHM 2017*

Figure 3: Demonstration of the unifying factors causing damage to tissue in diabetes
Medical and Nutritional  
in Diabetes

Updated Guidelines for Foot Care

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body we can’t feel. If this were the case, wouldn’t the disregard for that injured part, which is neuropathic, be the would-be cause of an amputation? If a person has a hammertoe deformity caused by motor neuropathy, does he need loss of sensation to develop a blister there from new shoes, perhaps? If dry, cracked skin that results in part from autonomic neuropathy, becomes infected, is it not the immunopathy and consequent infection that becomes the proximate cause of the amputation? A keen sense of diagnostic intuition comes from the familiar obligation of “when you hear hoof beats think not only of horses but zebras as well.” This was the mantra of Dr. Philip Gardner, a distinguished professor at California College of Podiatric Medicine, who in the early years of podiatry consistently preached that to his students.

In summary, many additional avenues of preventive measures and considerations were brought forth in this discussion of staving off foot disease in the person with diabetes. This paper was not a proposal to abandon the traditional recommendations for foot care in the person with diabetes, but a recommendation to expand it. Considering the breadth and depth of topics presented, it is obligatory for the sake of completeness to organize these ideas in a format that would be a usable stratum. Hence, it would be prudent to extrapolate from this treatise a new set of guidelines that could serve as a fresh approach to the prevention of diabetic foot disease.

Updated Guidelines for Foot Care in Diabetes

This algorithmic list highlights the elements of intervention that have been demonstrated to be essential for prevention of foot disease in diabetes:

- **Medical History:** the patient should become intimately familiar with family medical history and risk factors. The old adage is truly applicable in being a healthy person who wants to prevent the onset of diabetes or in controlling the disease. It is part of any weight control program and is essential for improving circulation to the whole body or strength-training program. Do not forget the importance of overall strength to optimize the mechanics of gait or when one is confined to a wheelchair or the bed, so common in the life of people with diabetes. Imagine all the ulcerations on the sacrum, the heel and wheelchair scrapes that would be avoided. Exercise needs to be consistent and directed to be efficient. Exercising the foot alone plays an important role in mobilizing waste products, managing the process of nonenzymatic glycosylation, maintaining soft tissues mobile and pliant, and increasing circulation to the feet.

- **Biomechanical Stability:** paying attention to the mechanical stability of the foot, how it relates to overall balance and the effect it has on the whole kinetic chain is fundamental to preventing foot disease in the person with diabetes. Remember that the foot is attached to the rest of the body, and to make the recommendation of appropriate shoes and inserts for patient with diabetes more meaningful, one has to consider the whole person.

- **Keep Yourself in Check…Keep your Feet in Check:** when patients visit their primary care physician for that proactive checkup, they need to always make sure that their foot health is discussed, their feet are examined and they are prepared with any thoughts and questions. The status of their circulation and whether there is neuropathy present should always be addressed. Referral to a podiatrist for regular foot exams and inspecting one’s own feet every day has a critical impact on foot health in the person with diabetes. Patients must make certain that they create time in their schedule to care for their diabetes…and their feet.

- **Skin and Nail Health:** Problems in the feet often start with the onset of various diseases on the skin, such as fungus conditions and xerosis, both of which are niduses for diabetes:

Exercise has been shown to lower HgA1C’s and play an essential role in being a healthy person who wants to prevent the onset of diabetes or in controlling the disease.

**Exercise:** exercise is essential to foot health in the person with diabetes. Exercise has been shown to lower HgA1C’s and play an essential role in being a healthy person who wants to prevent the onset of diabetes or in controlling the disease. It's important for patients to be proactive with their health and be aware of even the subtle dietary considerations that negatively affect the diabetic condition.

**Medical and Nutritional Health:** healthiness in general lends the body support and strength to deal with diabetes and all its complications. It’s important for patients to be proactive with their health and be aware of even the subtle dietary considerations that negatively affect the diabetic condition.

**Education:** the patient needs to educate him/herself from reliable sources so that his/her future behavior and choices are based on sound information and not on hearsay or unfounded information.

**Mental, Psychological and Emotional Fitness:** the patient must accept and reframe the diagnosis of diabetes so that perspective is gained and self-esteem is maintained. S/he should know that s/he is not a “diabetic” but rather a person who has diabetes. This powerful paradigm shift gives the person the mental power to develop a preventative strategy: after all, *if you think you don’t matter, then you think it doesn’t matter.*

**Exercise has been shown to lower HgA1C’s and play an essential role in being a healthy person who wants to prevent the onset of diabetes or in controlling the disease.*
Diabetes care can be intense, and proper care can be expensive. The ability to have quality care can make a difference when it comes to saving “life and limb”.

In conclusion, this article is the culmination of my personal journey, searching for the unifying mechanisms directed at prevention of diabetic foot disease. It’s the outcome of over 40 years of treating patients with diabetes; and identifying the circumstances that cause the catastrophic, traumatic and destructive complications of this syndrome. There isn’t a day that goes by that I don’t struggle to uncover the reasons why the devastating problems I see as a result of diabetes are not being prevented. I can point the finger at the system, the primary care physicians, my fellow podiatrists, or the patient. However, the answer lies not in blaming any one entity in particular but in coordinating and navigating care in such a way that each ingredient required is working in sync with the others, engaging in a coordinated harmonious balance, such that the fine art of prevention can prevail. This article is an attempt to lend insight, clarity and possibly some simplicity to this overwhelming task at hand and advance a proactive strategy that works. PM