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Manuscript received April 22, 2016; accepted for publication August 23, 2016.

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Successful Desensitization to Vitamin D in a Patient With Vitamin D Deficiency

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J Investig Allergol Clin Immunol 2016; Vol. 26(6): 392-393
doi: 10.18176/jiaci.0108

Key words: Colecalciferol hypersensitivity. Desensitization. Vitamin D deficiency.

Palabras clave: Hipersensibilidad a colecalciferol. Desensibilización. Deficiencia de vitamina D.

Vitamin D plays a key role in bone mineral density and bone turnover [1]. In addition to its relationship with bone metabolism, vitamin D is now recognized as an immunomodulator with marked effects on adaptive and innate immunity. Our knowledge of vitamin D deficiency is expanding to include evidence of its role in allergic diseases, such as asthma, allergic rhinitis, food allergy, atopic dermatitis, and urticaria [2]. Yip et al [3] provide a mechanistic explanation for the anti-inflammatory effects of vitamin D_3 on mast cell function.

However, the active metabolite of vitamin D (calcitriol) can cause allergic reactions. In 1999, Amandeep et al [4] reported hypersensitivity to calcitriol, the hormonally active metabolite of vitamin D. No other cases of desensitization with vitamin D have been reported.

A 52-year-old woman diagnosed with vitamin D deficiency experienced itching and hives on taking her first dose of colecalciferol. She was referred to our allergy clinic for evaluation of drug hypersensitivity. A skin test with the culprit drug was performed 4 weeks after the most recent reaction to minimize the likelihood of a false-negative result. The value of skin testing with vitamins has not been sufficiently demonstrated. We performed the skin test with dilutions of colecalciferol 1 mg/mL and intradermal testing with colecalciferol at a 1/100 concentration. The results of skin tests in 20 healthy controls were negative.

Given the negative skin test results with the culprit drug, an oral challenge test was performed by administering increasing doses of colecalciferol at 30-minute intervals starting with 1/10 of the total dose, followed by 1/4, and then the remainder of the dose. The total dose was 50 000 IU (300 drops, 15 mL).

Ten minutes after taking the last dose, the patient experienced urticaria, dyspnea, palpitations, and hypotension. As the reaction was considered to be anaphylaxis, she was immediately given 0.5 mg of epinephrine, 45 mg of pheniramine, and 40 mg of methylprednisolone. The reaction resolved within 2 hours. As no alternative treatment was available, a desensitization protocol with colecalciferol was planned. Written informed consent was

obtained from the patient. Desensitization was carried out in an intensive care setting with oral doses of colecalciferol that were increased according to the schedule presented in the Table. The desensitization protocol began with a 1-drop dose that was approximately equal to 1/300 of the total dose. The dose was increased at 30-minute intervals. Desensitization was completed successfully, and the patient was able to tolerate the full dose of colecalciferol.

Table. Colecalciferol Desensitization Protocol

Time	Dose[a]
08:30 AM	1 drop
09:00 AM	2 drops
09:30 AM	3 drops
10:00 AM	5 drops
10:30 AM	8 drops
11:00 AM	12 drops
11:30 AM	18 drops
Noon	27 drops
12:30 PM	40 drops
13:00 PM	60 drops
13:30 PM	124 drops

[a]1 cc=20 drops. The total dose was 15 cc (ie, 300 drops, 50 000 IU).

Desensitization should always be considered when no alternative drugs are available or when the clinical benefit is higher with the culprit drug than with an alternative drug [5]. In 1999, Amandeep et al [4] reported a case of hypersensitivity to intravenous and oral calcitriol, the active metabolite of vitamin D (colecalciferol). However, to date, no patients have been successfully desensitized to colecalciferol. The World Health Organization defined vitamin D deficiency as serum 25(OH)D <20 ng/mL (50 nmol/L) [6]. During the patient's evaluation, her vitamin D level was 15 ng/mL, which was compatible with vitamin D deficiency. She had a history of asthma with frequent attacks despite regular use of inhalers. 25(OH)D levels <30 ng mL are common in adult asthma and more pronounced in patients with severe and/or uncontrolled asthma [7]. The patient had experienced physical pain, and bone scintigraphy revealed multiple areas of osteogenic reaction. Since vitamin D deficiency has been implicated in osteoporotic diseases of the elderly [8], we thought that the patient would benefit from vitamin D therapy. As an alternative treatment was not recommended for vitamin D deficiency, a desensitization protocol with colecalciferol was performed. When 25(OH)D is <20 ng/mL, a booster dose is necessary to replenish body stocks. The most widely used schedule is to administer 50 000 IU/wk (or 7000 IU/d) of vitamin D for 6 to 8 weeks [9].

Desensitization was completed successfully, and the full dose of 50 000 IU (300 drops, 15 mL) of colecalciferol was administered.

The patient subsequently tolerated 50 000 IU and has continued to take 7000 IU every day for the last 6 weeks with no adverse reactions.

We report the first successful desensitization protocol for type 1 hypersensitivity reaction to colecalciferol and highlight the importance of desensitization in patients where no alternative therapies are available.

Funding

The authors declare that no funding was received for the present study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Manuscript received January 22, 2016; accepted for publication August 29, 2016.

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