

Pantothenic acid in the treatment of acne vulgaris - a patient's perspective

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Abstract

This article describes the author's personal experience with a moderate but chronic case of acne vulgaris and its many treatments over a 43 year period. The eventual remission of this condition, attributed to relatively high doses of pantothenic acid (vitamin B₅) over a three year period, is discussed, along with a theoretical basis for this response. A proposal is also made that the work of Dr. Lit-Hung Leung, reported during the years 1995 -1997, be re-evaluated as a possible new approach in the understanding and treatment of acne vulgaris.

Introduction

In the year 1995, three articles published in two different medical journals established valuable new insights into the understanding of acne vulgaris. The first was written by Dr. John Koo, MD, and was published in the Journal of the American Academy of Dermatology. Its title was *The psychosocial impact of acne: Patients' perceptions*¹. This article documented in accurate detail the physical, social, and emotional misery suffered by many acne patients.

The second 1995 article was also published in the Journal of the American Academy of Dermatology. It was written by Dr. James J. Leyden, MD, and was titled *New understandings of the pathogenesis of acne*². This comprehensive article documented the current thinking regarding the pathophysiologic factors influencing the development of acne. While providing a firm foundation for further research, the author concluded that "a great deal remains unknown" and "although the acute aspects of inflammation in acne are well researched, knowledge regarding its chronic aspects is nevertheless primitive".

The third 1995 article was published in the journal Medical Hypotheses. It was written by Dr. Lit-Hung Leung who was working at the time in the Department of General Surgery, Hong Kong Central Hospital, China. Although the article was titled *Pantothenic acid as a weight-reducing agent: Fasting without hunger, weakness and ketosis*³, this research would lead to a potential breakthrough in the understanding of acne vulgaris. During his study, Dr. Leung had noticed the completely unexpected result that many of the patients who were also affected by acne were experiencing a marked reduction in sebum secretion and an overall improvement in the condition of their acne.

One month after publishing the initial article described above, Dr. Leung followed with a second article in the same journal titled *Pantothenic acid deficiency as the pathogenesis of acne vulgaris*⁴. This article was followed in 1997 by a third report by Dr. Leung in the Journal of Orthomolecular Medicine titled *A Stone that Kills two Birds: How Pantothenic Acid Unveils the Mysteries of Acne Vulgaris and Obesity*⁵. The remainder of this discussion centers on this third article by Dr. Leung.

Case History

This author's experience with acne began in the adolescent years, at about the age of 17. While this particular condition was considered to be a common, moderate case of acne, it was unusual in the fact that it remained chronic and persistent over a 40 year period. It was also notable that this condition was characterized by a high level of sebum production on the face, which continued at a very steady rate. This was accompanied by a general inflammation of the facial area, with new acne lesions being

generated on a daily basis. The pores of the skin were also commonly found to contain what appeared to be solidified plugs of sebum. While this situation did not provide the most desirable conditions under which to live one's life, it did provide a uniquely stable platform for the testing of acne treatments.

During this period, treatment was obtained from three successive dermatologists, and treatments included both traditional therapies and alternative therapies. The traditional therapies involved the use of medications such as tetracycline, Retin-A, Differin, Clinac-OC, and various cleansing soaps. The alternative therapies involved the use of a product called Acne-Statin, various restrictive diets, meditation to reduce stress, etc. None of these approaches provided any significant, longlasting relief.

In 1987, the medication Accutane (isotretinoin) was prescribed. While the previous acne treatments had been primarily directed at treating the symptoms of acne, Accutane appeared to attack the root cause of the problem, which seemed to be excess sebum production. The initial dosage was 40 mg taken every other day. Within a short period, significant reductions in sebum production were seen to occur, and at the same time the acne proceeded into remission. The Accutane appeared to be a true miracle drug. The only apparent drawback to the Accutane treatment was its cyclic, sine-wave effect on sebum production. This delivered a skin condition that was usually either too dry or too oily, depending on the time since the last dosage.

The Accutane treatment was continued for the next 18 years, at a steadily decreasing dosage, until it reached 40 mg every ten days. The Accutane dosage was being decreased for several reasons. The primary reason was that the acne severity seemed to be subsiding over time, requiring smaller and smaller dosages. But another concern was the potential side effects of Accutane, which were reported to include sunlight sensitivity, fetal deformities in pregnant women, depression, suicide, and Crohn's disease, among others. Access to Accutane was also becoming more difficult, due to

new FDA restrictions on the use of this drug, and its perceived risks.

In mid-2006, although the acne had been brought under reasonable control, the significant amount of sebum production on the face, on a daily, unrelenting basis, had become significantly distressing. This condition produced the incentive for a personal review of the medical literature on this subject, which ultimately led to a reading of Dr. Lit-Hung Leung's 1997 article describing an expanded hypothesis for the beneficial effect of pantothenic acid in the treatment of acne. Further investigation also revealed that in the years since 1997, several companies had begun producing vitamin B₅ supplements specifically for the treatment of acne.

