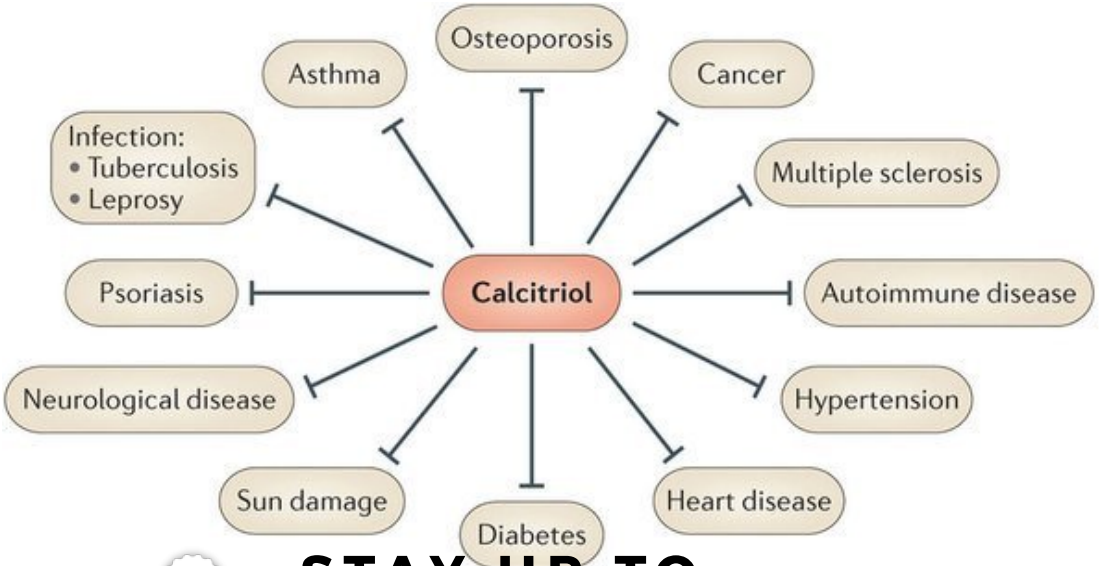
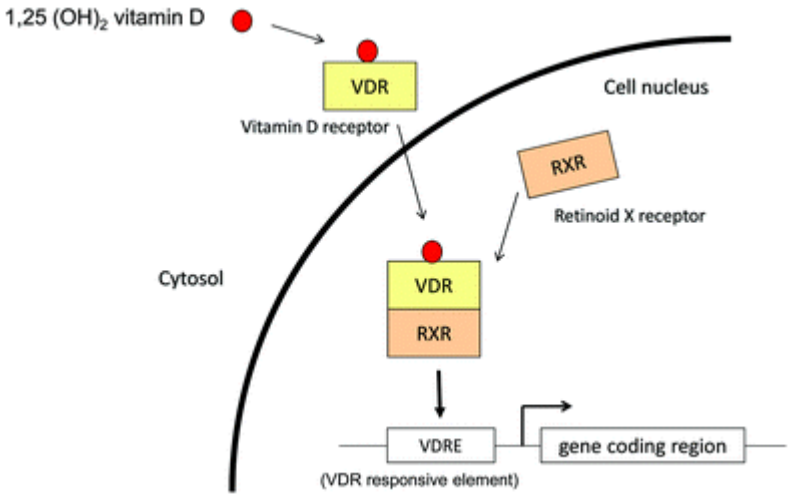
The Vitamin D Receptor has many really important functions. People mistakenly believe that to get Vitamin D related benefits, they need to supplement with Vitamin D3. Often, Vitamin D3 isn't enough.



Active Vitamin D vs Vitamin D3



We think of vitamin D3 (https://selfhacked.com/blog/35proven-health-benefits-vitamin-d-part-1/) as causing a bunch of health effects, but vitamin D3 is mainly just the beginning of the process that leads to its health benefits.

Vitamin D3 needs to convert to Calcitriol, the active form.

Then, Calcitriol needs to attach to a specific receptor – the Vitamin D Receptor or VDR (https://www.selfdecode.com/gene/vdr/?utm_source=seo&utm_medium=selfhacked&utm_cam Some infections or toxins block these receptors. If this happens, you won't get the health effects of Calcitriol or vitamin D3.

After Calcitriol binds to the VDR, for many bodily functions, this complex then needs to go to the nucleus and bind with another protein such as RXR (https://selfhacked.com/blog/retinoid-x-receptor-rxr/).

After that, there are cell-specific responses to regulate select genes that encode proteins that function in mediating the effects of vitamin D (R (https://www.ncbi.nlm.nih.gov/pubmed/22782502)).

In some cases, various steps can be left out. For example, in skin cells, the Vitamin D Receptor can have effects without Calcitriol to increase hair growth (via Wnt). (R (https://www.ncbi.nlm.nih.gov/pubmed/22782502))

(https://selfhacked.lpages.co/leadbox/1457ed5f3f72a2%3
blog-id=14409&boxid=1)

The Benefits of Vitamin D3

The active Vitamin D (calcitriol) has many benefits...

