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THE EFFECT OF VITAMIN D SUPPLEMENTATION DURING PREGNANCY ON PLACENTAL FUNCTION IN PREECLAMPSIA, INTRAUTERINE GROWTH RESTRICTION, AND PRETERM BIRTH

by
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A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Science
to the Department of Anatomy, Cell Biology, and Physiological Sciences
of the Faculty of Medicine
at the American University of Beirut

Beirut, Lebanon
August 2021

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ACKNOWLEDGEMENTS

To Dr. George Daoud: Thank you for supporting me during this journey, and for sharing with me some life's experiences.

To Dr. Wassim Abou Kheir and Dr. Firas Kobeissy: Thank you for being part of the committee.

To Dr. Ola El Zein: Thank you for helping me out with the search strategy, for being patient, and for answering all my questions.

To Ms. Joanne Khabsa: Thank you for your time, help, and late night reflections.

To Lama Assaf: Thank you for doing the screening, passionately.

To my professors at the American University of Beirut especially Dr. Nada Lawand, Dr. Assaad Eid, and Dr. Rihab Nasr, to my supportive friends and my lovely family: Thank you for motivating me to reach my goal.

ABSTRACT
OF THE THESIS OF

Lea Samir Kharrat for Master of Science
Major: Physiology

Title: The Effect of Vitamin D Supplementation During Pregnancy on Placental function in Preeclampsia, Intrauterine Growth Restriction, and Preterm Birth.

Background: The human placenta is a transitory organ playing the role of multiple organs during pregnancy. It is composed of trophoblastic cells that respond to vitamin D. Vitamin D is a secosteroid hormone that plays an important role in pregnancy. Its deficiency has been linked to multiple diseases affecting both the mother and the fetus. **Objective:** To highlight, through a systematic literature review, the effet of vitamin D supplementation during pregnancy on placental functions in some pregnancy-associated diseases such as preeclampsia, intrauterine growth restriction, and preterm birth. **Methods:** MEDLINE (Ovid), Embase, and CINAHL databases were systematically searched using "placenta" and "vitamin D" as concepts. The screening was done based on specific selection criteria. Data was abstracted and summarized in a tabular format. **Results:** A total of 3844 records was obtained from the 3 databases. 2456 records remained after the removal of duplicates of which 22 were used in this systematic review. These studies showed that vitamin D have been reported to affect inflammation, oxidative stress, amino acid transporters, pro-labor genes, and preeclamptic markers in case of preeclampsia, intrauterine growth restriction, and preterm birth. In fact, it

decreased TNF-α, IL-10, and IL-6 wich are involved in inflammation. It increased antimicrobial peptides like HBD2, HBD3, and hCTD. Regarding oxidative stress, it decreased TXB2 production, TXB2 to 6-keto PGF1α ratio, 8-isoprostane, caspase-3 cleavage, ROCK1 activation, MP, caveolin-1, and superoxide (when induced by CoCl2), but had no effect on HO-1 and 15-F2t-isoP. Also, a negative correlation was seen between vitamin D and MDA and a positive correlation was seen between VDR and CBS. Moreover, a negative correlation was seen between vitamin D and the cell survival marker MAP1LC3B/BECN1. Different results were obtained for the association of vitamin D with VEGF, sFLT-1, PAPP-A, or PlGF which play a role in preeclampsia. However, it had no effect on MAP, UtA PI, VCAM-1, ESR1, and hCG-β. A negative correlation was seen between vitamin D and ICAM-1. Also, it increased EVT invasion, pro-MMP2, and pro-MMP9. In addition, it increased amino acid transporters SNAT2 but had no effect on SNAT4, LAT1, LAT2, 4E-BP1 Thr-37/46 and Akt Ser-473. A positive correlation was found between vitamin D and LAT3, ASCT1 or y+LAT1. Different results were obtained with SNAT1. Lastly, it decreased CRH, COX-2 which are pro-labor genes.

Conclusion: Vitamin D increased some of the outcomes, decreased, or showed no effect on others.

Keywords: Placenta; trophoblasts; cytotrophoblasts; vitamin D; vitamin D deficiency; calcitriol; 25(OH)D; VDR; preeclampsia; intrauterine growth restriction; preterm birth.

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ABBREVIATIONS

15-F2t-isoP:	Urinary 15-F2t-isoprostane
4E-BP1:	Eukaryotic translation initiation factor 4E-binding protein 1
6-Keto PGF1 alpha:	6-Keto Prostaglandin F1 alpha
Akt:	Protein kinase B
AMP:	Antimicrobial peptides
ASCT1:	Alanine/serine/cysteine transporter 1
AT1-AA:	Angiotensin II AT1 recpetor auto-antibody
BECN1:	Beclin-1
CBS:	Cystathionine-β-synthase
COX:	Cyclooxygenase
CRH:	Corticotropin releasing hormone
DAMPs:	Damage-associated molecular patterns
DRIP:	Vitamin D receptor interacting complex
EAAT3:	Excitatory amino acid transporter 3
eNOS:	Endothelial nitric oxide synthase
EOPE:	Early onset preeclampsia
ESR1:	Estrogen receptor 1
FGR:	Fetal growth restriction
GLUT:	Glucose transporter
HBD:	Human β defensins
hCGβ:	Human chorionic gonadotropin beta
hCTD:	Cathelicidin
HIF-2α:	Hypoxia- inducible factor 2-alpha
HO-1:	Heme oxygenase-1
hPL:	Human placental lactogen
ICAM-1:	Intracellular adhesion molecule 1
IFN- γ:	Interferon γ
IGF-1:	Insulin-like growth factor I
Il-1, Il-6, Il-10:	Interleukins
IRS-1:	Insulin receptor substrate
IUGR:	Intrauterine growth restriction
LAT:	L-type amino acid transporters
LOPE:	Late onset preeclampsia
LPS:	Lipopolysaccharide
MAP:	Mean arterial pressure.
MAP1LC3B:	Microtubule associated protein 1, light chain 3 beta
MDA:	Plasma malondialdehyde
MP:	Microparticles
MPP:	Matrix metalloproteinases
mTOR:	Mechanistic target of rapamycin
NF-kB:	Nuclear Factor kappa-light-chain-enhancer
PAMPs:	Pathogen-associated molecular patterns
PAPP-A:	Pregnancy-associated plasma protein A
PE:	Preeclampsia
PGF:	Placental growth factor

PlGF:	Placental growth factor
PRB:	Progesterone receptor B
PTH:	Parathyroid hormone
PTHrP:	Parathyroid hormone-related peptide
ROCK1:	Rho-associated coiled-coil protein kinase 1
RXR:	Retinoid X receptor
SAM68:	SRC associated in mitosis of 68 kDa
sFlt1:	Soluble fms-like tyrosine kinase
SNAT:	Sodium- coupled neutral amino acid transporrters
sPLA2:	Soluble phospholipase-A2
SRC:	Steroid receptor coactivator complex
Th1, Th2, Th17:	T helper cells
TLRs:	Toll-like receptors
TNF-α:	Tumor necrosis factor alpha
TXB2:	Thromboxane B2
UtA PI:	Uterine artery pulsatility index
V6/7:	6th or 7th prenatal study visit
VCAM-1:	Vascular adhesion molecule 1
VDBP:	Vitamin D binding protein
VDR:	Vitamin D receptors
VDRE:	Vitamin D reponse elements
VEGF:	Vascular endothelial growth factor

CHAPTER 1

INTRODUCTION

During pregnancy, the human fetus relies on the placenta. The placenta is a transient, discoid, hemochorial (no retention of maternal layers), fetomaternal organ. Its weight is about 500g and its diameter is about 20 cm [1]. It protects and nourishes the fetus. It responds to vitamin D which seems to play an important role during pregnancy. Defects in placentation can lead to preeclampsia, fetal growth restriction, and preterm birth. Many studies are focusing on vitamin D to explore its role in the placenta and whether its deficiency can negatively affect the health of the mother and the fetus.

CHAPTER 2

PLACENTA

The placenta is a transitory organ that connects the fetus to the mother during pregnancy.

2.1. Structure

The placenta is composed of the chorionic plate (fetal portion) and the basal plate (maternal portion) which are separated by a space containing the villi filled with maternal blood coming from the spiral arteries [2] (figure 1). The basal plate is composed of lobes separated by placental septa [3]. Lobes are composed of cotyledons. Each cotyledon consists of a stem villus with its branches [1]. Stem villi have the largest diameter and they support the villous tree [4].

The main cells are the trophoblasts which are epithelial cells. Cytotrophoblasts are mononuclear cells that can fuse and differentiate into syncytiotrophoblasts [2]. Other cells include fibroblasts and vascular cells [5]. It also contains immune cells like Hofbauer cells which are macrophages that are thought to play an important role during pregnancy.

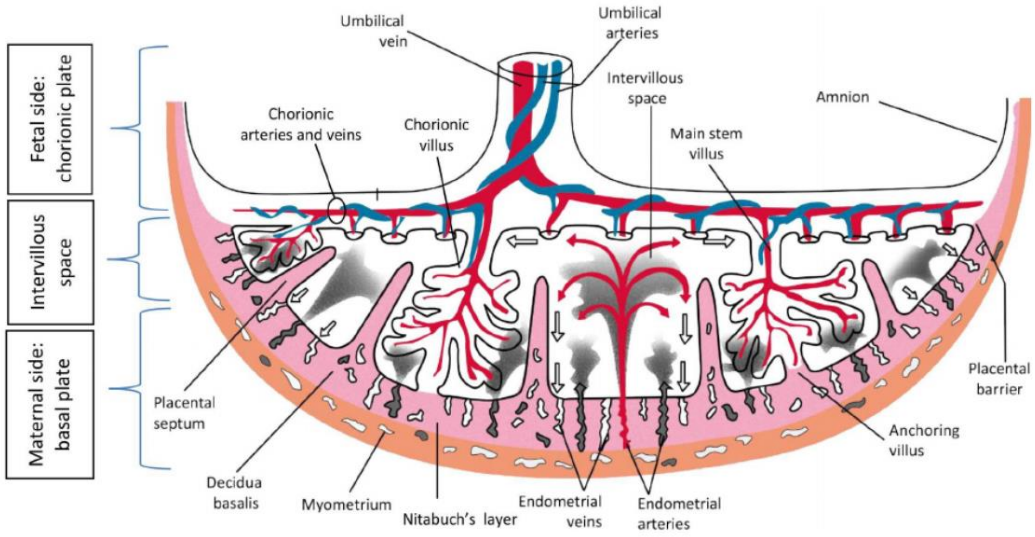


FIGURE 1 Schematic drawing of the fetal side and maternal side of the placenta in the second half of pregnancy. Fetal side: Chorionic plate that contains the amnion and main stem villi (chorionic villi). Maternal side: Basal plate that contains placental septa and decidua basalis. Red, fetal veins: Umbilical vein, chorionic veins and venules; maternal arteries: endometrial arteries. Blue, fetal arteries: Umbilical arteries, chorionic arteries and arterioles. Pink, decidua basalis, Nitabuch's layer, placental septa. Brown, myometrium [Color figure can be viewed at wileyonlinelibrary.com]

Figure 1: Fetal side and maternal side of the placenta. [6]

2.2. Functions

The placenta produces many hormones like progesterone, estrogen, placental lactogen, human chorionic gonadotrophin, throughout the gestational period to maintain pregnancy [2]. It contains glucose transporters like GLUT1 and GLUT3 [7] to ensure the transfer of glucose to the fetus, and amino acid transporters like system L, ASC, and A for amino acid transport [8]. Free fatty acids and glycerol can cross the placenta by simple diffusion or via fatty acid binding proteins [9]. Moreover, it plays an important role in protecting the fetus. For example, IgG crosses the placenta by pinocytosis. Syncytiotrophoblasts have the neonatal F_c receptor allowing the transport of IgG from the mother to the fetus [10].

2.3. Development of the Human Placenta

The blastocyst is composed of an inner cell mass which gives rise to the embryo and umbilical cord. It is surrounded by a layer of mononucleated trophoblasts. The placenta begins to form when the blastocyst attaches to the uterine lining. Mononucleated cells fuse to form syncytiotrophoblasts which invade the uterine epithelium. The ones that did not undergo fusion are called cytotrophoblasts. Within the syncytiotrophoblasts, spaces containing fluid are formed at day 8. They come together to form lacunae. Syncytiotrophoblasts between lacunae are called trabeculae. They come into contact with maternal capillaries [3]. Then, cytotrophoblasts migrate from the fetal side to the maternal side of the placenta, leave the placenta, and become extravillous cytotrophoblasts which invade the stroma of the endometrium. Some of them invade the wall of the spiral arteries to become the endovascular cytotrophoblasts [11]. Trabeculae form primary villi which are trophoblastic protrusions. They become secondary villi after penetration of extraembryonic mesodermal cells. Secondary villi become tertiary villi with the formation of placental vessels. All villous trees are covered by a single layer of syncytiotrophoblasts [3].

Abnormalities in the formation of the placenta can lead to diseases like preeclampsia (PE), intrauterine growth restriction (IUGR), and preterm birth [12] [13].

CHAPTER 3

VITAMIN D

Vitamin D is a fat soluble secosteroid hormone that can be produced in the body or obtained from the diet [14]. Vitamin D2 which is known as ergocholecalciferol is present in plants and vitamin D3 which is known as cholecalciferol is present in mammals [14]. In the blood, vitamin D is bound to vitamin D binding protein (VDBP) because it is hydrophobic [14].

3.1. Functions

It has classical and nonclassical actions. It is involved in calcium homeostasis. It plays a role in the immune, nervous, cardiovascular systems [15]. Analogs can be used to treat cancer and autoimmune diseases [16]. Its deficiency has adverse effects on fertility in both males and females. Vitamin D can cause the release of insulin from β-pancreatic cells by regulating intracellular calcium flux [17]. Moreover, it can lead to the upregulation of glucose transporter type 4 (GLUT4) in adipocytes [18] and insulin receptor substrate (IRS-1) in muscles [19].

It regulates the production of some hormones during pregnancy such as estradiol, progesterone, human chorionic gonadotropin and human placental lactogen [20] [21] [22] and induces decidualization (endometrial cells become decidual cells) [23]. Vitamin D injection can increase the weight of the uterus and promote decidualization in pseudo-pregnant rats [23]. Vitamin D increases the expression of HoxA10 [24] which is important for the development of the endometrium and

implantation [23] [24]. It decreases the expression proteins that normally cause uterine contractions, such as oxytocin and connexin 43, in the myometrium [25].

