Diet causes acne. No it doesn’t! But that is what the media will say when they get wind of this report.” In a commentary published in the Journal of the American Academy of Dermatology (2008;58:794-5), Guy F. Webster, M.D., Ph.D., clinical professor of dermatology at Jefferson Medical College, articulated a controversy surrounding the role of diet in acne vulgaris that’s as lively as ever, three years later. While Dr. Webster was responding to publication of a specific study linking milk consumption and acne in teenaged boys, the current discussion extends to a range of other potential dietary culprits, including foods with a high glycemic index and chocolate.

While chocolate, fats, and sweets were suspected of aggravating acne as early as the 1930s, two studies published in 1969 and 1971 cast doubt on a link between diet and acne, and diet as a significant factor was relegated to myth status for several decades. In a comprehensive examination of the evidence linking diet and acne, published in JAAD (2010;63:124-41), authors Whitney Bowe, M.D., Smita S. Joshi, M.D., and Alan R. Shalita, M.D., noted that despite weakness in the studies’ design, “textbooks were revised to reflect this new academic consensus, and dermatologists took the stance that any mumblings about the association between diet and acne were unscientific.”
Beginning in 2005, a series of studies linking consumption of dairy products with acne jumpstarted the controversy and drew some dermatologists — even those who found the studies seriously flawed — to reconsider the role of diet. “We’re learning more about hormonal influences and other factors, so I think it’s worth taking a second look,” said Diane Thiboutot, M.D., professor of dermatology at Penn State University College of Medicine. “At this point I’d have to say there’s not sufficient evidence [pointing to a significant role for diet]. Hopefully, as we move forward, we’ll have more data to be able to evaluate whether there is an association.”

The quality of the evidence goes to the heart of the disagreement between those who are convinced of a link between diet and acne and those who are not. Many dermatologists, including Dr. Webster, admit that existing studies suggest an association, but they insist that without data from more rigorous, controlled studies, the link remains hypothetical. “We’ve got to remember that everything we tell a patient has a consequence,” he said. “The advice you give a patient should be based on real facts, not hypothesis. And we don’t have data that strong yet.”

THE CASE AGAINST MILK
A co-author of several studies examining the relationship between dairy products and acne stands by his findings and vigorously recommends a dairy-free and low glycemic load (LGL) diet for teenagers and adults with acne. “In patients who have no genetic background for acne, dairy plays no role whatsoever. It will not give them acne,” said William Danby, M.D., adjunct assistant professor of surgery, division of dermatology, at Dartmouth Medical School. “But for those who have a propensity for acne and are susceptible to the effects of dairy, it can make their acne much worse.”

Working with researchers at the Harvard School of Public Health, Dr. Danby examined data from the Nurses Health Study II, in which 47,355 women provided information about their high school diet and whether they had physician-diagnosed severe teenage acne. The acne question was included in the first survey in 1989, when the participants were aged 25 to 42. In 1998, members of the cohort were asked if they would be willing to complete a high school food-frequency questionnaire. The reported prevalence of severe acne according to the intake of total milk was statistically significant; it ranged from 0.06 for one or fewer servings per week to 0.08 for more than three servings per day. Thus, acne was positively associated with the reported quantity of milk ingested, particularly skim milk.

Published in JAAD (2005;52(2):207-14), the study has drawn criticism for its methodology but has also served to refocus attention on dairy and acne. “There have been several studies now that have shown a consistent relationship between dairy and acne. Although this effect cannot be ignored, the effect of dairy on acne appears to be incremental,” said Dr. Bowe, who is assistant clinical professor of dermatology at SUNY Downstate College of Medicine. Other weaknesses cited by Dr. Bowe and her co-authors include the study’s retrospective design, and the fact that the women were asked to recall their milk consumption in the distant past.