Vitamin D protects against:

- **Osteoporosis (https://www.selfdecode.com/disease/osteoporo utm_source=seo&utm_medium=selfhacked&utm (https://www.nature.com/nrc/journal/v14/n5/box**
- **Cancer (https://www.selfdecode.com/disease/neoplasm utm_source=seo&utm_medium=selfhacked&utm (R (https://www.nature.com/nrc/journal/v14/n5/box**

- **Diabetes (https://www.selfdecode.com/disease/diabetes-mellitus/?utm_source=seo&utm_medium=selfhacked&utm (https://www.nature.com/nrc/journal/v14/n5/box – Type 1 and 2** (R (https://www.ncbi.nlm.nih.gov/pubmed/19758226))
- **Heart disease (https://www.selfdecode.com/disease/heart-diseases/?utm_source=seo&utm_medium=selfhacked&utm (https://www.nature.com/nrc/journal/v14/n5/box**
- **Neurological diseases (R (https://www.nature.com/nrc/journal/v14/n5/box**
- **Psoriasis (https://www.selfdecode.com/disease/psoriasis/?utm_source=seo&utm_medium=selfhacked&utm (https://www.nature.com/nrc/journal/v14/n5/box**
- **Infections (R (https://www.nature.com/nrc/journal/v14/n5/box**
- **Multiple sclerosis (https://www.selfdecode.com/disease/multiple-sclerosis/?utm_source=seo&utm_medium=selfhacked&utm (https://www.nature.com/nrc/journal/v14/n5/box**
- **Asthma (https://www.selfdecode.com/disease/asthma/?utm_source=seo&utm_medium=selfhacked&utm (https://www.nature.com/nrc/journal/v14/n5/box**

- **Sun damage (R (https://www.nature.com/nrc/journal/v14/n5/box**
- **Kidney inflammation** and kidney disease death. (It should lower your creatinine levels.) (R (https://www.nature.com/ki/journal/v80/n10/fig_tab
- **High Blood Pressure (https://www.selfdecode.com/disease/hypertens utm_source=seo&utm_medium=selfhacked&utm** (Decreases Renin/angiotensin system). (R (https://www.nature.com/ki/journal/v80/n10/fig_tab
- **Lupus (https://www.selfdecode.com/disease/systemic-lupus-erythematosus/? utm_source=seo&utm_medium=selfhacked&utm (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Arthritis (https://www.selfdecode.com/disease/arthritis/? utm_source=seo&utm_medium=selfhacked&utm (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Scleroderma (R (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Sarcoidosis (R (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Sjogren's (https://www.selfdecode.com/disease/sjogren-syndrome/? utm_source=seo&utm_medium=selfhacked&utm (https://www.ncbi.nlm.nih.gov/pubmed/1975822**

- **Autoimmune thyroid disease (Hashimoto's (https://www.selfdecode.com/disease/hashimot disease/? utm_source=seo&utm_medium=selfhacked&utm Grave's (https://www.selfdecode.com/disease/graves- disease/? utm_source=seo&utm_medium=selfhacked&utm (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Ankylosing spondylitis (R (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Reiter's syndrome (R (https://www.ncbi.nlm.nih.gov/pubmed/1975822**
- **Uveitis (R (https://www.ncbi.nlm.nih.gov/pubmed/1975822**

Vitamin D is particularly good for Th1 (https://selfhacked.com/blog/supplements-people-th1-dominant/) and Th17 (https://selfhacked.com/blog/th17/) dominant people.

Vitamin D's Anti-Inflammatory (https://www.selfdecode.com/health-effect/anti-inflammatory/?

utm_source=seo&utm_medium=selfhac

Role

Vitamin D mainly lowers the “adaptive” immune system.

- **Inhibits B cell proliferation**. (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
- **Inhibits immunoglobulin (Ig) secretion**. (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
- **Inhibits T cell proliferation**. (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
- **Shift from Th1 to Th2 (https://selfhacked.com/blog/supplements-**

foods-exercise-right-type-th1-vs-th2-dominance/). (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
R2 (https://www.ncbi.nlm.nih.gov/pubmed/19309553))

- **Inhibits Th17 (https://selfhacked.com/blog/th17/)**. (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
- **Increases Tregs (https://selfhacked.com/blog/treg/) and IL-10 (https://selfhacked.com/blog/il-10/).** (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
- **Decreases inflammatory cytokines** (IL-1 (https://selfhacked.com/blog/interleukin-1/), IL-6 (https://selfhacked.com/blog/interleukin-6/), IL-8 (https://selfhacked.com/blog/il-8/), IL-12 (https://selfhacked.com/blog/supplements-people-th1-dominant/), TNFα (https://selfhacked.com/blog/supplements-lifestyle-factors-influence-tnf-interleukin-6-il-6/), IL-17 (https://selfhacked.com/blog/th17/), IL-21 (https://www.selfdecode.com/gene/il21/?utm_source=seo&utm_medium=selfhacked&utm_
(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31
- **Decreases TGF-beta (https://selfhacked.com/blog/tgf/)** (R (https://www.nature.com/ki/journal/v80/n10/fig_tab
- **Decreases expression of MHCII and co-stimulatory molecules**

(https://selfhacked.com/blog/balance-elevated-th1-th2-immune-system/), which inhibits Dendritic Cell differentiation and maturation. (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC31

Vitamin D also boosts the immune system:

Vitamin D mainly stimulates the "innate" immune system.