3.2. Metabolism of Vitamin D

When 7-dehydrocholesterol is exposed to UVB from the sun, vitamin D_3 is produced in the skin [14]. In fact, 7-dehydrocholesterol is converted to previtamin D which is then converted to vitamin D through thermal isomerization [26]. The mitochondrial P450 cytochrome enzyme, 25-hydroxylase, converts vitamin D_3 to $25OHD_3$ in the liver (figure 2). 25 OHD_3, also known as calcidiol, is considered as the major circulating form in the blood [14]. It is converted to active $1,25(OH)2D_3$ (calcitriol) under the effect of the mitochondrial P450 cytochrome enzyme, 1α-hydroxylase, in the kidney after being internalized with DBP by megalin/cubilin in the proximal convoluted tubules [27] [28] (figure 2). 1α-hydroxylase is encoded by CYP27B1 gene (figure 2). This conversion can also be done in non-kidney tissues like placental tissues. The parathyroid hormones and fibroblast growth factor 23 can affect calcitriol by stimulating or inhibiting its production, respectively [29]. 25 OHD_3 and $1,25(OH)2D_3$ can be converted to inactive 24,25-dihydroxyvitamin D and 1,24,25-trihydroxyvitamin D, respectively, by 24-hydroxylase [30] (figure 2). These inactive water-soluble metabolites will then be excreted. The enzyme 24-hydroxylase is encoded by CYP24A1 gene. The concentration of 25-hydroxyvitamin D_3 is used to assess the levels of vitamin D in the blood. This concentration is affected by exogenous factors like dietary intake, sunshine protection [31] and UVB exposure.

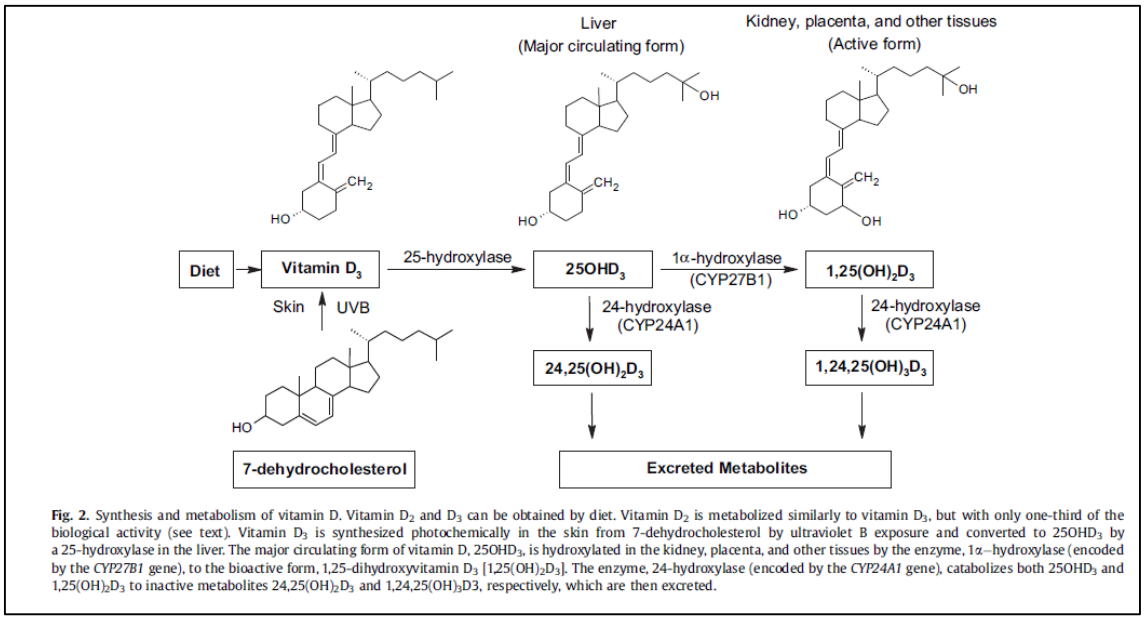


Fig. 2. Synthesis and metabolism of vitamin D. Vitamin D_2 and D_3 can be obtained by diet. Vitamin D_2 is metabolized similarly to vitamin D_3, but with only one-third of the biological activity (see text). Vitamin D_3 is synthesized photochemically in the skin from 7-dehydrocholesterol by ultraviolet B exposure and converted to $25OHD_3$ by a 25-hydroxylase in the liver. The major circulating form of vitamin D, $25OHD_3$, is hydroxylated in the kidney, placenta, and other tissues by the enzyme, 1α–hydroxylase (encoded by the *CYP27B1* gene), to the bioactive form, 1,25-dihydroxyvitamin D_3 [$1,25(OH)_2D_3$]. The enzyme, 24-hydroxylase (encoded by the *CYP24A1* gene), catabolizes both $25OHD_3$ and $1,25(OH)_2D_3$ to inactive metabolites $24,25(OH)_2D_3$ and $1,24,25(OH)_3D3$, respectively, which are then excreted.

Figure 2: Vitamin D metabolism [14]

3.3. Modes of Action

Calcitriol binds to the nuclear vitamin D receptor forming a complex that binds retinoid X receptor (RXR) (figure 3). This heterodimer binds vitamin D response elements (VDRE) to regulate the transcription of vitamin D target genes [32] [33] (figure 3). Coactivators such as steroid receptor coactivator complex (SRC) and vitamin D receptor interacting complex (DRIP) and corepressors such as hairless gene can affect the response pathways [34] [35] [36]. This is known as the slow genomic response pathway. However, there is another pathway known as the rapid non-genomic pathway. In this pathway, the ligand calcitriol binds to its receptor associated with caveolae to activate specific signaling cascades that include protein kinases and phospholipases (A_2 and C) [15] [37] (figure 3).

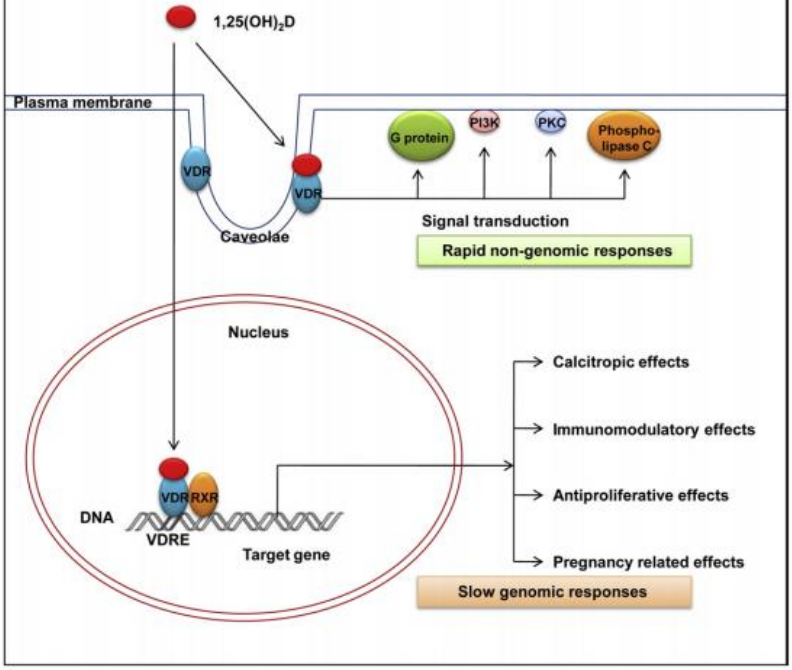


Fig. 3. Genomic and non-genomic responses of vitamin D receptor binding to $1,25(OH)_2D$. In the genomic response, $1,25(OH)_2D$ binds to the nuclear vitamin D receptor (VDR). Heterodimerization of the VDR with the retinoid X receptor (RXR) and binding to vitamin D response elements (VDREs) in the promoters of target genes affects transcription, usually by increasing transcription, and generating downstream biological responses. In the non-genomic response pathway, binding of $1,25(OH)_2D$ to VDR associated with caveolae of the plasma membrane activates one or more second messenger systems to elicit rapid responses. PI3K, phosphatidylinositol-3-kinase; PKC, protein kinase C.

Figure 3: Mode of actions of Vitamin D [14]

3.4. Vitamin D and Immunity

Vitamin D receptor is expressed in immune cells. Vitamin D affects immunity. In fact, it decreases the adaptive immune system by inhibiting the proliferation of IgG of B lymphocytes, T lymphocytes [38] [39] [40] [41], and T helper 1. It induces T helper 2 and regulatory T cells cytokine's secretion [38] [42].

Calcitriol can activate antimicrobial HBD2, HBD3 (β-defensins) in the placenta [43]. It downregulates Il-10 expression which normally inhibits maternal immunity leading to microbial invasion and infection [44] [45]. It is one of the anti-inflammatory factors that prevents the rejection of the fetus [26]. It induces TGF-beta which interacts with natural killer immune cells to impede their action in killing the fetus [26].

3.5. Vitamin D and Pregnancy

During pregnancy, there is an increase in the metabolism of maternal vitamin D. Trophoblasts express vitamin D receptors (VDR) and respond to the active form of vitamin D [14]. There are no studies on whether vitamin D enters placental cells via diffusion or endocytosis of VDB- 25(OH)D or both. Calcitriol does not cross the placenta but 25(OH)D_3 can cross the placenta in rats [46]. Placental cells express megalin/cubilin, RXR, CYP27B1, CYP24A1 [14]. CYP27B1 is active in trophoblasts [47]. In humans, decidual and placental cells produce 1,25(OH)2D and 24,25(OH)2D [48].

The synthesis of calcitriol increases in the maternal kidney [14]. In pregnancy, most of the calcitriol increase comes from the kidneys [49]. The increase in calcitriol is linked to an increase in renal, placental, and decidual CYP27B1 [50] [51] [52]. When the active form of vitamin D increases, the transcription of CYP27B1 decreases and the transcription of CYP24A1 increases in human cytotrophoblasts and syncytiotrophoblasts [53] [54]. Vitamin D binding protein increases as well during pregnancy [55]. Calcitriol is higher in the mother as compared to the fetus [56]. The levels of maternal calcitriol increase during the 3rd trimester [57] because most of the fetal bone mineralization [58] takes place during that period, resulting in an increase in calcium intestinal absorption [57]. Some studies showed that the levels of the active form of vitamin D rise in the first trimester to reach a plateau [58] [59] until delivery while others [60] [61] [26] showed that they keep on increasing until term. During pregnancy, the levels of calcitriol are not correlated with parathyroid hormone (PTH) [60] [62] but rather with parathyroid hormone-related peptide (PTHrP) [60] produced by fetal parathyroid gland and placenta, and with insulin-like growth factor I (IGF-1)

[61]. Supplementation is needed during pregnancy since pregnant women have a higher risk of developing nutritional imbalance like the one related to vitamin D [63].

3.6. Vitamin D Deficiency and Pregnancy

Women with dark skin [64] or those living in higher latitude [65] are more likely to develop hypovitaminosis D.

Vitamin D deficiency can lead to preeclampsia [66], insulin resistance [67], bacterial vaginosis [68], and muscle weakness [69]. It can lead to urinary tract infections [70] and periodontal disease [71] in pregnant woman. Deficiency in vitamin D impairs muscle function [69] leading to a higher risk of Cesarean section [72]. In HIV-positive pregnant women, vitamin D deficiency increases the risk of the transmission of the virus to the fetus [73]. Moreover, its deficiency has adverse effects on the fetus causing craniotabes [74], type I diabetes [75], and acute lower respiratory tract infection [76] , rickets associated infant heart failure [77].

CHAPTER 4

PLACENTAL COMPLICATIONS AND VITAMIN D

4.1. Preeclampsia

Preeclampsia occurs in stage I (in the first half of pregnancy) and II (after 20 weeks of gestation) [78]. In stage I, placental invasion and placental function are affected. In stage II, proteinuria, hypertension, and maternal systemic inflammation are observed [78]. This is the result of the release of some soluble factors like soluble fms-like tyrosine kinase 1 (sFlt1) [78], angiotensin II AT1 receptor auto-antibody (AT1-AA) [79], and cardiac glycosides (marinobufagenin) [80] from the hypoxic placenta [81]. Once the placenta is delivered, this condition is cured [81]. sFlt-1 binds vascular and placental growth factors causing endothelial dysfunction [78] and AT1-AA binds AT1 receptor leading to maternal hypertension [79]. Vitamin D3 impairs oxidative stress [82], stops inflammation [83], and impedes the damage caused to endothelial cells [83]; thus, preventing the risk of preeclampsia. Circulating levels of IGF-1 and PTHrP [84] [85] in pregnant women, placental IGF-1 expression [86] [87] and levels [88] are low in preeclamptic women. This can explain why calcitriol levels are low in this case. Further studies are needed.

In preeclampsia, the expression of 25-hydroxyvitamin D-1 alpha hydroxylase is low in cultured syncytiotrophoblasts [89]. Also, CYP27B1 expression is low when studied in syncytiotrophoblasts [90] and high when studied in whole human placental tissues. High CYP24A1 expression in preeclampsia might lead to low levels of calcitriol [91]. Further studies are needed.

Some studies showed a correlation between low levels of calcidiol and preeclampsia while others did not show that [92] [93] [94] [95]. In some studies, they compared preeclamptic and normotensive women. They found that calcitriol levels are lower in preeclamptic women [96] [97] [98] [99] [100] [101]. One study on vitamin D supplementation showed that the group of patients receiving 4000 IU vitamin D have fewer pre-eclampsia events than the one receiving 400 IU vitamin D [102]. Therefore, the number of preeclampsia events decreases with vitamin D supplementation. In this study, vitamin D was supplemented early in the second trimester to strengthen the correlation between vitamin D and the lower risks of preeclampsia [103] [104] [105] [106]. However, few studies did not show a correlation between vitamin D deficiency and preeclampsia [102]. In these studies, they measured the levels of vitamin D in early pregnancy without taking into consideration that vitamin D levels are high during this period [107].

In preeclamptic 3rd trimester pregnancies Th1 levels and Th1:Th2 ratio are higher and Th2 levels are lower when compared to healthy pregnant women [108]. There is an imbalance between the differentiation of the regulatory T cell and Th17 cell in preeclampsia [109]. The active form of vitamin D enhances immunity by inducing T reg [110]. In addition, it suppresses Th17 cells [111].