Vitamin B₅ therapy was started in July, 2006. For the first two weeks, there were no noticeable effects, and Accutane dosage was continued (40 milligrams every ten days) along with the vitamin B₅ (10 grams per day). During the third week, however, a significant change became apparent, and the Accutane was discontinued. The previously grainy skin texture, caused by solidified plugs of sebum embedded in the facial pores, was becoming noticeably smoother and softer. Significant sebum production was still present, but the continuous production of sebum plugs in the pores was beginning to taper off. It was also noticed that the viscosity of the sebum seemed to have increased.

During this period, there were mild, noticeable side effects, which included hunger pangs, along with a loose-stool condition that lasted for several weeks. The latter symptom was easily corrected by taking a standard dose of fiber supplement.

Over the next three months, the facial skin condition continued to show very slow but steady improvement, with occasional new acne lesions. It was not until the fourth month on vitamin B₅ that a significant reduction was noticed in the amount of facial sebum production. This occurred first on the cheeks, which for the first time in memory would stay dry to the touch for up to four hours. After about six months of treatment,

this improvement gradually migrated to include the nose and forehead.

The vitamin B₅ treatment continued for a period of four years, at an average dosage of 12 grams per day. Sporadic acne lesions were observed to reappear for the first several years, but these tapered off as treatment continued. By the end of the fourth year of treatment, although sebum production was still considered somewhat higher than normal, most evidence of acne had disappeared. Skin condition was extremely smooth and clear, enlarged pores had shrunk in size and were slowly healing, and sebum production had reduced to a very tolerable level.

It was at this stage that a suggestion was made to discontinue the vitamin B₅ therapy and observe the results. This was due in part to a desire to evaluate whether a spontaneous remission (possibly due to an age-related decline in androgen levels) had been a factor in the improvement in acne. The vitamin B₅ therapy was therefore discontinued in August of 2010. After three months, it was observed that the skin condition had remained relatively unchanged, but occasional, very minor acne lesions were beginning to appear for brief periods on the nose and neck areas. This correlates with Dr. Leung's observation in 1995 that "It was found that a maintenance dose was always required. This dose ranged from 1-5 g per day, and was usually proportional to the severity of the patient's previous acne conditions"⁴.

Another observation following this patient's discontinuation of vitamin B₅ was that energy levels seemed to decrease noticeably. This would seem to support the idea that pantothenic acid supports fatty acid metabolism, and thereby helps to convert these nutrients into useful energy.

Discussion

The basis behind Dr. Leung's theory on the pathogenesis of acne vulgaris is that "acne arises from a deficiency in fatty acid metabolism which in turn results from a deficiency in dietary pantothenic acid"⁴. He suggests that as fatty acid metabolism is reduced, excess lipids start to accumulate in

the sebaceous glands, sebum excretion is increased, and acne begins to appear. A thorough discussion of how this process may occur is presented in Dr. Leung's 1997 article.

From this patient's perspective, based on 40 years of observation, it does appear that the root cause of acne may be directly related to the over-production of sebum. This connection was reported in the 1995 article by Dr. Leyden, which stated that "The relation between acne and the overproduction of sebaceous gland lipids has long been acknowledged, as has been the correlation between the severity of acne and the amount of sebum secretion"². Dr. Leyden also notes in the same article the possible association between bacteria (*Propionibacterium acnes*) and the pathogenesis of acne.

It seems quite possible that the overproduction of sebum, in combination with plugged skin pores that interrupt the waste discharge process, may provide a rapid growth environment for the normally harmless *Propionibacterium acnes* bacteria, resulting in a significant population increase. This situation could be expected to lead to inflammation and infection.

At this point, it may be worthwhile to review how far acne research has progressed since the 1990s. While acne study and treatments have expanded significantly, the summary statement in Dr. Leyden's 1995 article that "a great deal remains unknown" still remains true. As reported in the 2009 article *Changing the face of acne therapy*⁶, topical retinoids are now used as one of the cornerstones of acne therapy and are recommended as first-line therapy for all but the most severe forms of acne. It is also noted that due to the increasingly antibiotic-resistant strains of *Propionibacterium acnes*, topical antibiotics should no longer be used as a stand-alone therapy. While interesting new treatments such as lasers and light therapy have also been introduced⁷, practitioners still seem constrained to treating the symptoms of acne rather than the elusive cause.

The September, 2010 issue of the *Journal of Investigative Dermatology* included a listing

of 600 abstracts from the 40th Annual Meeting of the European Society for Dermatological Research. These abstracts contained 118 mentions of the word “acne”, but not one reference to pantothenic acid. One may ask why, in the many years since Dr. Leung’s 1997 article, has no clinical research been conducted nor additional literature been published on the effects of pantothenic acid in the treatment of acne vulgaris. The following discussion will focus on some possible reasons behind this unfortunate situation.

1. Journal Article Reviews. The large amount of medical articles published in the wide range of medical journals available can present an information overload. This can make it difficult for reviewers to distinguish between the articles that are merely interesting from those that have significant potential impact. In addition, due to time constraints, practitioners may be limited to reviewing only select articles in premier journals dedicated to their specialty. This may explain why Dr. Leung’s research has escaped the attention of the majority of the American medical community.