- **Crucial for T Cell activation**. In this sense it's an immune booster. (R (https://www.sciencedaily.com/releases/2010/03/10
- **Increase** (https://selfhacked.com/blog/homing-fundamenal-cause-epstein-barr-reactivation/)**CD8 (https://selfhacked.com/blog/homing-fundamenal-cause-epstein-barr-reactivation/#Top_Supplements_to_Increase_CD T Cells**, which is important in controlling viral infections.
- **Increases Natural Killer T Cells**. (R (https://www.ncbi.nlm.nih.gov/pubmed/21996367)) – good for preventing an autoimmune disease (https://www.selfdecode.com/disease/autoimmune disease/?utm_source=seo&utm_medium=selfhacked&utm_ but bad for asthma.

- **Increases NK cells (https://selfhacked.com/blog/intro-natural-killer-cells-increase-decrease/)**. (R (https://www.ncbi.nlm.nih.gov/pubmed/9720658?dopt=Abstract)) (are associated with...)
- **Releases Antimicrobials** in response to an infection such as cathelocidin and beta defensin 4. (R (https://www.ncbi.nlm.nih.gov/pubmed/9720658?dopt=Abstract))

Other Benefits of the Vitamin D Receptor

The most popular benefits for vitamin D3 is it's role in bone health.

Low blood levels of vitamin D3 are associated with lower bone density (https://www.selfdecode.com/trait/bone-density/?utm_source=seo&utm_medium=selfhacked&utm_cam (R (https://www.ncbi.nlm.nih.gov/pubmed/18088161)). Clinical trials have shown that Calcitriol is helpful for people with lower bone density (R (https://www.ncbi.nlm.nih.gov/pubmed/19960185)).

VDR activation induces the expression of liver and intestinal phase I detox enzymes (e.g., CYP2C9 (https://www.selfdecode.com/gene/cyp2c9/?utm_source=seo&utm_medium=selfhacked&utm_cam and 3A4) that play major roles in metabolizing drugs and toxins (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC223181(

The Vitamin D Receptor is important for hair growth and loss of VDR is associated with hair loss in experimental animals (R) (https://www.ncbi.nlm.nih.gov/pubmed/20138991).

The VDR regulates intestinal transport of calcium (https://selfhacked.com/blog/calcium-101/), Iron and other minerals (R) (https://www.ncbi.nlm.nih.gov/pubmed/21182397).

Since many infections block the Vitamin D Receptor, our body can't fight them off well. Researches are using a combination of Calcitriol (active D) and antibiotics (https://www.selfdecode.com/health-effect/antibiotic/?utm_source=seo&utm_medium=selfhacked&utm_cam with good effects in many conditions. It's a good idea to gradually eliminate pathogens over several years to minimize immune reactions. (R (https://www.ncbi.nlm.nih.gov/pubmed/19758226))

Calcitriol/VDR increases dopamine (https://selfhacked.com/blog/dopamine/) by increasing the enzyme that's the rate limiting step for dopamine production (tyrosine hydroxylase) (R (https://www.ncbi.nlm.nih.gov/pubmed/26210580)).

Calcitriol/VDR increases tyrosine (https://www.selfdecode.com/chemical/l-tyrosine/?utm_source=seo&utm_medium=selfhacked&utm_cam hydroxylase in the hypothalamus (https://selfhacked.com/blog/hypothalamus-101/) (R (http://www.direct-ms.org/pdf/VitDGenScience/D%20recptor%20brain.pd adrenal glands (R (https://www.ncbi.nlm.nih.gov/pubmed/9011759)), substantia nigra (R (http://ajcn.nutrition.org/content/97/5/907.full)) and likely other areas. This means that it increases productions of dopamine, adrenaline and noradrenaline (https://selfhacked.com/blog/norepinephrine-stress-hormone/). Although having more neurotransmitters is a good thing, Tyrosine hydroxylase also increases oxidative stress (https://selfhacked.com/blog/oxidative-stress-101/), so it doesn't provide a free lunch. (R (https://en.wikipedia.org/wiki/Tyrosine_hydroxylase))

Calcitriol increases GAD67 and therefore increases GABA (https://selfhacked.com/blog/gaba/) (R (https://www.ncbi.nlm.nih.gov/pubmed/25533012)).

Calcitriol increases glial derived neurotrophic factor (GDNF) (in vitro), which protects dopamine neurons. (R (http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0062040))

Researchers hypothesize that inadequate levels of circulating vitamin D could lead to dysfunction in the substantia nigra, an area of the brain in which the characteristic dopaminergic degeneration occurs in parkinsonian disorders (R (https://www.ncbi.nlm.nih.gov/pubmed/25890641)).

A high prevalence of vitamin D deficiency has been reported in Parkinson's (https://www.selfdecode.com/disease/parkinsons-disease/?utm_source=seo&utm_medium=selfhacked&utm_cam patients and Parkinson's has been associated with decreased bone mineral density (https://www.selfdecode.com/trait/bone-density/?utm_source=seo&utm_medium=selfhacked&utm_cam (R (https://www.ncbi.nlm.nih.gov/pubmed/25890641)).