In winter, there is a higher risk of preeclampsia because the production of vitamin D is reduced [112].

4.1.1. Vitamin D and sFLT-1

Soluble fms-like tyrosine kinase 1 (sFlt-1) binds to the placental growth factor and vascular endothelial growth factor (VEGF) leads to the dysfunction of the vascular

endothelial cells [113] (figure 4) which is manifested by hypertension and proteinuria. Vitamin D is not related directly to sFlt- 1. Wei et al showed that women with low vitamin D levels have lower placental growth factors [113]. This can explain the importance of vitamin D in angiogenesis.

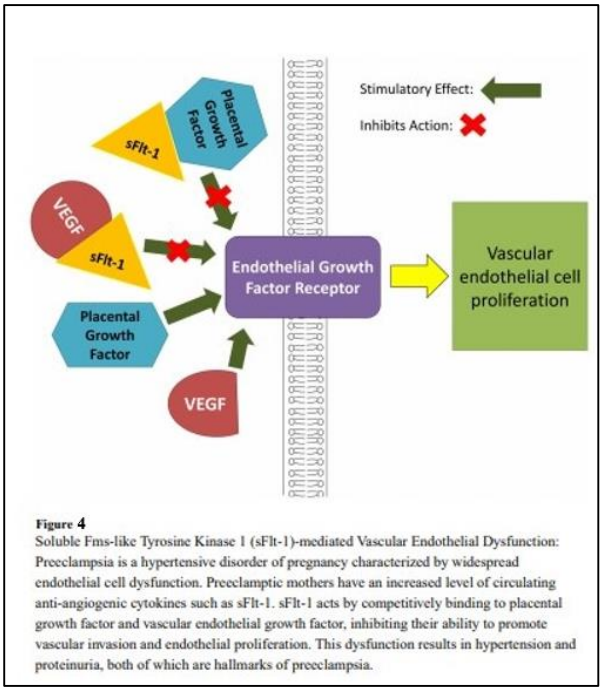


Figure 4
Soluble Fms-like Tyrosine Kinase 1 (sFlt-1)-mediated Vascular Endothelial Dysfunction: Preeclampsia is a hypertensive disorder of pregnancy characterized by widespread endothelial cell dysfunction. Preeclamptic mothers have an increased level of circulating anti-angiogenic cytokines such as sFlt-1. sFlt-1 acts by competitively binding to placental growth factor and vascular endothelial growth factor, inhibiting their ability to promote vascular invasion and endothelial proliferation. This dysfunction results in hypertension and proteinuria, both of which are hallmarks of preeclampsia.

Figure 4: (sFlt-1)-mediated vascular endothelial dysfunction [114]

4.1.2. Vitamin D and VATPase

V-ATPase is a proton pump involved in placentation [81]. Problems in V-ATPase can make the placenta shallow; therefore, leading to preeclampsia [81]. a2V-ATPase plays a role in controlling the release of many cytokines secreted by the trophoblasts [115]. V-ATPase is needed for autophagy which is induced by hypoxia [116]. In fact, in preeclampsia, defect in placentation leads to hypoxia which increases the number of apoptotic trophoblasts impairing further placentation. This should be treated by cell autophagy. V-ATPase, coupled to calcitriol, can lead to autophagy which

is needed to prevent diseases. Vitamin D deficiency can affect the activity of V-ATPase leading to preeclampsia [81].

4.1.3. Vitamin D and TLR4 pathway

Pathogen-associated molecular patterns (PAMPs) and damage-associated molecular patterns (DAMPs) bind to Toll-like receptors. In case of preeclampsia, TLRs pathway is activated because of the DAMPS and PAMPS leading to higher inflammation [117] [118] [119].

TLR4 is one of the cell surface TLRs. It identifies bacterial lipopolysaccharide (LPS) which is considered as PAMPS. Once stimulated, the signaling of the inflammation cascade begins. The subunits of NF-kB will be translocated into the cell nucleus. The transcription of pro-infammatory cytokines, such as TNF- α, IL-1, and IL-6 occurs [117] [119].

Higher expression of TLR4 is seen in preeclamptic pregnancies as compared to normal pregnancies [120]. A study conducted by Litang et al. [121] showed that the levels of TLR4 and NF-κB p65 are higher in preeclamptic women compared to normal women and they can be used for the diagnosis of PE. Nizyaeva et al. have shown that the expression of TLR4 is lower in placental villi in early onset preeclampsia when compared to late onset preeclampsia [122].

Vitamin D binds to its receptor forming a complex which forms a heterodimer with the retinoid receptor (RXR) (figure 5). They bind to vitamin D response elements VDRE in DNA increasing the expression of IκBα which inhibits the translocation of NF-κB to the nucleus. In this case, pro-infammatory cytokines expression is downregulated [123] (figure 5).

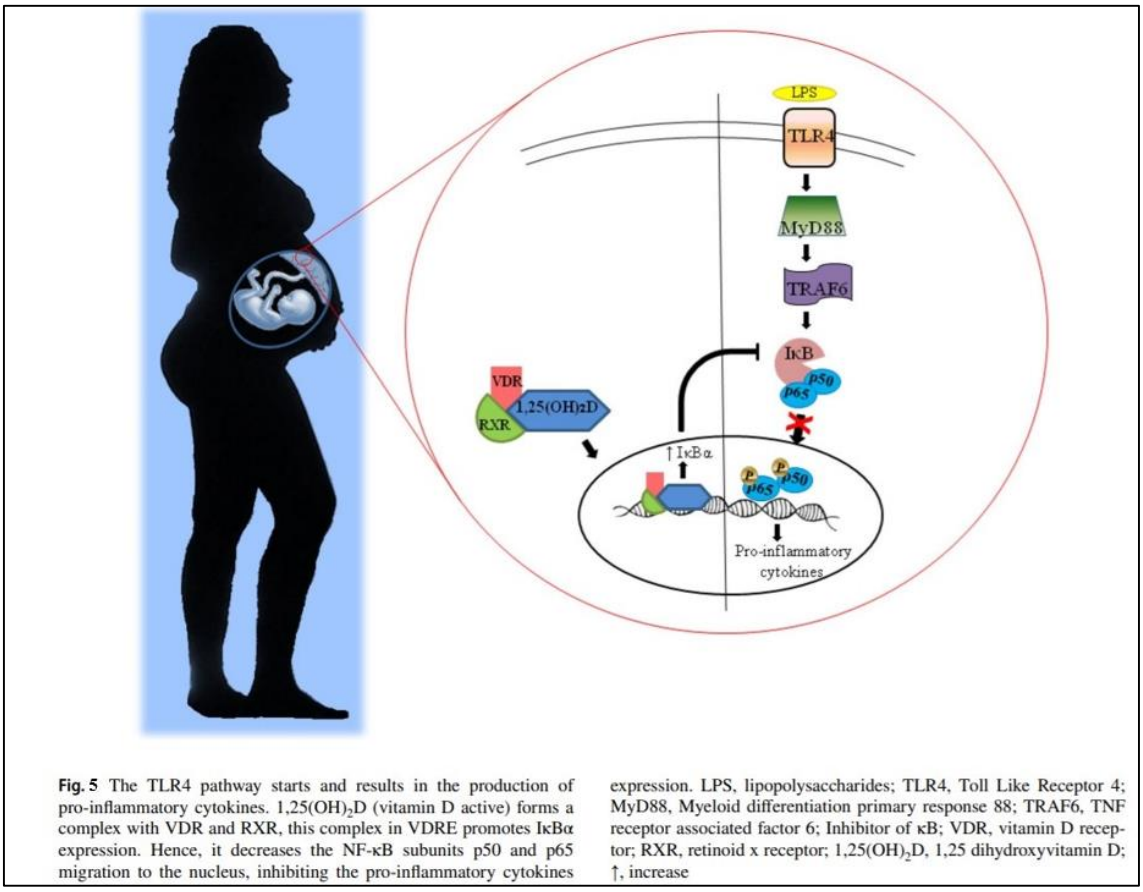


Fig. 5 The TLR4 pathway starts and results in the production of pro-inflammatory cytokines. $1,25(OH)_2D$ (vitamin D active) forms a complex with VDR and RXR, this complex in VDRE promotes IκBα expression. Hence, it decreases the NF-κB subunits p50 and p65 migration to the nucleus, inhibiting the pro-inflammatory cytokines expression. LPS, lipopolysaccharides; TLR4, Toll Like Receptor 4; MyD88, Myeloid differentiation primary response 88; TRAF6, TNF receptor associated factor 6; Inhibitor of κB; VDR, vitamin D receptor; RXR, retinoid x receptor; $1,25(OH)_2D$, 1,25 dihydroxyvitamin D; ↑, increase

Figure 5: TLR4 pathway [124]

4.1.4. Vitamin D and Cell Survival

Microtubule associated protein 1, light chain 3 beta (MAP1LC3B) and beclin-1 (BECN1), (MAP1LC3B/BECN1) is considered as a survival marker [125]. Its level is low in IUGR and early onset preeclampsia [125]. Vitamin D plays a role in the regulation of cell survival to counteract cell death caused by impaired placentation (figure 6). Vitamin D is important for placentation. It is deficient in preeclampsia [126]; therefore, vitamin D supplementation reduce the risk of preeclampsia [127].

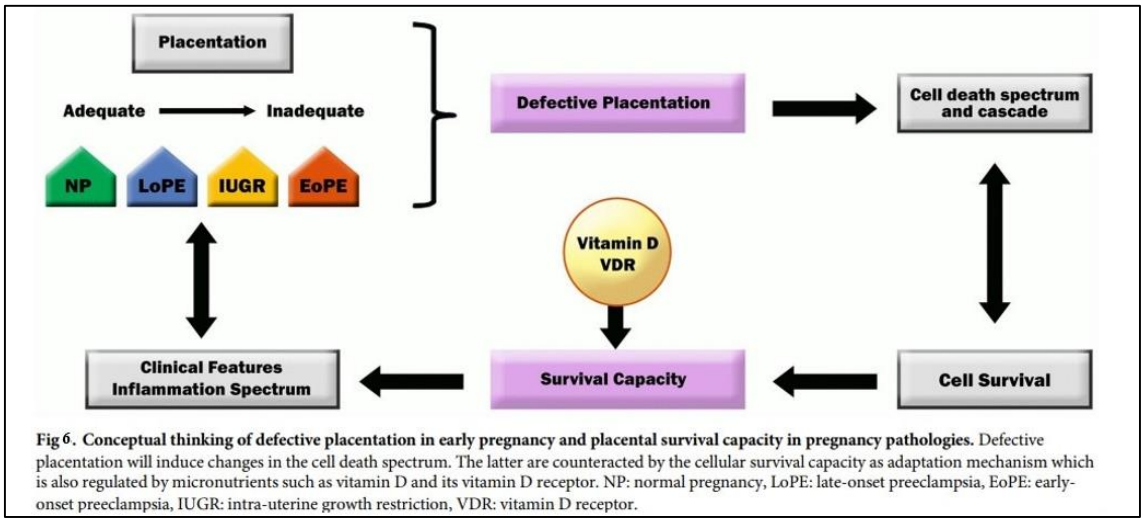


Fig 6. Conceptual thinking of defective placentation in early pregnancy and placental survival capacity in pregnancy pathologies. Defective placentation will induce changes in the cell death spectrum. The latter are counteracted by the cellular survival capacity as adaptation mechanism which is also regulated by micronutrients such as vitamin D and its vitamin D receptor. NP: normal pregnancy, LoPE: late-onset preeclampsia, EoPE: early-onset preeclampsia, IUGR: intra-uterine growth restriction, VDR: vitamin D receptor.

Figure 6: Defective placentation and cell survival [128]

4.1.5. Vitamin D and Thromboxane Production

Linoleic acid (omega-6 family) and alpha linolenic (omega-3 family) are converted to long chain polyunsaturated fatty acids such as arachidonic acid, eicosapentaenoic acid, and decosahexaenoic acid [129] which are the precursors of prostaglandins, prostacyclins (vasodilator), and thromboxane (vasoconstrictor) [130]. Arachidonic acid is converted into thromboxane under the effect of cyclooxygenase (COX). Thromboxane increases in the placenta of preeclamptic women [130]. Free radicals lead to an increase in thromboxane [131]. Vitamin D inhibits thromboxane production [132] by inhibiting COX2 [132].

4.2. Preterm Birth

Exaggerated inflammation caused by the activation of TLR can lead to preterm birth. Vitamin D can prevent preterm birth by decreasing TLR4 expression [25]. It also diminishes the inflammation in the myometrium by increasing IL-10 and decreasing proinflammatory cytokines [25].

COX-2 and CRH are pro-labor genes. COX-2 lead to prostaglandin synthesis [133] which play a role in uterine contractions. The placenta produces corticotropin-releasing hormone (CRH) reaching a peak at delivery [134]. In preterm birth, women have higher CRH early in pregnancy [135].

In addition, vitamin D insufficiency can lead to bacterial vaginosis [68] which is caused by the replacement of lactobacillus by anaerobic bacteria [136]. This can cause infection of the placenta leading to preterm birth [137].

4.3. Intrauterine Growth Restriction

Intrauterine growth restriction is also known as fetal growth restriction. It is defined by the 2015 Delphi consensus as birth weight that is less than the 3rd percentile [138]. In this case, the placenta is smaller than in normal pregnancies [139] [140] [141] [142]. The chorionic plate and the mean placental diameter are smaller [143] which decreases the interface of nutrient exchange [144]. There is an impairement in the development of the trophoblasts and formation of the vessels [145] [146]. In addition, the villi are thinner and less branched [144].

4.3.1. Downregulation of SNAT2

The plasma membranes of syncytiotrophoblasts contain nutrient transporters [147]. The transfer of nutrients to the fetus is reduced if the fusion of the villous cytotrophoblasts is altered leading to fetal growth restriction [148].

Fetal growth depends on amino acids transferred through the placenta. Non-essential amino acids are transported through system A amino acid transporters called sodium-coupled neutral amino acid transporters (SNAT1- SNAT2- SNAT4) [149].

Essential amino acids are transported through L- type amino acid transporters (LAT1-LAT2) independently of Na+ [150]. In the case of fetal growth restriction, SNAT2 is down regulated in the placenta [151] [152] [153]. The transport of amino acid across the placenta may be regulated by vitamin D [154]. One study showed that the group of patients receiving 4000 IU vitamin D have fewer cases of developing intrauterine growth restriction (IUGR) than the one receiving 400 IU vitamin D [102].