Dr. Danby emphasized that his group included two Harvard statisticians who work in public health. “The questionnaires have all been validated over the years, this is standard evidence,” he said. “Regarding the numbers, the people who drank two glasses of skim milk per day had a 1.44 risk, or a 44 percent increase. At one end of the spectrum you’d have the people who don’t have the genes for developing acne — they’d be at zero — and at the other end would be people who are at three to five times the risk, but the mean is .44. I worry about those at the top end who have the acne genes and the high dairy load.”

Dr. Danby theorizes that steroid hormones and other components of bovine milk precipitate a complex cascade that acts to overstimulate the pilosebaceous unit. Dr. Webster maintained that this explanation remains a “tantalizing hypothesis” until a controlled study is conducted that assesses the effects of a dairy-free diet on teenagers at risk for acne. “Their study has strong enough evidence to say that there’s an effect of diet on acne, but no study has confirmed any mechanism,” Dr. Webster said.

HIGH GLYCEMIC LOAD DIET
The strongest evidence points to a high glycemic load (HGL) diet as a significant factor in acne, Dr. Bowe said. “It began when a group of scientists looked at two

We can’t look our patients in the eye and say with certainty, ‘your diet has no effect on your acne.’
hunter-gatherer societies that consumed low glycemic load diets — vegetables, nuts, proteins. No white bread, white potatoes, cookies, cereals — none of the foods most likely to spike blood glucose levels.” The group’s first published study on this topic, which dubbed acne a “disease of Western civilization,” appeared in the *Archives of Dermatology* (2002;138(12):1584-90). Their observations of 1,200 Kitavan Islanders of Papua New Guinea and 115 Aché hunter-gatherers of Paraguay (including a total of 315 subjects aged 15-25) revealed no cases of acne. “The lead author, Loren Cordain, developed some interesting theories that were very convincing, based on the basic science,” Dr. Bowe said. “The thinking is that if you have a diet with a high glycemic index, then diet-induced hyperinsulinemia leads to a cascade of endocrine response that includes male hormones, androgen, growth hormones, insulin-like growth factor-1, and the end of that cascade leads to plugging of follicles and actually increases secretion of the sebaceous glands.” (See sidebar for more on the glyemic index.)

In the comprehensive *JAAD* article, Dr. Bowe and her co-authors noted that Dr. Cordain’s evidence might be stronger if the acne-free subjects had been given a high glycemic load (HGL) diet and had subsequently developed acne. She cites a study by a group of Australian scientists, published in *JAAD* (2007;57(2):247-56), as providing the best evidence of dietary impact on acne. “This was a well-designed, randomized controlled trial that showed a significant reduction in acne in subjects who basically cut the high glycemic index foods out of their diet,” Dr. Bowe said. “They were able to measure blood levels of IGF and free androgen as well as insulin sensitivity, and found that patients on the LGL diet became more sensitive to insulin, had less free androgen and less IGF. And that group has done several studies since then that have only bolstered their argument.” One limitation of the 2007 study, noted by the authors and by Dr. Bowe, was that the subjects on the LGL diet lost weight and decreased their body mass index (BMI), and the effects of diet and weight loss could not be separated. When the investigators statistically adjusted the data for changes in BMI, the effect of the LGL diet on several clinical parameters was lost. In addition, the subjects were all male, and the results could not be generalized to female adolescents.

Drs. Webster and Thiboutot also singled out the Australian study as the strongest evidence to date that diet can affect acne, but both warned against jumping to conclusions. “The study was very encouraging, but it was done with a small number of patients,” said Dr. Thiboutot. “I think more research is needed, and hopefully there are more studies underway that will

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**GLYCEMIC INDEX**

The glycemic index (GI) ranks the potential of different foods to increase blood glucose levels. The glycemic load takes into account both the quality and quantity of carbohydrates, and is calculated by multiplying the GI of a food by the amount of carbohydrate in grams provided by that food and dividing the total by 100. Dietary glycemic load is the sum of the glycemic loads for all foods consumed in the diet. Low GI foods include peanuts, low-fat yogurt, apples, kidney beans, and most vegetables. High GI foods include white bread, white potatoes, water-melon, doughnuts, and dates.
put this in perspective. A lot of this data is theoretical linkages and possible associations, but not really a cause and effect.” Dr. Webster noted that a low-carbohydrate, high-protein diet is expensive and could impose a burden on low-income patients. “They’ve shown there’s a signal between diet and acne, so then you’ve got to do a study that lets you say how important it is,” he said. “The reason is that you don’t want to give your patients ridiculous recommendations, or recommendations that cost them money and don’t do anything.”