Active D has different effects in cancer. In **breast cancer (https://selfhacked.com/blog/66-natural-scientific-ways-prevent-treat-breast-cancer/)** cells, estrogen (https://selfhacked.com/blog/estradiol/) (and aromatase) production decreased, while Testosterone (https://selfhacked.com/blog/testosterone-will-add/)/androgens increased (both **GOOD**). In adrenal cancer cells, it decreased DHT (https://selfhacked.com/blog/attacking-male-pattern-baldness-part-1/) (GOOD). In **prostate cancer (https://www.selfdecode.com/disease/prostatic-neoplasms/?utm_source=seo&utm_medium=selfhacked&utm_ca** cells, the production of testosterone and DHT increased (**BAD**). (R (https://www.ncbi.nlm.nih.gov/pubmed/21262387))

High levels of the enzyme that breaks down active D is found in lung cancer (https://www.selfdecode.com/disease/lung-neoplasms/?utm_source=seo&utm_medium=selfhacked&utm_cam (R (https://www.ncbi.nlm.nih.gov/pubmed/21169243)) and breast cancer (https://selfhacked.com/blog/66-natural-scientific-ways-prevent-treat-breast-cancer/) (R (https://www.ncbi.nlm.nih.gov/pubmed/20831823)). This would suggest that increasing its levels are good for breast and lung cancer.

Active vitamin D increases prolactin (https://selfhacked.com/blog/prolactin/) production (R (https://www.ncbi.nlm.nih.gov/pubmed/10406465)).

Technical: 1,25D induces RANKL, SPP1 (osteopontin), and BGP (osteocalcin) to govern bone mineral remodeling; TRPV6, CaBP(9k), and claudin 2 to promote intestinal calcium (https://selfhacked.com/blog/calcium-101/) absorption; and TRPV5, klotho (https://selfhacked.com/blog/do-you-have-this-intelligencelongevity-protein-all-about-klotho-and-how-to-increase-it-rs9536314/), and Npt2c to regulate kidney calcium and phosphate reabsorption (R (https://www.ncbi.nlm.nih.gov/pubmed/22782502)).

Natural Ways to Increase Calcitrol and Vitamin D Receptor Gene Expression

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- **Exercise (https://selfhacked.com/blog/top-14-proven-health-benefits-exercise-references-mechanisms/)** (R (https://www.ncbi.nlm.nih.gov/pubmed/10954775)) increases calcitriol, but not aerobic exercise (R (https://www.ncbi.nlm.nih.gov/pubmed/12395212)).
- **RXR (https://selfhacked.com/blog/importance-real-vitamin-retinol/)** (and retinol) is needed to produce proteins with the VDR (R (https://en.wikipedia.org/wiki/Calcitriol_receptor)). 1,25D3 binds to the VDR, which then combines with RXR to activate gene expression. (Not all VDR dependent genes need RXR.)
- **Parathyroid hormone (https://selfhacked.com/blog/parathyroid-hormone-pth/) (PTH) –** increases Calcitriol/1,25 D3 (R (https://www.ncbi.nlm.nih.gov/pubmed/6317364))

and **PTH -related peptide** (R (https://onlinelibrarystatic.wiley.com/store/10.1359/jv=1&t=ijdfx7qj&s=c48e6dc3be36fa31d52ccf17f8316b4

- **SIRT1** (https://selfhacked.com/blog/nad-and-sirt1-their-role-in-chronic-health-issues/) -potentiates VDR (R (https://www.ncbi.nlm.nih.gov/pubmed/25536521), (http://press.endocrine.org/doi/abs/10.1210/endo-meetings.2015.BCHVD.6.LBS-042)) – acetylation of VDR lessens 1,25D/VDR signaling. SIRT1 increased the ability of VDR to associate with RXR.
- **PGC-1a (https://selfhacked.com/blog/about-pgc-1alpha-and-natural-ways-to-increase-it/)** (R (https://www.ncbi.nlm.nih.gov/pubmed/15908514)) – potentiates VDR. It is a coactivator of the VDR, but it still needs 1,25D3.
- **Dopamine** (https://selfhacked.com/blog/dopamine/) (R (https://www.ncbi.nlm.nih.gov/pubmed/7776973))
- **Bile (https://selfhacked.com/blog/bile-supplements/) – specifically Lithocholic acid or LCA** (R (https://www.ncbi.nlm.nih.gov/pubmed/20371703)) The VDR evolved from its ancient role as a detoxification nuclear receptor. LCA is produced from the gut bacteria (metabolizing liver derived chenodeoxycholic acid). LCA travels to the colon, where the VDR binds to LCA or 1,25 D and

activates the CYP3A4 (https://www.selfdecode.com/gene/cyp3a4/?utm_source=seo&utm_medium=selfhacked&utm_ and SULT2A genes facilitates disposal from the cell via the ABC efflux transporter (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852))

- **Omega-3 (https://selfhacked.com/blog/top-22-science-based-health-benefits-of-fish-oil/): DHA, EPA** (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)) – Fish oil (https://selfhacked.com/blog/top-22-science-based-health-benefits-of-fish-oil/)/DHA
- **Omega-6: Linolenic acid, Arachidonic acid (https://www.selfdecode.com/chemical/arachido acid/?utm_source=seo&utm_medium=selfhacked&utm** (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852))
- **Curcumin (https://selfhacked.com/blog/curcumin-cures-top-15-scientifically-proven-health-benefits-with-references/)** (R (https://www.ncbi.nlm.nih.gov/pubmed/22782502)) – Curcumin is more active than LCA/Bile (https://selfhacked.com/blog/bile-supplements/) in driving VDR-mediated transcription and that it binds to VDR with approximately the same affinity as LCA.