4.3.2. Hypoglycemia

During pregnancy, fetal gluconeogenesis is minimal causing high transplacental glucose gradient [155]. Hypoglycemia is due to a reduced level of glycolytic enzymes and lactate production in FGR placenta [156] rather than reduced expression of GLUT1 or glucose uptake [157] [158] [159].

4.3.3. Hypoxia

During early pregnancy, the placental environment is low in oxygen [160] [161] to avoid the formation of reactive oxygen species [162] that lead to oxidative stress. After the first trimester, a low oxygen partial pressure is a sign of a pathological environment in FGR placenta [144]. Hypoxia can also affect the vasculature in FGR placentae. Some studies have shown that soluble vascular endothelial growth factor (sFlt-1) and HIF-2α are high in term FGR placentae [163] [164].

CHAPTER 5

METHODS

5.1. Data sources- Search strategy

The search strategy was done with the help of an experienced librarian. MEDLINE (Ovid) (appendix 1), Embase (appendix 2), and CINAHL (appendix 3) databases were searched with the medical subject headings (MeSH), Emtrees, and CINAHL subject headings for "placenta" and "Vitamin D". Two reviewers performed independently the title/abstract screening and full-text screening. A screening form was developed for the full-text screening. Disagreements were resolved by consensus. We summarized the results using a PRISMA flow diagram.

5.2. Eligibility criteria- Study selection

- Topic: Studies related to vitamin D exposure or supplementation or deficiency focusing on the role of vitamin D on the placenta in cases of preeclampsia (preeclamptic women vs normotensive), preterm birth, and IUGR. Studies related to epigenetics were excluded.
- Study design: Primary research articles were included. Reports, conferences, congresses, meetings, editorials, correspondences, reviews, systematic reviews were excluded. The articles were restricted to English and French Languages.
- Population: Pregnant women of all age groups were included. Women with preexisting hypercalcemia, hypertension, diabetes, obesity, or autoimmune diseases were excluded, as well as, women who smokes or consume alcohols. Animal models, cell lines, h*uman* umbilical vein endothelial cells *(*HUVECs), and fetal

endothelial cells were excluded. Trophoblasts were included. Cells were included whether exposed to calcitriol in culture or taken from women supplemented with calcitriol.

- Outcomes: TXB2, 6-Keto PGF1α, sPLA2, 8-isoprostane, COX-2, HO-1, amino acid transporters, 4E-BP1, Akt, TNF-α, IFN-γ, IL-6, IL-1β, IL-10, sFLT1, SAM68, FLT1, MAP, UtA PI, PlGF, PAPP-A, HBD2, HBD3, hCTD, MAP1LC3B, BECN1, ICAM-1, VCAM-1, MDA, CBS, VEGF, PRB, hPL, ESR1, hCG-β, urinary 5-F2t-isoP, pro-MMP2, pro-MMP9, MP, superoxide, caveolin-1, eNOS, caspase-3 cleavage, ROCK1, and pro-labor genes (CRH and COX-2).

5.3. Data Abstraction

Data extraction was performed. All the information needed (study ID, country of corresponding author, sample size, type of study, population, outcomes, exposure, results) were summarized in a tabular format.

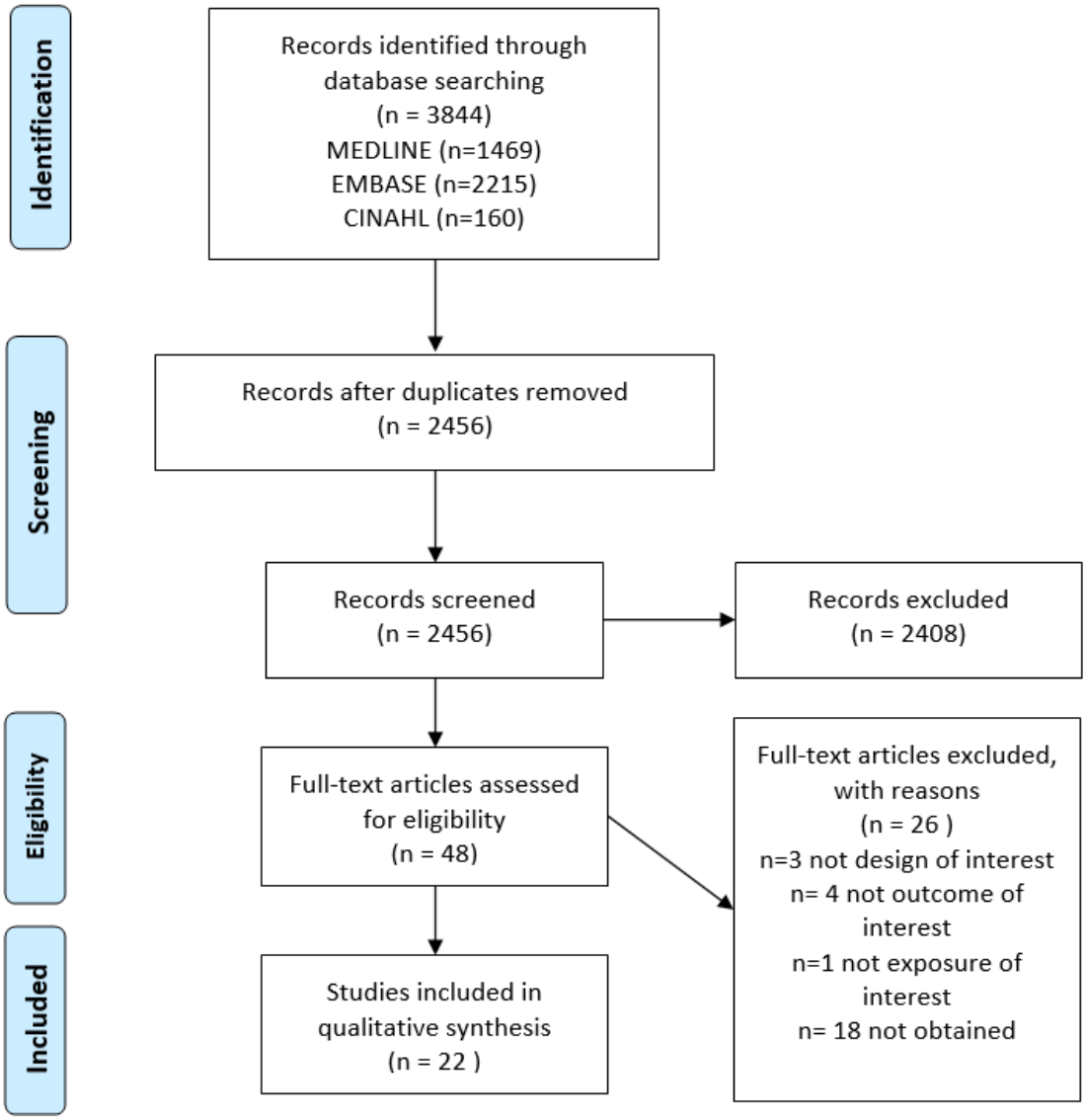
CHAPTER 6

RESULTS

6.1. General Characteristics

3844 records were obtained from MEDLINE (Ovid), Embase, and CINAHL (MEDLINE: (n=1469)/ Embase (n=2215)/ CINAHL (n=160)). Results were exported to endnote. After the removal of duplicates, 2456 records remained for the title/abstract screening. From the 2456 records, 48 records were selected for the full text screening according to the eligibility criteria. Among the 48 articles, 22 were included, 8 were excluded, and 18 were not obtained.

Table 1: PRISMA Flow Diagram



6.2. Results

Table 2: Characteristics of included studies

Study ID	Country of corresponding author	Type of study	Sample size	Population (inclusion/ exclusion criteria)	Exposure	Outcomes	Results
(Sun, Zhong et al. 2014)	USA	Lab study	NA	Inclusion: All placentas were delivered by uncomplicated pregnancies. Exclusion: NA	Calcitriol	*TXB2 and 6-Keto PGF1 alpha (stable metabolites of thromboxane-A2 and prostacyclin) *Soluble phospholipase-A2 (sPLA2) production *8-isoprostane (marker of increased oxidative stress and lipid peroxide production) *COX-2 *heme oxygenase-1: HO-1 (sensor of cellular stress)	*1,25(OH)2D3 alone had no effect on TXB2, 6-Keto PGF1alpha, and sPLA2 production. *It significantly decreased TXB2 production and the ratio of TXB2 to 6-Keto PGF1alpha induced by CoCl2. *It suppressed CoCl2-induced 8-isoprostane production and CoCl2-induced COX-2 up-regulation. *No significant effect on HO-1 (when cells were treated with CoCl2).
(Chen, Powell et al. 2017)	USA	Lab study	N=13	Inclusion: Healthy pregnant women undergoing elective Cesarean section at 37-40 weeks of gestation [term placental tissue treated with calcitriol]	Calcitriol	*Amino acid transporters: system A (SNAT1-SNAT2-SNAT-4)/ system L (LAT-1/LAT-2) *4E-BP1/ Akt (mTOR signaling)	*1,25-dihydroxy vitamin D3 significantly increased SNAT2 (mRNA). *No significant effect upon SNAT1 and SNAT 4. *No influence on LAT1, LAT2, total or phosphorylated 4E-BP1 Thr-37/46, and Akt Ser-473.

				Exclusion: NA			
(Noyola-Martinez, Diaz et al. 2013)	Mexico	Lab study	NT= 9 PE= 7	Inclusion: Placentas were acquired from normotensive controls (NT) (37–41 weeks of gestation) and PE pregnancies (29–37 weeks of gestation) following caesarean section. Exclusion: NA	Calcitriol	*TNF-α *IFN- γ *IL-6 *IL-1 β	*Calcitriol decreased both TNF-α and IL-6 in PE (gene expression+ protein). [IL-6 mRNA was not different compared to cells obtained from NT] (calcitriol downregulates IL-6 gene expression to levels observed in NT) *No significant effect upon IFN-γ and IL-1β.
(Barera, Noyola-Martinez et al. 2012)	Mexico	Lab study	NT= 9 PE= 7	Inclusion: All placentas were obtained by cesarean section. Exclusion: Patients with chronic hypertension (before pregnancy), diabetes mellitus, cervico-vaginal infections, renal, and	Calcitriol	IL-10	*Calcitriol inhibited IL-10 in NT and PE cultured cells (gene expression). At the protein level, same effect was observed in NT cell cultures but Il-10 was below the assay sensitivity limits in PE. *Calcitriol inhibited IL-10 (mRNA+ protein) when TNF-α was added in NT cell cultures to induce inflammation.

				other systemic illnesses.			
(Diaz, Noyola-Martinez et al. 2009)	Mexico	Lab study	NA	Inclusion: Term placentae (37–41 weeks of gestation) were acquired from uncomplicated pregnancies. Exclusion: NA	Calcitriol	*TNF-α *IL-6 *IFN-γ	*Calcitriol inhibited cytokine expression profile. *At the protein level, calcitriol inhibited IL-6.
(Awe, Sinkway et al. 2020)	US	Cohort (this is what the authors report on)	N=43 vitamin D deficient (n=36) vitamin D sufficient (n=7)	Inclusion: *18-45 years *37 delivered at term gestation, 6 were delivered between 34 + 4 to 36 weeks' gestation. Two cases developed pre-eclampsia. 25 were delivered by caesarean-section and 18 by vaginal delivery. Exclusion: NA	vitamin D	*sFLT1 *SAM68 (RNA binding protein) *FLT1	*At baseline assessment => no significant difference in median ΔCT values for sFLT1, SAM68 and FLT1 between vitamin D deficient and vitamin D sufficient patients. *At V6/7 => significant differences in median ΔCT values for FLT1 and SAM68 (more decrease in median fold expression for SAM68 in vitamin D sufficient pregnancies compared to vitamin D deficient pregnancies). *Median sFLT1 mRNA levels decreased in vitamin D sufficient placentas when considering V1 and V6/7 (more decrease at V6/7). *In multivariable regression models that included covariate adjustments for maternal infant characteristics, associations between ΔCT values and mother's V6/7 vitamin D status remained unchanged for sFLT1 and

							SAM68 but the significant association between FLT1 and mother's V6/7 vitamin D status was lost.
(Bomba-Opon, Brawura-Biskupski-Samaha et al. 2014)	Poland	Cross-sectional	N= 280 [25(OH)D < 20 ng/ml (n= 151)/ 25(OH)D > 20 ng/ml (n= 129)]	Inclusion: Healthy pregnant women examined at 11–13 weeks of gestation Exclusion: NA	25(OH)D	Preeclampsia markers: *MAP: mean arterial pressure *UtA PI: uterine artery pulsatility index *PlGF: placental growth factor *PAPP-A: pregnancy-associated plasma protein A	*No correlation between 25(OH)D and preeclampsia markers in the first trimester.
(Olmos-Ortiz, Noyola-Martinez et al. 2015)	Mexico	Lab study	NA	Inclusion: All placentas were obtained by cesarean section. Exclusion: Patients with chronic hypertension, diabetes mellitus, cervico-vaginal infections, renal, and other systemic illnesses.	Calcitriol	*IL-10 *AMP: antimicrobial peptides such as human β defensins HBD and cathlicidins): *HBD2 *HBD3 *hCTD	*Calcitriol up-regulated HBD2, HBD3 and hCTD (gene expression). *Calcitriol antagonized IL-10 inhibitory effects upon AMPs. * Il-10 secretion was downregulated by calcitriol (significantly).
(Hutabarat, Wibowo	Indonesia	Cross-sectional (this is what	N= 40 (N= 10 normal	Inclusion: all pregnant women	VDR levels	*MAP1LC3B *BECN1	*Negative correlation between the MAP1LC3B/BECN1 ratio and intracellular VDR in

et al. 2018)		the authors report on)	gestation group/ N= 11 with late-onset preeclampsia / N= 9 with early-onset preeclampsia / N=10 in the IUGR group).	whose pregnancy was terminated by cesarean section due to early and late-onset preeclampsia, IUGR and normal term pregnancy without complications in the labor process. Exclusion: all pregnant women who suffered from other diseases, such as heart disease in pregnancy, diabetes mellitus, auto-immune diseases during pregnancy such as lupus erythematosus, pregnant women with congenital		(MAP1LC3B/ BECN1 ratio: cellular survival marker)	villous trophoblast in the four groups (strongest correlation with normal pregnancy group then IUGR group then late-onset preeclampsia group then early-onset preeclampsia group).

