



A Case of Vitamin D Toxicity



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Short communication

An eighty four year old Caucasian male started taking glucosamine for joint health two years previously. He failed to notice that the glucosamine tablets also contained large doses of cholecalciferol, a precursor of vitamin D. According to the label on the container, two tablets each having five times the recommended daily amount (RDA) were to be taken every day. This was in addition to the vitamin D taken in milk at breakfast, and that in half gram calcium tablets taken twice daily and also vitamin D in a multiple vitamin preparation. All together this added up to 6000 international units (IU) of the vitamin taken each day. The RDA for older people is 800 IU. So he was taking 7.5 times the RDA of vitamin D for over a year. When he discovered the overdose, he stopped taking vitamin D except for milk at breakfast.

Symptoms noted during vitamin D intoxication were mostly central nervous system effects (nervousness, insomnia, irritability, clumsiness) not uncommon in an eighty four year old man. These symptoms persisted for several months even after cessation of vitamin D overdose but gradually decreased in intensity. Submandibular pain also occurred but went away after correcting the overdose. Arthritis also occurred in the knee joints but this did not abate after cessation of the overdose. Reversible Parkinsonism is also seen in vitamin D intoxication. Some increase in tremor was evident in the patient during the overdose but the tremor gradually became less intense with increased time without the vitamin supplement.

The most serious symptoms occurred about two weeks after cessation of the overdose. A severe bradycardia (38 beats/min) was noted on several occasions at that time. A physician was consulted and did an EKG, a 24 hour Holter monitor and an echocardiogram to document the symptoms. A marked weakness of the heart beat was noted and dizziness was experienced. It took about ten days for the strength of the pulse to return and for the severe bradycardia to correct itself. Some cardiac arrhythmias were present even before the vitamin D overdose (heart block and premature ventricular contractions). These

were referred to as benign by a physician and did not change with vitamin D overdose except as mentioned above.

Vitamins are substances that cannot be produced in the body and must be taken in the diet. Since vitamin D can be formed in the body, it is not a true vitamin but is designated a “pro-hormone”. However, amounts produced in the body are generally not sufficient, and some vitamin D must also be taken in the diet. Pro-vitamin D compounds are lipid soluble sterols and can accumulate in body fat [1]. They are also slowly removed from the body. This is why symptom can persist long after the patient stops taking the vitamin D supplement. The pro-vitamin molecule formed by UV light in the skin or taken orally, goes to the liver and is hydroxylated to form cholecalciferol. This substance is not very active physiologically and is hydroxylated in the kidney to form calcitriol which is powerful steroid and works to maintain a constant blood level of calcium by promoting calcium absorption in the gut and by inhibiting calcium re absorption from bone. Blood calcium mediates nerve and muscle activity and must be maintained at a constant level for proper function. To estimate levels of vitamin D in the body, serum concentrations of 25(OH)D are measured. Apparently this is a simple assay and reflects the amounts calcitriol and cholecalciferol and other analogs. Some have suggested that it might be better to measure both 25(OH)D and calcitriol but estimating calcitriol is a delicate procedure and is done only in specialized labs [2]. The chemical form of vitamin D which causes symptoms in patients receiving an overdose, have not been fully identified. Calcitriol is the most potent form but when formation of this substance is blocked in knockout mice, it makes no difference in the toxicity of cholecalciferol [3]. It is possible that several vitamin D analogs are responsible for the toxic effects.

Cholecalciferol is not only a dietary supplement but is also a rat poison and can be a problem when ingested by house pets. It is therefore of great interest to veterinarians [4]. Another symptom, more annoying than serious, appeared after terminating excess vitamin D. Cutaneous inflammation on the arms, legs and body with lesions about one to two cm

in diameter began to appear about 10 weeks after stopping the excess vitamin intake. Redness and itching were intense but gradually disappeared about five months after correcting the overdose.

There has been a marked increase in marketing of vitamin D supplements recently. One report covering years 2010 to 2014 shows a twenty fold increase in use of these supplements [4,5]. Vitamin D has a reputation of being “healthy and safe” so that physicians promote vitamin D use. So the main message in this publication is that caution is needed in use of vitamin D supplements which can cause serious and even lethal effects if used over a long time interval.



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