- **Resveratrol (https://selfhacked.com/blog/top-15-scientific-health-benefits-of-resveratrol-with-references/)** (R (https://www.ncbi.nlm.nih.gov/pubmed/25536521)) – Potentiates VDR by: (1) potentiating 1,25D binding to VDR; (2) activating RXR; (3) stimulating SIRT1 (https://selfhacked.com/blog/nad-and-sirt1-their-role-in-chronic-health-issues/).
- **Forskolin (https://selfhacked.com/blog/forskolin-everything-know-powerful-substance/)** (R (https://www.ncbi.nlm.nih.gov/pubmed/6317364)), – increases 1,25D3 from 25D3 in-vitro.
- **Gamma Tocotrienol** (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)) (https://www.selfdecode.com/chemical/vitamin-e/?utm_source=seo&utm_medium=selfhacked&utm_c (http://www.iherb.com/Now-Foods-Mixed-Tocopherols-Vitamin-E-60-Softgels-Discontinued-Item/52544?rcode=coh780) (IHERB)
- **Vitamin E (https://www.selfdecode.com/chemical/vitamin-e/?utm_source=seo&utm_medium=selfhacked&utm** tocopherol (R

(https://www.ncbi.nlm.nih.gov/pubmed/18844852)) doesn't compete with calcitriol for the VDR.

- **Dexamethasone (https://www.selfdecode.com/chemical/dexamet utm_source=seo&utm_medium=selfhacked&utm** (https://www.ncbi.nlm.nih.gov/pubmed/18844852)) – doesn't compete with 1,25
- **Interferon gamma (https://www.selfdecode.com/gene/IFNG/? utm_source=seo&utm_medium=selfhacked&utm** -IFN-γ treatment inhibited 1,25D3 induction of 24-hydroxylase, the enzyme that breaks down 1,25 D3. This means 1,25D3 increased. (Technical: IFNγ (https://www.selfdecode.com/gene/IFNG/? utm_source=seo&utm_medium=selfhacked&utm_ not change the base level activity of the promoter, or change 1,25D binding to the VDR or nuclear VDR levels. IFN-γ impairs VDR-RXR binding to VDRE through a Stat1 (https://www.selfdecode.com/gene/stat1/? utm_source=seo&utm_medium=selfhacked&utm_ mediated mechanism) (R (https://www.ncbi.nlm.nih.gov/pubmed/11909970))
- **Estradiol (https://selfhacked.com/blog/estradiol/)** increases VDR expression (R (https://www.ncbi.nlm.nih.gov/pubmed/9886836), R2 (https://www.ncbi.nlm.nih.gov/pubmed/15930183))

and calcitriol levels (R (http://circ.ahajournals.org/content/118/14/1476)).

- **Phytoestrogens** (R (https://www.ncbi.nlm.nih.gov/pubmed/17088408)
- **Testosterone** (https://selfhacked.com/blog/testosterone-will-add/) (R (https://www.ncbi.nlm.nih.gov/pubmed/9115169)),
- **Prostaglandins** (R),
- **Bisphosphonates** (R),

DHA, EPA, linoleic acid and arachidonic acid are all 10,000X less capable than 1,25 D3 at activating the VDR (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)).

Curcumin (https://selfhacked.com/blog/curcumin-cures-top-15-scientifically-proven-health-benefits-with-references/) is 1,000X less capable than 1,25 D3 in inducing VDR gene expression (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)).

Curcumin and bile have similar binding ability to the VDR and similar levels of gene expression (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)).

Curcumin, Bile, DHA, EPA, Arachidonic acid all compete with 1,25 D3 for binding. Dexamethasone (https://www.selfdecode.com/chemical/dexamethason

utm_source=seo&utm_medium=selfhacked&utm_cam and alpha-tocopherol don't compete (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)).

A natural question to pose would be that if these are competitive binders and have much lower binding capacity for the VDR, are they of use? The answer seems to be yes.

High concentrations of PUFAs could occur in select cells or tissues and exert bioactivity (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)).

Excess Bile/LCA given to rats caused the same effect that 1,25D3 would cause (in particular calcium transport activation) (R (https://www.ncbi.nlm.nih.gov/pubmed/18844852)).

Kidney glandular might contain some 1,25 vitamin D.

What Inhibits The Vitamin D Receptor (VDR) or Calcitriol

- Caffeine (https://www.selfdecode.com/chemical/caffeine/?utm_source=seo&utm_medium=selfhacked&utm_ decreases VDR production (R (https://www.ncbi.nlm.nih.gov/pubmed/17223552)),
- Cortisol (https://selfhacked.com/blog/35-biological-reasons-overeat/#4_Cortisol)/Glucocorticoids (https://www.selfdecode.com/chemical/glucocortic utm_source=seo&utm_medium=selfhacked&utm_ decreases VDR production (R) (https://www.ncbi.nlm.nih.gov/pubmed/21182397),
- Prolactin (https://selfhacked.com/blog/prolactin/) (R (https://www.ncbi.nlm.nih.gov/pubmed/19074549))
- Thyroid hormones (https://selfhacked.com/blog/thyroid-hormones-t4t3/) repress VDR activation (R (https://www.ncbi.nlm.nih.gov/pubmed/9731705)),
- TGF-beta (https://selfhacked.com/blog/tgf/) reduces the activation of VDR/RXR combination, which results in VDR-mediated gene expression