				abnormalities of the baby, preterm labor, severe infection during pregnancy or women not willing to take part in this study.			
(Wei, Audibert et al. 2013)	Canada	Prospective cohort study (this is what the authors report on)	N=697 (n=32 developed preeclampsia including 6 superimposed preeclampsia)	Women were in the high risk stratum for preeclampsia if they met at least one of the following 4 criteria: (1) prepregnancy chronic hypertension (diastolic blood pressure of 90 mm Hg or greater or the use of an antihypertensive medication before 20 weeks of	25(OH)D (measured at 12-18 and 24-26 weeks) [The lower and upper limits of detection for 25(OH)D were 10 nmol/L and 375 nmol/L, respectively]	indicators of angiogenesis and endothelial dysfunction (measured at 24-26 weeks): *sFlt-1 *PlGF *ICAM-1: intercellular adhesion molecule-1 *VCAM-1: vascular adhesion molecule	*Maternal 25(OH)D levels at 12-18 weeks and 24-26 weeks of gestation were positively correlated with PlGF at 24-26 weeks. Maternal 25(OH)D level at 12-18 weeks and ICAM-1 at 24-26 weeks were inversely correlated. *No association between 25(OH)D and sFlt-1 or VCAM-1. <u>Vitamin D status:</u> *PlGF at 24-26 weeks were significantly lower and ICAM-1 levels were significantly higher in pregnant women whose 25(OH)D levels were less than 50 nmol/L at 12-18 weeks and 24-26 weeks of gestation compared with those who were not. *No significant association between vitamin D status and sFlt-1 or VCAM-1 concentrations.

				gestation); (2) prepregnancy diabetes; (3) a multiple pregnancy; or (4) a history of preeclampsia. The remaining women were nulliparae without other risk factors for preeclampsia (low-risk group) Exclusion: NA			
(Yu, Ertl et al. 2013)	UK	Case-control study (this is what the authors report on)	N= 90 PE, [30 early PE and 60 with late PE] N= 1000 unaffected controls	None of the women were receiving vitamin D supplements and none had any known liver or renal disease.	Vitamin D (at 11-13 weeks)	*PAPP-A *MAP *Uterine artery PI (at 11-13 weeks)	*No significant association of vitamin D with PAPP-A, uterine artery PI, MAP. (either in the control group or the PE group)
(Nandi, Wadhwani et al. 2021)	India	Cross-sectional study (this is what the authors	N= 119 pregnant women [69 normo	Inclusion: Women with singleton pregnancy, aged 18 to 35	*25(OH)D *VDR	*MDA: plasma malondialdehyde: oxidative stress marker *CBS: cystathionine-	*Maternal plasma malondialdehyde was negatively associated with maternal serum 25(OH)D levels. *Placental VDR was positively associated with

		report on)	tensive control women and 50 women with preeclampsia]	years. *NC group consisted of pregnant women delivering at term (total gestation ≥37 weeks and baby weight ≥2.5 kg) with no medical or obstetric complications. *Women with preeclampsia delivering both at term and preterm. Exclusion: *Women with chronic hypertension, seizure disorder, type 1 or type 2 diabetes mellitus, renal disease, and liver disease. *Pregnant women consuming alcohol or drugs.		β-synthase: components of the one carbon metabolism [lower CBS → more homocysteine → more oxidative stress]	placental CBS (protein+ mRNA).

(Schulz, Cruze et al. 2017)	USA	Cohort (this is what the authors report on)	N= 43 [13: vitamin D deficient (< 100 nmol/L) and 30 vitamin D sufficient (≥ 100 nmol/L) at V6/7] [At baseline, 36 women were vitamin D deficient and 7 women were vitamin D sufficient.]	Inclusion: 18–45 years of age who presented at 8-14 weeks' gestation with a singleton pregnancy. Exclusion: pre-existing calcium or uncontrolled thyroid/parathyroid disease, requiring chronic diuretic/cardiac medications, sickle cell disease, sarcoidosis, and inflammatory bowel disease.	Vitamin D	<u>Function in angiogenesis:</u> *sFLT1 *PGF: placental growth factor *VEGF: vascular endothelial growth factor <u>Role in placental maintenance:</u> *PRB: progesterone receptor B *hPL: human placental lactogen *ESR1: estrogen receptor 1 *hCGβ: human chorionic gonadotropin b	**At V6/7:** *Delta CT values for VEGF and sFlt-1 are significantly different between vitamin D deficient and sufficient pregnant women (median values were higher in the vitamin D sufficient group). **At V1:** *the values for sFlt-1, PRB, and hPL are significantly different between vitamin D deficient and sufficient pregnant women. (higher 25(OH)D → higher VEGF, PGF, PRB, s-Flt-1). *Mean $2^{-\Delta CT}$ for PGF, VEGF, s-Flt-1: lower in vitamin D sufficient group (downregulation in PGF, VEGF, s-Flt-1) There is no statistically significant difference in PGF expression between the two groups. /There is a significant difference in VEGF and s-Flt-1 expression between the 2 groups. *Baseline 25(OH)D is associated with VEGF after considering other variables in the model at a significance level of 0.05 but not with the other genes. * 25(OH)D at V6/7 is not associated with these genes at a significance level of 0.05, adjusting the effect of maternal age, maternal baseline BMI and race/ethnicity. *Vitamin D sufficiency has a significant effect on

							downregulating the overall expression of VEGF, sFlt-1 (and a small but not significant decrease in PGF) as compared to deficient women. *Significant association between 25(OH)D and PRB, hPL at baseline. *No significant difference of ESR1 or hCGβ between vitamin D sufficient and deficient groups (mRNA).
(Woodham, Brittain et al. 2011)	US	Nested case-control study (this is what the authors report on)	164 samples [with severe preeclampsia (n=41) versus women with uncomplicated term birth (n=123)]	Inclusion: Healthy women with term deliveries (≥37 weeks) were used as controls. Exclusion: women with multiple gestation, major congenital fetal anomalies, pregestational hypertension, kidney disease, diabetes mellitus, known thrombophilias, or any other significant preexisting chronic medical disease.	Midgestation serum 25(OH)D 2nd trimester	*VEGF *sFLT-1 *PlGF (sFLT-1/PlGF ratio)	*No correlation of VEGF, sFLT-1, PlGF, or sFLT-1/PlGF ratio with 25(OH)D levels.

(Cleal, Day et al. 2015)	UK	Cross-sectional	N=102 (placental samples)	20-34 years (no preeclampsia or gestational diabetes)	*25(OH)D (measured for 91 women)	Placental amino acid transporters	*Positive correlation between maternal 34-week plasma 25(OH)D levels and LAT3, ASCT1 and y+LAT1 and a negative correlation with SNAT1. *Positive correlation between maternal VDBP and TAT1, LAT3, LAT4, SNAT1, SNAT2, y+LAT2, type-II membrane glycoprotein heavy chain (4F2HC), and EAAT3/ no significant correlation with LAT1. *After adjusting for maternal confounding factors: -all correlations were still present, except for the relationships between 25(OH)D and ASCT1, and VDBP and TAT1 -positive correlation between VDBP and LAT-1 (mRNA)
(Zabul. Wozniak et al. 2015)	Poland	Cross-sectional	74 pregnant women (43 with severe preeclampsia and 31 women with no symptoms of preeclampsia)	The investigational group comprised patients with direct indications for having the pregnancy terminated by caesarian section, i.e., preeclampsia due to uncontrolled rise in blood pressure in spite of	25(OH)D3 (after C-section)	Urinary 5-F2t-isoprostane (15-F2t-isoP: a product of nonenzymatic lipid peroxidation/ renal vasoconstrictor/ marker of oxidative stress)	*No correlation between of 15-F2t-isoP and plasma levels of 25(OH)D3 in either of the study groups (preeclamptic vs control).

				antihypertensive treatment. The control group was made up of pregnant patients with other obstetric indications for C-section, such as breech presentation, cephalopelvic disproportion or dystocia. Exclusion: concomitant medical conditions in the mother and low birth weight in the newborn.			
(Xu, Lee et al. 2014)	US	Cohort study/ retrospective study (this is what the authors report on)	*N=100 NT (30 subjects had vitamin D deficiency/ 54 had vitamin D insuffi	Nulliparous women carrying a singleton pregnancy.	Vitamin D (vitamin D deficiency < 37.5 nmol/L vitamin D insufficiency 37.5-75	Il-6 (3rd trimester)	*No significant difference in the prevalence of IL-6 elevation between women who are vitamin D deficient and the ones who are not.

			ciency / 16 had vitamin D sufficiency) *N=100 preeclamptic (41% had severe vitamin D deficiency, 54% had vitamin D insufficiency, and 5% had normal vitamin D concentrations)		nmol/L Vitamin D sufficiency> 75 nmol/L).		
(Alvarez-Fernandez, Prieto et al. 2015)	Spain	Retrospective full-blinded cohort study (this is what the authors report on)	N= 257 (74 developed PE)	Women were classified into two groups: < 34 weeks and ≥ 34 weeks of gestation. Exclusion: Women who were diagnosed of PE	25(OH)D (at 20-41 weeks (clinical presentation) and at the 1st trimester (9-12 weeks)	*PlGF *sFlt-1 *sFlt-1/PlGF ratio (only in samples obtained at clinical presentation)	*No association between PlGF, sFlt-1 and sFlt-1/PlGF ratio) and 25(OH)D.

				before their presentation at the Emergency Department were not included.			
(Vestergaard, Justesen et al. 2021)	Denmark	Prospective cohort study (this is what the authors report on)	N=223 (blood samples) (N=132 placentas)	Inclusion: pregnant women undergoing a nuchal translucency scan in weeks 11-14 of gestation. Exclusion: age < 18 years and weak Danish language skills. For gene analysis, 30 placental samples from singleton pregnancies were selected excluding placentas from women who smoked, and from pregnancies affected by FGR and PE.	25(OH)D (vitamin D insufficiency: <75 nmol/L)	PAPP-A	*PAPP-A was significantly lower in women with 1st trimester vitamin D insufficiency.

(Chan, Susarla et al. 2015)	UK	Lab study	NA	The fetuses were not known to have abnormal karyotypes nor structural anomalies	1,25-D3 and 25-D3	*EVT invasion *Matrix metalloproteinases: *pro-MMP2 *pro-MMP9	*1,25-D3 and 25-D3 lead to an increase in EVT invasion. *Vitamin D treatment lead to an increase in pro-MMP2 and pro-MMP9 secretion.
(Xu, Jia et al. 2017)	USA	Lab study	N= 31 (25 from uncomplicated and 6 from preeclamptic pregnancies)	None of the pregnant women had signs of infection Exclusion: smokers	Calcitriol	*MP: microparticle (microvesicles shed by syncytiotrophoblasts) *Superoxide *Caveolin-1 *Endothelial nitric oxide synthase (eNOS) expression *Caspase-3 cleavage and Rho-associated coiled-coil protein kinase 1 (ROCK1) activation (Apoptosis pathway signaling molecules)	*1,25(OH)2D3 plus CoCl2 (in uncomplicated placentas) => decrease in MP shedding + inhibition of superoxide *No effect of calcitriol alone on caveolin-1 and eNOS expression in trophoblasts and trophoblasts-derived MP. * 1,25(OH)2D3 inhibited increased caveolin-1 expression in trophoblasts and trophoblast derived MPs (under oxidative stress). *It partially inhibited decrease in eNOS expression in trophoblasts and increase in eNOS expression in MPs (under oxidative stress) * 1,25(OH)2D3 decreased caspase-3 cleavage and ROCK1 activation in trophoblasts (induced by CoCl2). *Calcitriol reduced the expression of procaspase-3, cleaved caspase-3, and cleaved ROCK1 in trophoblast derived MP cells (induced by CoCl2).
(Wang, Cruz Ithier et al. 2018)	USA	Lab study	NA	Inclusion: placenta from healthy women	Calcitriol	*CRH *COX-2 (prolabor genes)	*15 of the miRNAs putatively targeting *CRH* are stimulated by 1,25(OH)2D-VDR

				with estimated gestational age of 38 and 40 weeks who were delivered by elective Cesarean section. Exclusion: Women with diabetes, hypertension, autoimmune diseases, infection, fetal growth restriction and preeclampsia.			*miR-26b-5p that putatively target COX-2 was stimulated by 1,25(OH)2D-VDR *Calcitriol downregulates COX2 and CRH genes.

6.3. Main Outcomes

5 studies showed the effect of vitamin D on inflammatory cytokines, 10 studies on markers in preeclampsia, 1 study on pro-MMP2 and pro-MMP9, 1 study on MAP1LC3B/BECN1 ratio, 1 study on MDA and CBS, 1 study on 15-F2t-isoP, 2 studies on placental amino acid transporters, and 1 study on pro-labor genes.

6.3.1. Inflammatory Cytokines and Antimicrobial Peptides

Calcitriol decreased TNF-α [165] [166] and inhibited IL-10 [167] [44]. One study showed that it had no significant effect on IFN-γ and IL-1β [165] while another

study showed that it decreased IFN-γ [166]. Noyola-Martinez et al. and Diaz et al. showed that it decreased IL-6 [165] [166] while Xu et al. showed that there is no significant difference in the prevalence of IL-6 elevation between vitamin D deficient and vitamin D sufficient women [168]. In addition, it increased the expression of HBD2, HBD3 and hCTD in placental cell cultures [44].