2. Traditional Opinions Concerning Vitamins. The National Academy of Sciences has determined that the recommended dietary allowance of vitamin B₅ is less than 10 milligrams per day for 98 percent of the population⁸. The prevailing scientific viewpoint is that a balanced diet is the best source of nutrients, and that true deficiencies of most nutrients are unusual. There is also a belief that supplements can be harmful if taken in excess and can potentially upset the body’s balance⁹. This conventional thinking may result in a bias against any new therapy that proposes a thousand-fold increase in dietary vitamin intake.

Fortunately, it appears that these perceptions concerning vitamins may be slowly changing. For example, the Harvard Medical School is currently engaged in a government-funded study that will be recruiting 20,000 healthy older Americans to test whether taking 2,000 IUs of vitamin D will lower the risk of heart disease, stroke, or certain cancers¹⁰. The current recommended dietary allowance for vitamin

D, including both diet and supplements, is 600 IUs¹¹.

With regard to pantothenic acid, it seems plausible that at least a small segment of the population may have a deficiency in this nutrient. It is also reasonable to consider that since vitamin B₅ is a water-soluble vitamin, any excess not used by the body will be excreted. This latter point was addressed by the British Food Standards Agency (FSA) in 2002. The FSA commissions studies using independent scientific committees for the purpose of providing advice to the British public on the subject of nutrition. In a report titled *Review of Pantothenic Acid*¹², under the heading “Human Toxicity”, it is stated that “Pantothenic acid is generally considered as safe, even at extremely high doses, as excesses of the compound are mostly excreted in the urine, rather than being stored in the tissues”. The report also mentions that high doses of calcium pantothenate (10 grams per day for ten weeks) may cause “diarrhoea and gastrointestinal disturbances” and that these are typically the only side effects observed.

3. Funding for Research. The majority of funding for medical research originates from the pharmaceutical companies. These companies have a legitimate expectation to be financially compensated for the typically significant investments required to bring a new patented drug to market. However, in the case of non-patentable vitamins, there is little financial incentive for expensive research.

4. Human Nature. It is a generally accepted scientific principle that the preferred solution for any phenomenon is the one with the most economy and simplicity. However, it is also human nature to assume that complex problems require complex solutions. This mindset can conceivably cause simple solutions to be overlooked, especially when faced with such an intractable and complex problem as acne.

It is interesting to note that the current situation regarding Dr. Leung’s research involving pantothenic acid has several parallels in the fields of chemistry and engineering. For example, in 1938, Dr. Roy

Plunkett, working in the Dupont Jackson Laboratory in New Jersey, was experimenting with new refrigerants to be used as alternatives to the highly toxic sulphur dioxide and ammonia refrigerants previously used. He had stored 100 lbs of tetrafluoroethylene (TFE) gas in refrigerated cylinders prior to chlorination. When he and his assistant tried to withdraw some of the gas, the cylinder they were using appeared empty, although its weight had not changed.

As it turns out, the refrigerated gas had polymerized into a solid now referred to as PTFE. A lesser researcher may have simply discarded the cylinders and written this experiment off as a failure. However, Dr. Plunkett decided instead to investigate this totally unexpected result. His discovery would eventually come to be used in everything from clothing to gaskets to medical devices. It is commonly known today as Dupont Teflon^{®13}.

Another instructive experience involves a Russian mathematician, physicist, and engineer named Dr. Pyotr Ufimtsev who was working as chief scientist at the Moscow Institute of Radio Engineering in the 1960s. Dr. Ufimtsev had published a paper in Russian titled *Method of Edge Waves in the Physical Theory of Diffraction*. Dr. Ufimtsev would later remark that "Soviet designers were absolutely uninterested in my theories"¹⁴. The Russians were so unimpressed with Dr. Ufimtsev's work that they allowed it to be translated into English and distributed. In 1975, an exceptional mathematician and radar specialist named Denys Overholser, working for Lockheed, reviewed this dense technical paper and realized that he was looking at a truly unique advancement in radar technology. Dr. Ufimtsev's research was to become the basis for a breakthrough in the U.S. military's stealth aircraft program.

Summary

One might legitimately suggest that the acne remissions reported in the limited experiments described above were due to coincidence or the placebo effect. However, it is difficult to argue this line of reasoning in light of the fact that the results observed in Dr. Leung's original 1995 study were

numerous and totally unexpected. In this patient's experience, it would also be difficult to conclude, after 40 years of exposure to many acne treatments, that coincidence or the placebo effect would play a part in a remission that started exactly three weeks after initiating vitamin B₅ therapy.

The classic phrase "more research is needed" could not be more appropriate in this case. The next logical step would be a thorough clinical study, conducted by medical professionals, under today's strict standards for medical investigation. One could not ask for a more capable organization to move this research forward than the American medical community. From a patient's perspective, this could not happen soon enough.

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