(R (https://www.ncbi.nlm.nih.gov/pubmed/8612541)).
- TNF (https://selfhacked.com/blog/supplements-lifestyle-factors-influence-tnf-interleukin-6-il-6/) (R (https://www.ncbi.nlm.nih.gov/pubmed/8194478)) (inhibits osteocalcin interaction with VDR, but not osteopontin)
- Corticosteroids decrease calcitriol (R (https://onlinelibrarystatic.wiley.com/store/10.1359/j v=1&t=i4lus57j&s=7d39cec8da1c108fdb6843a9053f3
- Phosphatonin, Ketoconazole, Heparin (https://www.selfdecode.com/chemical/heparin/?utm_source=seo&utm_medium=selfhacked&utm_ Thiazides decrease calcitriol (R (https://onlinelibrarystatic.wiley.com/store/10.1359/j v=1&t=i4lus57j&s=7d39cec8da1c108fdb6843a9053f3
- Ubiquitin (R (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC26 – autophagy (https://selfhacked.com/blog/everything-wanted-know-autophagy/) stops this

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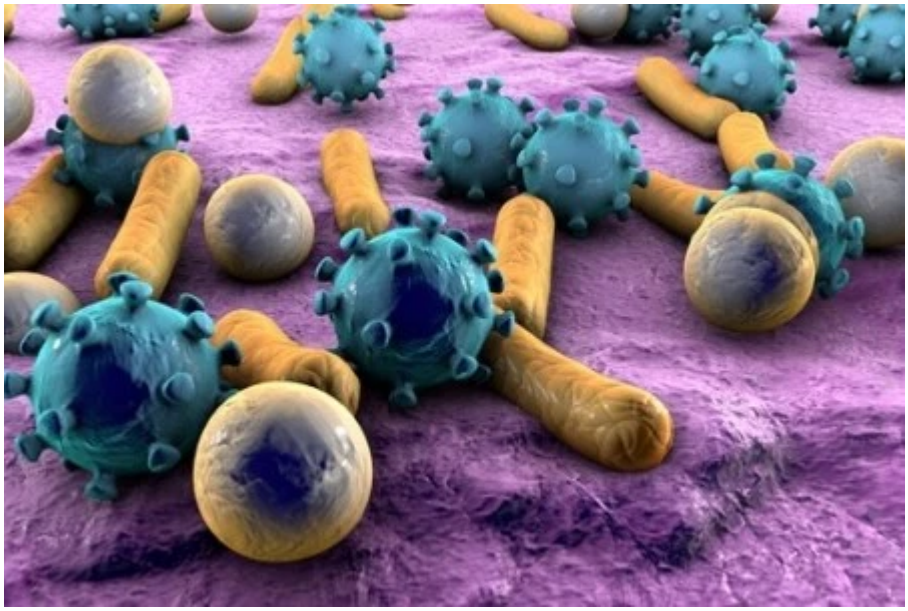
Pathogens That Inhibit The Vitamin D Receptor



Many pathogens inhibit some aspect of the vitamin D system – either the VDR, the ability of molecules to bind to it or the ability of VDR to cause gene expression.

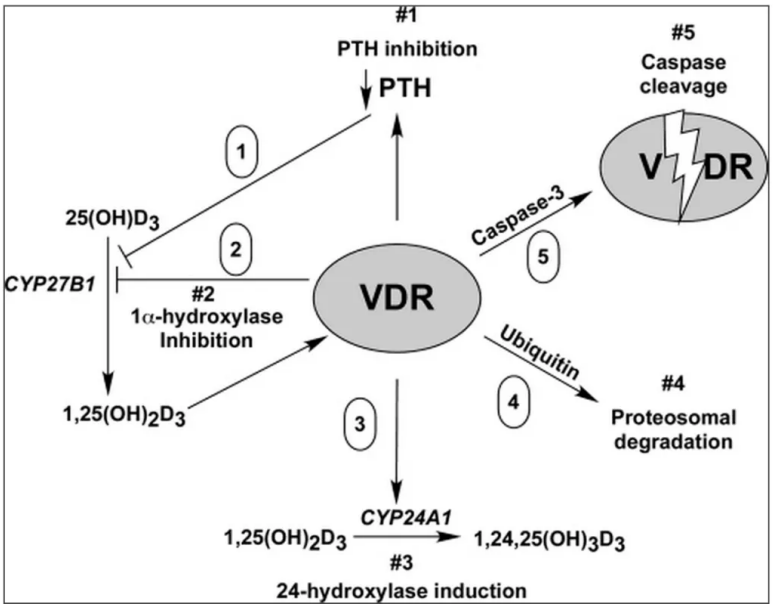
These are some examples, but I'm sure I haven't covered all of them known to the body of science.