6.3.2. Markers in Case of Preeclampsia

Calcitriol decreased TXB2 production and TXB2 to 6-keto PGF1α ratio, suppressed 8-isoprostane, and COX-2 upregulation, but had no effect on HO-1 (when induced by CoCl2) [132]. No correlation was seen between 25(OH)D and MAP, UtA PI, PlGF, or PAPP-A in the first trimester [169], and between vitamin D and PAPP-A, uterine artery PI, or MAP at 11-13 weeks [170]. However, one study showed that PAPP-A was significantly lower in women having 1st trimester vitamin D insufficiency [171]. A positive correlation between 25(OH)D (at 12-18 weeks and 24-26 weeks) and PlGF (at 24-26 weeks) , a negative correlation between 25(OH)D and ICAM-1, but no correlation were seen between 25(OH)D and sFlt-1 or VCAM-1 [172]. When they took into consideration vitamin D status, they found that PlGF were significantly lower, ICAM-1 were significantly higher in women with 25(OH)D levels less than 50 nmol/L compared with those who were not [172]. However, there was no significant association between vitamin D status and sFlt-1 or VCAM-1 between these 2 groups [172]. FLT1, sFLT1, and SAM68 were lower in vitamin D sufficient pregnancies [173]. No correlation was seen between 25(OH)D and VEGF [174], sFLT-1 [174] [175], PlGF [174] [175], or sFLT-1/PlGF ratio [174] [175]. One study showed that VEGF and sFLT-1 were significantly decreased in the vitamin D sufficient group as compared to

the vitamin D deficient group [176]. There was a no significant difference of ESR1 or hCG-β between vitamin D sufficient and deficient groups and a significant association between 25(OH)D and PRB or hPL [176]. One study showed that calcitriol inhibited superoxide, decreased MP, caspase-3 cleavage and ROCK1 activation (when induced by CoCl2) [177]. It inhibited increased caveolin-1 expression in trophoblasts and MPs [177]. It partially inhibited decrease in eNOS expression in trophoblasts and increase in eNOS expression in MPs [177].

6.3.3. Pro-MMP2 and Pro-MMP9

Vitamin D can lead to an increase in EVT invasion, pro-MMP2 and pro-MMP9 secretion [178].

6.3.4. MAP1LC3B/BECN1 Ratio

A negative correlation was seen between MAP1LC3B/BECN1 ratio and VDR in villous trophoblasts [128].

6.3.5. MDA and CBS

One study conducted by Nandi et al. showed a negative association between maternal plasma MDA and maternal 25(OH)D and a positive association between placental VDR and placental CBS [179].

6.3.6. Urinary 15-F2t-isoP

No correlation was found between urinary 15-F2t-isoP and 25(OH)D3 [82].

6.3.7. Amino Acids Transporters

2 studies reported that vitamin D can influence amino acid transporters [180] [181]. The transfer of amino acids in the placenta is important for fetal growth [182]. One of these 2 studies showed that calcitriol caused an increase in SNAT2, but had no significant effect on SNAT1 [180]. The other one showed that there was a positive correlation between VDBP and SNAT2 and a negative correlation between maternal 34-week plasma 25(OH)D levels and SNAT1 [181]. Regarding other amino acid transporters, there was a positive correlation between maternal 34-week plasma 25(OH)D levels and LAT3, ASCT1 or y+LAT1 [181]. Calcitriol did not affect SNAT4, LAT1, and LAT2 [180]. It had no effect on total or phosphorylated 4E-BP1 Thr-37/46, Akt Ser-473 [180]. Therefore, it does not affect mTOR signaling [180] that has been shown to play a role in the effect of vitamin D on protein synthesis [183].

6.3.8. CRH and COX2 Genes

One study reported that vitamin D downregulates CRH and COX2 genes which are pro-labor genes [184] preventing preterm birth.

6.4. Risk of Bias Assessment

Table 3: Risk of bias for observational studies

Study ID	Population	Flawed measurement (exposure + outcome)	Confounding	Follow-up
(Awe, Sinkway et al. 2020)	Not clear	Tests done Low risk of bias	Regression Low risk of bias	Yes Low risk of bias
(Bomba-Opon, Brawura-Biskupski-Samaha et al. 2014)	Study groups examined at the same hospital Low risk of bias	Tests done Low risk of bias	No High risk of bias	No (cross-sectional) High risk of bias
(Hutabarat, Wibowo et al. 2018)	Study groups attended 2 hospitals Low risk of bias	Tests done Low risk of bias	No High risk of bias	No (cross-sectional) High risk of bias
(Wei, Audibert et al. 2013)	Canadian INTAPP subjects Low risk of bias	Tests done Low risk of bias	No adjustment for the association of interest. High risk of bias	Yes Low risk of bias
(Yu, Ertl et al. 2013)	Study groups examined at the same hospital Low risk of bias	Tests done Low risk of bias	No adjustment for the association of interest. High risk of bias	No (11-13 weeks) High risk of bias
(Nandi, Wadhwani et al. 2021)	Study groups examined at the same hospital Low risk of bias	Tests done Low risk of bias	No High risk of bias	No (cross-sectional) High risk of bias
(Schulz, Cruze et al. 2017)	Study groups examined at the same hospital Low risk of bias	Tests done Low risk of bias	Regression Low risk of bias	Yes Low risk of bias
(Woodham, Brittain et al. 2011)	Study groups delivered at the same hospital Low risk of bias	Tests done Low risk of bias	No adjustment for the association of interest. High risk of bias	No (15-20 weeks) High risk of bias
(Cleal, Day et al. 2015)	Southampton Women's Survey Low risk of bias	Tests done Low risk of bias	Yes Low risk of bias	No (cross-sectional) High risk of bias
(Zabul. Wozniak et al. 2015)	Caucasian women of northern Poland who were admitted to the hospital Low risk of bias	Tests done Low risk of bias	No High risk of bias	No (cross-sectional) How risk of bias
(Xu, Lee et al. 2014)	Not clear	Tests done Low risk of bias	Regression Low risk of bias	Yes Low risk of bias
(Alvarez-Fernandez,	Same hospital Low risk of bias	Tests done Low risk of bias	No adjustment for the association of interest.	Yes Low risk of bias

Prieto et al. 2015)			High risk of bias	
(Vestergaard, Justesen et al. 2021)	Same hospital Low risk of bias	Tests done Low risk of bias	No adjustment for the association of interest. High risk of bias	Yes Low risk of bias

CHAPTER 7

DISCUSSION

7.1. Summary of Findings

Vitamin D decreased TNF-α, IL-10, and IL-6 wich are involved in inflammation. Different results were obtained for the association of vitamin D with IFN-γ. It increased antimicrobial peptides like HBD2, HBD3, and hCTD. Regarding oxidative stress, it decreased TXB2 production, TXB2 to 6-keto PGF1α ratio, 8-isoprostane, caspase-3 cleavage, ROCK1 activation, MP, caveolin-1, and superoxide (when induced by CoCl2), but had no effect on HO-1 and 15-F2t-isoP. Also, a negative correlation was seen between vitamin D and MDA and a positive correlation was seen between VDR and CBS. Moreover, a negative correlation was seen between vitamin D and the cell survival marker MAP1LC3B/BECN1. Different results were obtained for the association of vitamin D with VEGF, sFLT-1, PAPP-A, or PlGF which play a role in preeclampsia. However, it had no effect on MAP, UtA PI, VCAM-1, ESR1, and hCG-β. A negative correlation was seen between vitamin D and ICAM-1. Also, it increased EVT invasion, pro-MMP2, and pro-MMP9. In addition, it increased amino acid transporters SNAT2 but had no effect on SNAT4, LAT1, LAT2, 4E-BP1 Thr-37/46 and Akt Ser-473. A positive correlation was found between vitamin D and LAT3, ASCT1 or y+LAT1. Different results were obtained with SNAT1. Lastly, it decreased CRH, COX-2 which are pro-labor genes.

7.2. Comparison to Other Studies

TNF-α, Il-6, and IFN-γ contain VDRE [185] [186] [187] which can explain the effect of calcitriol on these cytokines. Calcitriol downregulates IL-6 and TNF-α [188] which is in accordance with the papers used in table 2 [165] [166].

One study in this systematic review showed a positive correlation between maternal plasma 25(OH)D levels and LAT3, ASCT1 [181]. In their promoter region, these 2 genes have been shown to have VDRE [189] which explains the association between LAT3, ASCT1 and 25(OH)D.

Some other studies showed that vitamin D deficiency has an impact on placental formation, angiogenesis, and immunity leading to the pathogenesis of PE [190] [191] [192] [193]. In our case, some studies showed a correlation between vitamin D and PE markers while others did not.

In our results, 2 studies showed no correlation between 25(OH)D and PAPP-A [169] [170] and 1 study showed that PAPP-A was lower in women with vitamin D insufficiency [171]. The latter is consistent with a study conducted by Yayla Abide et al. showing an association between low PAPP-A and low 25(OH)D [194].

In this systematic review we showed that vitamin D can lead to an increase in EVT invasion [178]. hCG-β were not significantly different between vitamin D sufficient and deficient groups [176]. Aditionally, there was a significant association between 25(OH)D and hPL [176]. Other studies showed that calcitriol leads to extravillous trophoblast invasion and regulates human chorionic gonadotropin, estradiol, and placental lactogen [21] [22] [20].

7.3. Strengths and Limitations

- Strengths:
  - It is systematic.
  - 3 databases were searched and the search strategy was comprehensive.
  - Inclusion and exclusion criteria were stated.
  - Included studies were mentioned.
  - Risk of bias was done for observational studies using GRADE.

- Limitations:
  - Grey literature was not searched.
  - Data abstraction was not done in duplicate.

7.4. Implication for Practice

Researchers are realizing the importance of vitamin D in fertility, reproduction, and pregnancy. Many studies are showing that vitamin D supplementation should be recommended during pregnancy. It is used as a therapeutic tool to prevent some health problems not only during gestation but also over the long term. Regarding the association of vitamin D with some preeclamptic markers, different results from different studies were obtained; therefore, more studies should be done. Currently, many studies are being done on COVID-19 positive women to explore the effect of vitamin D in these cases.

CHAPTER 8

CONCLUSION

As a conclusion, this systematic review showed that vitamin D downregulates pro-labor genes to avoid preterm birth and increases the expression of the amino acid transporter SNAT2 which is essential for fetal growth. Moreover, it decreases some inflammatory cytokines. Regarding preeclamptic markers, different results from different studies were obtained. Maternal vitamin D deficiency causes serious health problems. Thus, vitamin D supplementation should be recommended. Further investigation is needed.

APPENDIX 1

Search strategy- MEDLINE

1 exp Placenta/ (67676)

2 (placent* or transplacent* or (trans adj placent*) or f?etoplacent* or (f?eto adj placent*) or uteroplacent* or (utero adj placent*) or chorionic villi or chorionic villus or basal plate?).mp. (132344)

3 (cell differentiation/ or asymmetric cell division/ or cellular reprogramming/ or cell lineage/) and exp Placenta/ (2505)

4 (((cell* adj (lineage? or differentiation? or fate? or elongation? or specificity)) or ((assymetric or as-symetric) adj (cell* division? or cell* differentiation?)) or (nuclear adj (reprogram* or (re adj program*)))) and (placent* or trophoblast* or cytotrophoblast* or (cyto adj trophoblast*) or syncytiotrophoblast* or (syncytio adj trophoblast*) or decidua?)).mp. (4290)

5 (decidua* or deciduoma* or deciduum or (deciduous adj2 membrane?)).mp. (11726)

6 (cytotrophoblast* or (cyto adj trophoblast*) or (Langhans adj3 layer?) or syncytiotrophoblast* or (syncytio adj trophoblast*) or trophoblast*).mp. (28664)

7 Placental Extracts/ (638)

8 Placentation/ (2703)

9 (Induced Pluripotent Stem Cells/ or exp Cell Transdifferentiation/ or Cellular Reprogramming Techniques/) and exp Placenta/ (132)

10 ((Induced Pluripotent Stem Cell? or ips cell? or hipsc or (cell* adj (transdifferentiat* or (trans adj differentiat*) or plasticit* or reprogram* or (re adj program*) or program*)) or (epithelial adj mesenchymal adj (transformation* or transition*)) or (epithelial to mesenchymal adj (transformation* or transition*)) or directed differentiation technique?) and (placent* or trophoblast* or cytotrophoblast* or (cyto adj trophoblast*) or syncytiotrophoblast* or (syncytio adj trophoblast*) or decidua?)).mp. (490)

11 exp Vitamin D/ or Vitamin D Deficiency/ (64716)

12 ("1406-16-2" or VitaminD or VitaminD1 or VitaminD2 or VitaminD3 or VitD or VitD1 or VitD2 or VitD3 or ((Vitamin* or Vit) adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3")))).mp. (82162)

13 (c?olecalciferol* or (c?ole adj calciferol*) or 1c6v77qf41 or 67-97-0 or calciol* or hydroxycalciol* or (hydroxy adj calciol*)).mp. (9091)

14 (hydroxyc?olecalciferol* or (hydoxy adj c?olecalciferol*) or (hydroxy adj c?ole adj calciferol*) or (hydroxyc?ole adj calciferol*) or ((hydroxyvitamin* or (hydroxy adj vitamin*) or hydroxyvit or (hydroxy adj vit) or (OH adj vitamin*) or (OH adj vit) or OHvitamin* or OHvit) adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or hydroxyvitaminD or hydroxyvitaminD1 or hydroxyvitaminD2 or hydroxyvitaminD3 or hydroxyvitD or hydroxyvitD1 or hydroxyvitD2 or hydroxyvitD3 or (hydroxy adj (vitaminD or vitaminD1 or vitaminD2 or vitaminD3 or VitD or VitD1 or VitD2 or VitD3))).mp. (24491)

15 (25hydroxyc?olecalciferol* or ("25" adj hydroxyc?olecalciferol*) or ("25" adj hydroxy adj c?ole adj calciferol*) or (25hydroxy adj c?ole adj calciferol*) or ("25" adj hydroxyc?ole adj calciferol*) or (25hydroxyc?ole adj calciferol*) or ("25" adj hydroxy adj c?olecalciferol*) or (25hydroxy adj c?olecalciferol*) or ((25hydroxyvitamin* or