CHOCOLATE COMES FULL CIRCLE
Once a prime suspect in the hunt for a dietary villain, chocolate has again come under scrutiny by researchers at the University of Miami Miller School of Medicine. “Patients often swear that chocolate causes their acne. The notion that chocolate and acne are not related is based on previous studies which did not assess the effect of pure chocolate on acne. That had never been done,” said Samantha Block, a third-year medical student working on a team headed by Brian Berman, M.D., Ph.D., professor of dermatology and cutaneous surgery. “Dr. Berman and the other team members felt strongly that we needed to reassess the effect of 100 percent cocoa on acne.” The study team also included Whitney Valins, M.D., Caroline Caperton, M.D., Martha Viera, M.D., and Sadegh Amini, M.D.

The team recruited 10 healthy male subjects, aged 13 to 35, with one to four acneiform lesions. The subjects were not using any prescription or over-the-counter medications. “We had them binge on chocolate that was 100 percent, unsweetened cocoa in a single sitting,” Block said. The researchers counted the number of acneiform lesions on day four and day seven following the chocolate consumption. Their results, presented in poster form at the American Academy of Dermatology’s 2011 Annual Meeting, showed a statistically significant increase in the mean number of total lesions and a dose-dependent relationship between the amount of chocolate consumed and the number of lesions on days four and seven.

An audience member at the AAD presentation noted that microcomedo formation is thought to occur over six to eight weeks, and questioned how the chocolate could have impacted formation so quickly. Dr. Berman replied that the subjects may have had microscopic microcomedones at baseline, and the chocolate may have hastened their development.

“That is something that will have to be investigated, of course,” Block said. “We’re now recruiting patients for a follow-up study to assess chocolate and acne in a double-blind, placebo-controlled manner with more subjects. We recognize that the number of subjects was one limitation of our first study.”

WHAT TO TELL PATIENTS
The controversy surrounding the possible milk-acne connection has led Dr. Thiboutot to pursue her own investigation because she is unconvinced by the existing epidemiologic studies. “We’re working with nutritionists at our medical center to sort of get a feel for the amount of dairy products that patients with acne are consuming, compared to patients without acne,” she said. “At this point, I haven’t altered my practice to make recommendations regarding diet. There may be an association, but I just don’t think we have enough evidence to support the recommendation that all patients with acne need to be on modified diets.”

Although he said he is thoroughly convinced that both dairy and an HGL diet adversely affect acne, Dr. Danby doesn’t rely on diet modification as standalone therapy. “Patients with acne want to get better. Depending on what degree of activity they have, I will start off with something as light as topical tretinoin,” he said. “Though if I had my way, every patient who comes in would immediately go on isotretinoin and at the same time go on a low glycemic load, zero dairy diet. I’ve had patients who have done that and looked wonderful.”

Dr. Bowe is in the early stages of investigating antioxidants (from both nutritional and topical sources) and probiotics as potential acne-fighting agents. She noted that there are patients who request “more of a natural approach to their acne; they don’t want all the prescriptions and chemicals. You can recommend that maybe they start by cutting out those high glycemic foods, and give them a list. And if a teenager is chugging milk, you can say this might have an influence. But we have to be responsible, and if we’re going to encourage patients to try these dietary modifications, we also have to provide information regarding supplementation of calcium and vitamin D. The most conservative takeaway message is that we can’t look our patients in the eye and say with certainty, ‘your diet has no effect on your acne.’”