- **P. aeruginosa** (often hospital acquired). Produces "Sulfonolipid ligand capnine."(R (https://www.ncbi.nlm.nih.gov/pubmed/19758177)) don't work well (R (https://en.wikipedia.org/wiki/Pseudomonas_aerug
- **H. pylori (https://selfhacked.com/blog/h-pylori-part-1/)** (responsible for stomach ulcers). 50% of the global population has this. Produces "Sulfonolipid ligand capnine."(R (https://www.ncbi.nlm.nih.gov/pubmed/19758177))

- **Lyme/Borrelia** – Live *Borrelia* reduces VDR by 50 times (in monocytes) and "dead" *Borrelia* reduces it by 8 times (R (https://www.ncbi.nlm.nih.gov/pubmed/19461888)) – This could explain why people develop autoimmune conditions after lyme infection.
- **Tuberculosis (https://www.selfdecode.com/disease/tuberculos utm_source=seo&utm_medium=selfhacked&utm** – Reduces VDR 3.3-fold. (R (https://www.ncbi.nlm.nih.gov/pubmed/12890386))
- **"Gliding" biofilm (http://mpkb.org/home/pathogenesis/microbiota bacteria have been shown to create Capnine** – Capnine (*Cytophaga, Capnocytophaga, Sporocytophaga,* and *Flexibacter)*
- **Chlamydia (trachomatis)**
- **Shigella** – bacteria in stool and causes intestinal problems and diarrhea (https://www.selfdecode.com/disease/diarrhea/). It increases Caspase-3, which is protein which breaks apart the VDR structure and thus limits the ability of VDR to perform gene transcription. (R (https://www.ncbi.nlm.nih.gov/pubmed/18832097))
- Mycobacterium leprase – produces mir-21 to target multiple genes associated with the VDR. (R (https://www.ncbi.nlm.nih.gov/pubmed/12890386))

- **Epstein-Barr virus (https://www.selfdecode.com/disease/epstein-barr-virus-infections/?utm_source=seo&utm_medium=selfhacked&utm (EBV)** – Decreases VDR by a factor of about five (R (https://www.ncbi.nlm.nih.gov/pubmed/19550398)) EBV also blocks the ability of VDR to produce products. (R (https://www.ncbi.nlm.nih.gov/pubmed/20593215))
- **HIV (https://www.selfdecode.com/trait/hiv-1-infection/?utm_source=seo&utm_medium=selfhacked&utm** – binds to the VDR (R (https://www.ncbi.nlm.nih.gov/pubmed/9814454)) a inhibits conversion to active D (R (https://www.ncbi.nlm.nih.gov/pubmed/19209727))
- **Aspergillus fumigatus** – In cystic fibrosis (https://www.selfdecode.com/disease/cystic-fibrosis/?utm_source=seo&utm_medium=selfhacked&utm_ patients, the fungus *A. fumigatus* has been shown to secrete gliotoxin, a toxin which dose-dependently decreases VDR.
- **Cytomegalovirus** – CMV decreases VDR 2.2 fold. (R (https://www.ncbi.nlm.nih.gov/pubmed/18566437))
- **Hepatitis C (https://www.selfdecode.com/disease/hepatitis-c/?**

utm_source=seo&utm_medium=selfhacked&utm
virus – Inhibits CYP24A1 (http://www.selfdecode.com/gene/CYP24A1/?utm_source=seo&utm_medium=selfhacked&utm_ the enzyme responsible for breaking down excess 1,25-D. (R (https://www.ncbi.nlm.nih.gov/pubmed/21793032))



(https://i0.wp.com/selfhacked.com/wp-content/uploads/2014/12/Screenshot-2015-01-14-15.57.25.png)

When bacterial products block the VDR, less of the CYP24A1 is produced, which results in excess active vitamin D – as is the case in many autoimmune conditions.

High Levels of Calcitriol Indicate Inflammatory/Autoimmune Disease

As bacterial products compromise the activity of the VDR, the receptor is prevented from expressing an enzyme (CYP24 (http://www.selfdecode.com/gene/CYP24A1/?utm_source=seo&utm_medium=selfhacked&utm_cam that breaks the calcitriol/1,25-D down into its inactive metabolites. This allows 1,25-D levels to rise without a feedback system to keep them in check, resulting in the elevated levels of the hormone (R (https://www.researchgate.net/publication/26815865_V

Studies show a strong association between these autoimmune conditions and levels of 1,25-D greater than 110 pmol/L (46 pg/mL (R (http://emedicine.medscape.com/article/2088672-overview))), even though there were no apparent cases of high blood calcium. 38 of the 100 people in a group of people with autoimmune conditions had over 160 pmol/L (66.6 pg/mL (R (http://emedicine.medscape.com/article/2088672-overview))) (R (https://www.researchgate.net/publication/26815865_V

I see clients with chronic inflammation often have active vitamin D levels between 50-80 pg/mL.

However, there was little association with vitamin D deficiency or the other inflammatory markers, meaning that the results challenge the assumption that blood levels of vitamin D3 or 25-D are a sensitive measure of the autoimmune disease state (R (https://www.researchgate.net/publication/26815865_V

Acquired hormone resistance has also been recognized with insulin (https://selfhacked.com/blog/insulin-101/), thyroid, steroid, and GHRH (https://selfhacked.com/blog/growth-hormone-releasing-hormone-101/) and elevated levels of hormones are seen in some autoimmune conditions (R (https://www.researchgate.net/publication/26815865_V

Calcitriol/Active Vitamin D on SelfDecode

- Check more information about Calcitriol on SelfDecode

(https://www.selfdecode.com/chemical/calcitriol/)

Figuring Out Calcitriol Levels From Vitamin D3

Common blood tests measure a variety of markers that indicate how much active vitamin D you have.