("25" adj hydroxyvitamin*) or ("25" adj hydroxy adj vitamin*) or (25hydroxy adj vitamin*) or ("25" adj hydroxyvit) or ("25" adj hydroxy adj vit) or (25hydroxy adj vit)) adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or ("25" adj hydroxyvitaminD) or ("25" adj hydroxyvitaminD1) or ("25" adj hydroxyvitaminD2) or ("25" adj hydroxyvitaminD3) or ("25" adj hydroxy adj vitaminD) or ("25" adj hydroxy adj vitaminD1) or ("25" adj hydroxy adj vitaminD2) or ("25" adj hydroxy adj vitaminD3) or (25hydroxy adj vitaminD) or (25hydroxy adj vitaminD1) or (25hydroxy adj vitaminD2) or (25hydroxy adj vitaminD3)).mp. (20040)
16 ("25(OH)D" or ("25" adj OH adj vitamin* adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or (25OH adj vitamin* adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or ("25" adj OHvitamin* adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or (25OHvitamin* adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or ("25" adj OH adj vit adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or (25OH adj vit adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or ("25" adj OHvit adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or (25OHvit adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3")))).mp. (11806)
17 (dihydroxyc?olecalciferol* or (di adj hydroxy adj c?ole adj calciferol*) or (dihydroxyc?ole adj calciferol*) or (dihydroxy adj c?olecalciferol*) or (di adj hydroxyc?olecalciferol*) or (di adj hydroxy adj c?olecalciferol*) or (di adj hydroxyc?ole adj calciferol*) or (dihydroxy adj c?ole adj calciferol*) or ((dihydroxyvitamin* or (dihydroxy adj vitamin*) or (di adj hydroxy adj vitamin*) or (di adj hydroxyvitamin*) or dihydroxyvit or (di adj hydroxy adj vit) or (di adj hydroxyvit) or (dihydroxy adj vit) or (OH2 adj vitamin*) or (OH2 adj vit) or (OH adj "2" adj vitamin*) or (OH adj "2" adj vit)) adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3"))) or dihydroxyvitaminD or dihydroxyvitaminD1 or dihydroxyvitaminD2 or dihydroxyvitaminD3 or dihydroxyvitD or dihydroxyvitD1 or dihydroxyvitD2 or dihydroxyvitD3 or ((dihydroxy or (di adj hydroxy)) adj (vitaminD or vitaminD1 or vitaminD2 or vitaminD3 or VitD or VitD1 or VitD2 or VitD3))).mp. (17054)
18 ((di adj hydrovitamin adj (D or D2 or (D adj "2"))) or (di adj hydro adj vitamin adj (D or D2 or (D adj "2"))) or (dihydro adj vitamin adj (D or D2 or (D adj "2"))) or (dihydrovitamin adj (D or D2 or (D adj "2"))) or (vitamin adj (D adj "4")) or (vitamin adj D4)).mp. (31)
19 ("(24r)-24,25-dihydroxyvitamin d3" or 40013-87-4 or "55721-11-4 ((3beta,5z,7e,24r)-isomer)" or ((1,25 or 24,25) adj dihydroxyc?olecalciferol*) or ((1,25 or 24,25) adj dihydroxyc?ole adj calciferol*) or ((1,25 or 24,25) adj dihydroxy adj c?olecalciferol*) or ((1,25 or 24,25) adj di adj hydroxyc?olecalciferol*) or ((1,25 or 24,25) adj dihydroxy adj c?ole adj calciferol*) or ((1,25 or 24,25) adj di adj hydroxyc?ole adj calciferol*) or ((1,25 or 24,25) adj di adj hydroxy adj c?olecalciferol*) or ((1,25 or 24,25) adj di adj hydroxy adj c?ole adj calciferol*) or 1,25dihydroxyc?olecalciferol* or (1,25dihydroxyc?ole adj calciferol*) or (1,25dihydroxy adj c?olecalciferol*) or (1,25di adj hydroxyc?olecalciferol*) or (1,25dihydroxy adj c?ole adj calciferol*) or (1,25di adj hydroxyc?ole adj calciferol*) or (1,25di adj hydroxy adj c?olecalciferol*) or (1,25di adj hydroxy adj c?ole adj calciferol*) or 24,25dihydroxyc?olecalciferol* or (24,25dihydroxyc?ole adj calciferol*) or (24,25dihydroxy adj c?olecalciferol*) or (24,25di adj hydroxyc?olecalciferol*) or (24,25dihydroxy adj c?ole adj calciferol*) or (24,25di adj hydroxyc?ole adj calciferol*)

or (24,25di adj hydroxy adj c?olecalciferol*) or (24,25di adj hydroxy adj c?ole adj calciferol*) or ((1,25dihydroxyvitamin* or 24,25dihydroxyvitamin* or ((1,25 or 24,25) adj dihydroxyvitamin*) or ((1,25 or 24,25) adj dihydroxy adj vitamin*) or (1,25dihydroxy adj vitamin*) or (24,25dihydroxy adj vitamin*) or ((1,25 or 24,25) adj di adj hydroxyvitamin*) or (1,25di adj hydroxyvitamin*) or (24,25di adj hydroxyvitamin*) or ((1,25 or 24,25) adj di adj hydroxy adj vitamin*) or (1,25di adj hydroxy adj vitamin*) or (24,25di adj hydroxy adj vitamin*) or ((1,25 or 24,25) adj dihydroxyvit) or ((1,25 or 24,25) adj dihydroxy adj vit) or ((1,25 or 24,25) adj di adj hydroxyvit) or ((1,25 or 24,25) adj di adj hydroxy adj vit) or 1,25dihydroxyvit or (1,25dihydroxy adj vit) or (1,25di adj hydroxyvit) or (1,25di adj hydroxy adj vit) or 24,25dihydroxyvit or (24,25dihydroxy adj vit) or (24,25di adj hydroxyvit) or (24,25di adj hydroxy adj vit) or (1,25 adj OH2 adj vitamin*) or (1,25 adj OH2 adj vit) or (1,25 adj OH adj "2" adj vitamin*) or (1,25 adj OH adj "2" adj vit) or (24,25 adj OH2 adj vitamin*) or (24,25 adj OH2 adj vit) or (24,25 adj OH adj "2" adj vitamin*) or (24,25 adj OH adj "2" adj vit)) adj (D or D1 or D2 or D3 or (D adj "1") or (D adj "2") or (D adj "3")))).mp. (12986)

20 (((1,25 or 24,25) adj (dihydroxyvitaminD or dihydroxyvitaminD1 or dihydroxyvitaminD2 or dihydroxyvitaminD3 or dihydroxyvitD or dihydroxyvitD1 or dihydroxyvitD2 or dihydroxyvitD3)) or ((1,25dihydroxy or (1,25di adj hydroxy) or 24,25dihydroxy or (24,25di adj hydroxy) or 1,25 dihydroxy or (1,25 di adj hydroxy) or 24,25 dihydroxy or (24,25 di adj hydroxy)) adj (vitaminD or vitaminD1 or vitaminD2 or vitaminD3 or VitD or VitD1 or VitD2 or VitD3))).mp. (17)

21 (50-14-6 or calciferol* or ergocalciferol* or vs041h42xc).mp. (3623)

22 (67-96-9 or calcamin? or dihydrotachysterin* or dihydrotachysterol* or (dihydro adj (tachysterin* or tachysterol*)) or (di adj hydro adj (tachysterin* or tachysterol*)) or (di adj (hydrotachysterin* or hydrotachysterol*)) or r5lm3h112r).mp. (795)

23 (21343-40-8 or 25hydroxycalciferol* or ("25" adj hydroxycalciferol*) or ("25" adj hdroxy adj calciferol*) or (25hydroxy adj calciferol*) or 25hydroxyergocalciferol* or ("25" adj hydroxyergocalciferol*) or ("25" adj hydroxy adj ergo adj calciferol*) or ("25" adj hydroxyergo adj calciferol*) or ("25" adj hydroxy adj ergocalciferol*) or (25hydroxy adj ergo adj calciferol*) or (25hydroxyergo adj calciferol*) or (25hydroxy adj ergocalciferol*) or ercalcidiol*).mp. (101)

24 ("9,10 secocholesta 5,7,10(19),16 tetraen 23 yne 1,3,25 triol" or ro 23 7553).mp. (34)

25 ("9,10 secocholesta 5,7,10(19),22 tetraene 1,3,25,26 tetrol" or ro 23 4319 or ro 23 8525).mp. (3)

26 (((1,23,25 or 1,24,25 or 1alpha,24,25) adj trihydroxyc?olecalciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj tri adj hydroxy adj c?ole adj calciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj trihydroxyc?ole adj calciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj trihydroxy adj c?olecalciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj tri adj hydroxyc?olecalciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj tri adj hydroxy adj c?olecalciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj tri adj hydroxyc?ole adj calciferol*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj trihydroxy adj c?ole adj calciferol*)).mp. (8)

27 ((((1,23,25 or 1,24,25 or 1alpha,24,25) adj trihydroxyvitamin*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj trihydroxy adj vitamin*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj tri adj hydroxyvitamin*) or ((1,23,25 or 1,24,25 or 1alpha,24,25) adj tri adj hydroxy adj vitamin*)) adj (D or D3 or (D adj "3"))).mp. (82)

28 ((1,25,28 adj trihydroxyvitamin* adj (D or D2 or (D adj "2"))) or (1,25,28 adj trihydroxy adj vitamin* adj (D or D2 or (D adj "2"))) or (1,25,28 adj tri adj hydroxyvitamin* adj (D or D2 or (D adj "2"))) or (1,25,28 adj tri adj hydroxy adj vitamin* adj (D or D2 or (D adj "2"))) or ro 23 6474).mp. (1)
29 ("20 epi 22 ethoxy 24a,26a,27a trihomo 9,10 secocholesta 5,7,10(19) trien 23 yne 1alpha,3beta,25 triol" or (cb adj "1093") or cb1093).mp. (45)
30 ((1 alpha,25 adj dihydroxyvitamin* adj d3) or (1 alpha,25 adj dihydroxyvitamin* adj (d adj "3")) or (1 alpha,25dihydroxyvitamin* adj (d adj "3")) or (1 alpha,25dihydroxyvitamin* adj d3)).mp. (939)
31 ("9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" or activated 7 dehydrocholesterol? or arachitol or d tracetten or d3 vicotrat or ddrops or desunin or devaron or duphafral or uvedose or vi-de 3 or vigantol or vigorsan or calcifediol* or calcidiol? or calderol? or dedrogyl or hidroferol? or p6yz13c99q or t0wxw8f54e or alderol or delakmin or didrogyl or dydrogil or rayaldee or u 32070 or u32070 or 19356-17-3 or calcitriol* or "1 alpha, 25-dihydroxy-20-epi-vitamin d3" or 32222-06-3 or decostriol* or fxc9231jvh or mc1288 or (mc adj "1288") or osteotriol* or renatriol* or rocaltrol* or silkis or sitriol* or soltriol* or tirocal or bocatriol* or calcijex or at10 or at-10).mp. (117237)
32 ("22 oxacalcitriol*" or maxacalcitol* or oxarol* or becocalcidiol* or asord or qrx 101 or qrx101 or daivobet or dovobet or enstilar or leo 80185 or leo80185 or taclonex or xamiol* or calcipotriol* or "1alpha, 24 dihydroxy 26, 27 cyclo 22, 23 didehydrocholecalciferol*" or "24 cyclopropyl 9, 10 secochola 5, 7, 10 (19), 22 tetraene 1alpha, 3beta, 24 triol" or "26, 27 cyclo 9, 10 seco 5, 7, 10 (19), 22 cholestatetraene 1, 3, 24 triol" or calcipotriene or daivonex or davonex or divonex or dovonex or (mc adj "903") or mc903 or psorcutan or psotriol or sorilux or bonky or "caraben sc" or cicarol* or citrihexal or "c decostriol*" or difix or (dn adj "101") or dn101 or ecatrol* or hitrol* or kolkatriol* or kosteo or lemytriol* or meditrol* or poscal or rexamat or ro 21 5535 or ro 215535 or ro215535 or roical or rolsical or tariol*).mp. (1848)
33 (topitriol* or triocalcit or vectical or "fortipan combi D" or "norsed combi" or "9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" or "baby d" or bonesyl or "d muslin" or desunin or dupharinterfran or irradia or irradiant or "kora liquid" or ostoforte or uvedose or ecalcidene or eldecalcitol* or (ed adj "71") or ed71 or elocalcitol* or (bxl adj "628") or bxl628 or (ro adj 26 9228) or (ro26 adj "9228") or falecalcitriol* or "1, 25 dihydroxy 26, 26, 26, 27, 27, 27 hexafluoroc?olecalciferol*" or "26, 26, 26, 27, 27, 27 hexafluorocalcitriol*" or flocalcitriol* or fulstan or hornel or (ro 23 adj "4194") or (ro23 adj "4194") or st 630 or st630 or inecalcitol* or lexacalcitol* or (kh adj "1060") or kh1060 or pefcalcitol* or (m adj "5181") or m5181 or secalciferol* or 24hydroxycalcidiol* or ("24" adj hydroxycalcidiol*) or ("24" adj hydroxy adj calcidiol*) or (24hydroxy adj calcidiol*) or osteo d or (ro 21 adj "5816") or (ro21 adj "5816") or seocalcitol* or (eb adj "1089") or eb1089 or tacalcitol* or bonalfa or bonealpha or curatoderm or "tv 02" or tisocalcitate or "10, 19 dihydroercalciol*" or antitanil or antitetanin? or atecen or calcinosefaktor or dht intensol or dichistrolum or dichysterol or dichystrol or dihydral or dihydrotachysterin? or dikystrol or dygratyl or hytakerol or manipal or parterol or tachidon or tachystin? or tachystol or tetilan).mp. (1501)
34 (Hydroxyergocalciferol* or (hydroxy adj ergocalciferol*) or (hydroxyergo adj calciferol*) or (hydroxy adj ergo adj calciferol*) or Doxercalciferol* or Dihydroxyergocalciferol* or (di adj hydroxy adj ergo adj calciferol*) or (di adj hydroxyergo adj calciferol*) or (dihydroxy adj ergo adj calciferol*) or ro 17 6218 or

trihydroxyergocalciferol* or (tri adj hydroxy adj ergo adj calciferol*) or (tri adj hydroxyergo adj calciferol*) or (trihydroxy adj ergo adj calciferol*)).mp. (329)
35 ((Euro adj D) or hectorol or alfacalcidiol* or alfacalcidol* or alphacalcidol* or paricalcitol* or (abt adj "358") or abt358 or paracalcin or zemplar or bonesil d flas or cacit d3 or cal d vita or cal-d-or or cal-d-vita or calceos or calci chew d3 or calcial d or calcichew d3 or calcigran or calcimagon d3 or calcimagon extra d3 or calcio d or calcioral d3 or calcium d or calcium wyeth or calcivit d or caldefix or caldevita or calisvit or calperos d3 or citrokalcium d or d-vital or dagravit d calcium or disnal or eurocal d3 or ideos or kombi kalz or mastical d or nycoplus calcigran or orocal d3 or orotre or osseans d3 or osteomerck or reliveran or sandocal-d or steovit d3 or steovit forte or tacal d3 or tepox cal d or versical d or alfarol or (alpha adj (calcidiol or calcidol or d3 or d 3)) or etalpha or onealfa or einsalpha or (one adj alpha) or unalfa or unalpha or oxidevite or oxydevit or cabone or (dn adj "101") or dn101 or meditrol or ro 21 5535 or ro215535 or soltriol or topitriol or vectical or condol or d vital or davitamon d or davitin or decaps or dee osterol or dee ron or dekristol or deltalin or deratol or detalup or diactol or divit urto or Drisdol or endo d or ercalciol or ergorone or ergosterina irradiate or ertron or fortodyl or genevis or infron or metadee or mina d2 or mulsiferol or mykostin or oldevit or oleovitamin d2 or ostelin or osteovit or radiostol or radsterin or raquiferol or shock ferol or sterodin or sterogyl or ultranol or uvesterol d or vi de or vi di or vide or vidi or vio d or viosterol or vitaminol or vitavel d or "10,19 dihydroercalciol" or dichystrol or dihydral or dygratyl or hytakerol or calcitetrol* or Tevabone or valebo or adrovance or fosavance or vantavo or "9, 10 secocholesta 5, 7, 10 (19) triene 1alpha, 3beta diol").mp. (4342)
36 (avitaminosis D or (D adj avitaminosis) or (hypo adj vitaminosis adj1 D) or (hypovitaminosis adj1 D)).mp. (1964)
37 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (191443)
38 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (149734)
39 37 and 38 (1469)