The following indicate higher calcitriol:

- Higher Parathyroid hormones (R)
- Higher blood calcium and phosphorous (R (https://onlinelibrarystatic.wiley.com/store/10.1359/j v=1&t=ijdfx7qj&s=c48e6dc3be36fa31d52ccf17f8316b
- Higher albumin (R (https://www.ncbi.nlm.nih.gov/pubmed/10922312))
- Higher creatinine (R (http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2796.1999.00515.x/full))
- Lower alkaline phosphatase (R (https://www.ncbi.nlm.nih.gov/pubmed/11007682))

Since at least some of these (maybe all) require the vitamin D receptor, checking Calcitriol Active/Vitamin D (1,25 Hydroxy) blood levels in combination with the other tests might indicate the degree of VDR resistance.

VDR Snps

You need to order your 23andme (http://refer.23andme.com/v2/share/6098688134909617 find out what your genotype is.

If you want to interpret your genes, you can use SelfDecode (https://www.selfdecode.com/), the best SNP analyzer around.

The program has a bunch of SNPs in the VDR Gene (http://www.selfdecode.com/gene/vdr/).

1. RS11574143 (VDR) **CC** (http://www.selfdecode.com/snp/rs11574143/)
2. RS1540339 (VDR) **CC** (http://www.selfdecode.com/snp/rs1540339/)
3. RS1544410 (VDR) **CT** (http://www.selfdecode.com/snp/rs1544410/)
4. RS2107301 (VDR) **GG** (http://www.selfdecode.com/snp/rs2107301/)
5. RS2228570 (VDR) **AG** (http://www.selfdecode.com/snp/rs2228570/)
6. RS2238136 (VDR) **CC** (http://www.selfdecode.com/snp/rs2238136/)
7. RS2239182 (VDR) **CC** (http://www.selfdecode.com/snp/rs2239182/)
8. RS2239185 (VDR) **AA** (http://www.selfdecode.com/snp/rs2239185/)
9. RS2239186 (VDR) **AA** (http://www.selfdecode.com/snp/rs2239186/)
10. RS3782905 (VDR) **CG** (http://www.selfdecode.com/snp/rs3782905/)
11. RS3819545 (VDR) **AA** (http://www.selfdecode.com/snp/rs3819545/)
12. RS4516035 (VDR) **TT** (http://www.selfdecode.com/snp/rs4516035/)
13. RS7041 (VDR) **AC** (http://www.selfdecode.com/snp/rs7041/)
14. RS731236 (VDR) **AG** (http://www.selfdecode.com/snp/rs731236/)
15. RS757343 (VDR) **CT** (http://www.selfdecode.com/snp/rs757343/)
16. RS7975232 (VDR) **AA** (http://www.selfdecode.com/snp/rs7975232/)

CYP24A1 breaks down the active form of vitamin D (Calcitriol). Check out the CYP24A1 (http://www.selfdecode.com/snp/Rs2296241/) gene that breaks down calcitriol.

(https://selfhacked.lpages.co/leadbox/1457ed5f3f72a2%3
blog-id=14409&boxid=3)

FDA Compliance

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(**2** votes, average: **4.00** out of 5)

13 () COMMENTS

KAREN Submitted May 17, 2017 04:07AM

This article seems like a very comprehensive and extensive list of the regulation of the vitamin D receptor. Especially the list about pathogens interfering with VDR expression was interesting ot me. However, when looking up the original references, there was no evidence about the interference with VDR. (e.g. it does not appear in the Cytomegalovirus transcriptome analysis linked, it is not regulated by HCV in the paper linked, it does not appear in the Borrelia study

linked).
Did I miss something? Or are the wrong references given?

REPLY (HTTPS://SELFHACKED.COM/BLOG/NATURAL-WAYS-TO-INCREASE-CALCITROL-AND-VITAMIN-D-RECEPTOR-GENE-EXPRESSION/?REPLYTOCOM=20805#RESPOND)

DUANE (HTTP://WWW.NATURALSTRESSCARE.ORG) Submitted April 29, 2017 11:12AM

Linolenic acid is an omega-3, not an omega-6. Might wanna correct the copy above.

REPLY (HTTPS://SELFHACKED.COM/BLOG/NATURAL-WAYS-TO-INCREASE-CALCITROL-AND-VITAMIN-D-RECEPTOR-GENE-EXPRESSION/?REPLYTOCOM=20592#RESPOND)

CAROL CLOSE Submitted February 17, 2017 09:22PM

Emu oil also reduces eczema, and other inflammatory skin conditions.

REPLY (HTTPS://SELFHACKED.COM/BLOG/NATURAL-WAYS-TO-INCREASE-CALCITROL-AND-VITAMIN-D-RECEPTOR-GENE-EXPRESSION/?REPLYTOCOM=19712#RESPOND)

CAROL CLOSE Submitted February 17, 2017 09:20PM

I for to mention that the benefits of emu oil on inflammation, cholesterol, diabetes, arthritis are from topical application; however, emu in inflammatory bowel diseases is from emu oil in an oral dose.