APPENDIX 2

Search strategy- Embase

1. 'placenta'/de OR ‘decidua’/de OR 'chorion villus'/de OR 'cytotrophoblast'/de OR 'trophoblast'/de OR 'syncytiotrophoblast'/de OR 'deciduoma'/de OR 'decidualization'/de OR 'placenta extract'/de OR 'placenta development'/de
2. ('cell fate'/de OR 'cell differentiation'/de OR 'asymmetric cell division'/de OR 'nuclear reprogramming'/de OR 'cell plasticity'/de OR 'cell lineage'/de OR 'cell reprogramming technique'/de OR 'induced pluripotent stem cell'/de OR 'cell transdifferentiation'/de OR 'epithelial mesenchymal transition'/de) AND ('placenta'/de)
3. placent*:ti,ab,kw OR transplacent*:ti,ab,kw OR ((trans NEXT/1 placent*):ti,ab,kw) OR f$etoplacent*:ti,ab,kw OR ((f$eto NEXT/1 placent*):ti,ab,kw) OR uteroplacent*:ti,ab,kw OR ((utero NEXT/1 placent*):ti,ab,kw) OR 'basal plate$':ti,ab,kw OR ‘chorionic villi’:ti,ab,kw OR ‘chorionic villus’:ti,ab,kw
4. ((cell* NEXT/1 (lineage$ OR differentiation$ OR fate$ OR specificity OR elongation$)):ti,ab,kw) AND (placent*:ti,ab,kw OR trophoblast*:ti,ab,kw OR cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR decidua$:ti,ab,kw)
5. (((nuclear NEXT/1 reprogram*):ti,ab,kw) OR ((nuclear NEXT/1 re NEXT/1 program*):ti,ab,kw)) AND (placent*:ti,ab,kw OR trophoblast*:ti,ab,kw OR cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR decidua$:ti,ab,kw)
6. (((assymetric NEXT/1 ‘cell* division$’):ti,ab,kw) OR ((assymetric NEXT/1 ‘cell* differentiation$’):ti,ab,kw) OR (('as symetric' NEXT/1 ‘cell* division$’):ti,ab,kw) OR (('as symetric' NEXT/1 ‘cell* differentiation$’):ti,ab,kw)) AND (placent*:ti,ab,kw OR trophoblast*:ti,ab,kw OR cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR decidua$:ti,ab,kw)
7. decidua*:ti,ab,kw OR deciduoma*:ti,ab,kw OR deciduum:ti,ab,kw OR ((deciduous NEAR/2 membrane$):ti,ab,kw)
8. cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR ((langhans NEAR/3 layer$):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR trophoblast*:ti,ab,kw
9. (‘induced pluripotent stem cell$’:ti,ab,kw OR ‘ips cell$’:ti,ab,kw OR hipsc:ti,ab,kw OR ‘directed differentiation technique$’:ti,ab,kw) AND (placent*:ti,ab,kw OR trophoblast*:ti,ab,kw OR cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR decidua$:ti,ab,kw)

10. (((epithelial NEXT/1 mesenchymal NEXT/1 transformation*):ti,ab,kw) OR ((epithelial NEXT/1 mesenchymal NEXT/1 transition*):ti,ab,kw) OR (('epithelial to mesenchymal' NEXT/1 transformation*):ti,ab,kw) OR (('epithelial to mesenchymal' NEXT/1 transition*):ti,ab,kw)) AND (placent*:ti,ab,kw OR trophoblast*:ti,ab,kw OR cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR decidua$:ti,ab,kw)

11. ('cell* transdifferentiat*':ti,ab,kw OR (('cell* trans' NEXT/1 differentiat*):ti,ab,kw) OR 'cell* plasticit*':ti,ab,kw OR 'cell* reprogram*':ti,ab,kw OR (('cell re' NEXT/1 program*):ti,ab,kw) OR 'cell program*':ti,ab,kw) AND (placent*:ti,ab,kw OR trophoblast*:ti,ab,kw OR cytotrophoblast*:ti,ab,kw OR ((cyto NEXT/1 trophoblast*):ti,ab,kw) OR syncytiotrophoblast*:ti,ab,kw OR ((syncytio NEXT/1 trophoblast*):ti,ab,kw) OR decidua$:ti,ab,kw)

12. 'vitamin d'/exp OR 'vitamin d deficiency'/de

13. '1406-16-2':ti,ab,kw OR vitamind:ti,ab,kw OR vitamind1:ti,ab,kw OR vitamind2:ti,ab,kw OR vitamind3:ti,ab,kw OR vitd:ti,ab,kw OR vitd1:ti,ab,kw OR vitd2:ti,ab,kw OR vitd3:ti,ab,kw

14. ((vitamin* NEXT/1 d):ti,ab,kw) OR ((vitamin* NEXT/1 d1):ti,ab,kw) OR ((vitamin* NEXT/1 d2):ti,ab,kw) OR ((vitamin* NEXT/1 d3):ti,ab,kw)

15. ((vit NEXT/1 d):ti,ab,kw) OR ((vit NEXT/1 d1):ti,ab,kw) OR ((vit NEXT/1 d2):ti,ab,kw) OR ((vit NEXT/1 d3):ti,ab,kw)

16. ((vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

17. ((vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((vit NEXT/1 d NEXT/1 3):ti,ab,kw)

18. c$olecalciferol*:ti,ab,kw OR ((c$ole NEXT/1 calciferol*):ti,ab,kw) OR '1c6v77qf41':ti,ab,kw OR '67-97-0':ti,ab,kw OR hydroxycalciol*:ti,ab,kw OR ((hydroxy NEXT/1 calciol*):ti,ab,kw) OR calciol*:ti,ab,kw

19. hydroxyc$olecalciferol*:ti,ab,kw OR ((hydoxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR ((hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw)

20. hydroxyvitamind:ti,ab,kw OR hydroxyvitamind1:ti,ab,kw OR hydroxyvitamind2:ti,ab,kw OR hydroxyvitamind3:ti,ab,kw OR hydroxyvitd:ti,ab,kw OR hydroxyvitd1:ti,ab,kw OR hydroxyvitd2:ti,ab,kw OR hydroxyvitd3:ti,ab,kw

21. ((hydroxy NEXT/1 vitamind):ti,ab,kw) OR ((hydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((hydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((hydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((hydroxy NEXT/1 vitd):ti,ab,kw) OR ((hydroxy NEXT/1 vitd1):ti,ab,kw) OR ((hydroxy NEXT/1 vitd2):ti,ab,kw) OR ((hydroxy NEXT/1 vitd3):ti,ab,kw)

22. ((hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw)

23. ((hydroxyvit NEXT/1 d):ti,ab,kw) OR ((hydroxyvit NEXT/1 d1):ti,ab,kw) OR ((hydroxyvit NEXT/1 d2):ti,ab,kw) OR ((hydroxyvit NEXT/1 d3):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((ohvitamin* NEXT/1 d):ti,ab,kw) OR ((ohvitamin* NEXT/1 d1):ti,ab,kw) OR ((ohvitamin* NEXT/1 d2):ti,ab,kw) OR ((ohvitamin* NEXT/1 d3):ti,ab,kw) OR ((ohvit NEXT/1 d):ti,ab,kw) OR ((ohvit NEXT/1 d1):ti,ab,kw) OR ((ohvit NEXT/1 d2):ti,ab,kw) OR ((ohvit NEXT/1 d3):ti,ab,kw)

24. ((hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

25. ((hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((oh NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((oh NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((ohvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((ohvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((ohvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((ohvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((ohvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((ohvit NEXT/1 d NEXT/1 3):ti,ab,kw)

26. 25hydroxyc$olecalciferol*:ti,ab,kw OR ((25 NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR ((25hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR ((25 NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((25hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((25hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw)

27. ((25 NEXT/1 hydroxyvitamind):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamind1):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamind2):ti,ab,kw) OR

((25 NEXT/1 hydroxyvitamind3):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamind):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamind):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamind3):ti,ab,kw)

28. ((25hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((25hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((25hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((25hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw)

29. ((25hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

30. ((25hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d3):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw)

31. ((25hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

32. '25(oh)d':ti,ab,kw

33. ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

34. ((25oh NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((25oh NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((25oh NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((25oh NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((25oh NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25oh NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25oh NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

35. ((25 NEXT/1 ohvitamin* NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 ohvitamin* NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 ohvitamin* NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 ohvitamin* NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 ohvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 ohvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 ohvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

36. ((25ohvitamin* NEXT/1 d):ti,ab,kw) OR ((25ohvitamin* NEXT/1 d1):ti,ab,kw) OR ((25ohvitamin* NEXT/1 d2):ti,ab,kw) OR ((25ohvitamin* NEXT/1 d3):ti,ab,kw) OR ((25ohvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25ohvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25ohvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

37. ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 oh NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

38. ((25oh NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((25oh NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((25oh NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((25oh NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((25oh NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25oh NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25oh NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

39. ((25 NEXT/1 ohvit NEXT/1 d):ti,ab,kw) OR ((25 NEXT/1 ohvit NEXT/1 d1):ti,ab,kw) OR ((25 NEXT/1 ohvit NEXT/1 d2):ti,ab,kw) OR ((25 NEXT/1 ohvit NEXT/1 d3):ti,ab,kw) OR ((25 NEXT/1 ohvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25 NEXT/1 ohvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25 NEXT/1 ohvit NEXT/1 d NEXT/1 3):ti,ab,kw)

40. ((25ohvit NEXT/1 d):ti,ab,kw) OR ((25ohvit NEXT/1 d1):ti,ab,kw) OR ((25ohvit NEXT/1 d2):ti,ab,kw) OR ((25ohvit NEXT/1 d3):ti,ab,kw) OR ((25ohvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((25ohvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((25ohvit NEXT/1 d NEXT/1 3):ti,ab,kw)

41. dihydroxyc$olecalciferol*:ti,ab,kw OR ((di NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR ((dihydroxyc$ole NEXT/1 calciferol*):ti,ab,kw)

OR ((dihydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((di NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((di NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((dihydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw)

42. dihydroxyvitamind:ti,ab,kw OR dihydroxyvitamind1:ti,ab,kw OR dihydroxyvitamind2:ti,ab,kw OR dihydroxyvitamind3:ti,ab,kw OR dihydroxyvitd:ti,ab,kw OR dihydroxyvitd1:ti,ab,kw OR dihydroxyvitd2:ti,ab,kw OR dihydroxyvitd3:ti,ab,kw OR ((dihydroxy NEXT/1 vitamind):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((dihydroxy NEXT/1 vitd):ti,ab,kw) OR ((dihydroxy NEXT/1 vitd1):ti,ab,kw) OR ((dihydroxy NEXT/1 vitd2):ti,ab,kw) OR ((dihydroxy NEXT/1 vitd3):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamind):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitd):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitd1):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitd2):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitd3):ti,ab,kw)

43. ((dihydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((dihydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((dihydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((dihydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d1):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d2):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d3):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d1):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d2):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d3):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw)

44. ((oh2 NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((oh2 NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((oh2 NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((oh2 NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin*

NEXT/1 d1):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 d3):ti,ab,kw)

45. ((dihydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((dihydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((dihydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((dihydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

46. ((oh2 NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((oh2 NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((oh2 NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((oh2 NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 1):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 2):ti,ab,kw) OR ((oh NEXT/1 2 NEXT/1 vit NEXT/1 3):ti,ab,kw)

47. ((di NEXT/1 hydrovitamin NEXT/1 d):ti,ab,kw) OR ((di NEXT/1 hydrovitamin NEXT/1 d2):ti,ab,kw) OR ((di NEXT/1 hydrovitamin NEXT/1 d NEXT/1 2):ti,ab,kw)

48. ((di NEXT/1 hydro NEXT/1 vitamin NEXT/1 d):ti,ab,kw) OR ((di NEXT/1 hydro NEXT/1 vitamin NEXT/1 d2):ti,ab,kw) OR ((di NEXT/1 hydro NEXT/1 vitamin NEXT/1 d NEXT/1 2):ti,ab,kw)

49. ((dihydro NEXT/1 vitamin NEXT/1 d):ti,ab,kw) OR ((dihydro NEXT/1 vitamin NEXT/1 d2):ti,ab,kw) OR ((dihydro NEXT/1 vitamin NEXT/1 d NEXT/1 2):ti,ab,kw)

50. ((dihydrovitamin NEXT/1 d):ti,ab,kw) OR ((dihydrovitamin NEXT/1 d2):ti,ab,kw) OR ((dihydrovitamin NEXT/1 d NEXT/1 2):ti,ab,kw)

51. (vitamin NEXT/1 d4):ti,ab,kw

52. (vitamin NEXT/1 d NEXT/1 4):ti,ab,kw

53. '(24r)-24,25-dihydroxyvitamin d3':ti,ab,kw OR '40013-87-4':ti,ab,kw OR '55721-11-4 ((3beta,5z,7e,24r)-isomer)':ti,ab,kw

54. '1,25 dihydroxyc$olecalciferol*':ti,ab,kw OR (('1,25 dihydroxyc$ole' NEXT/1 calciferol*):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 c$olecalciferol*):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 c?ole NEXT/1 calciferol*):ti,ab,kw)

55. '24,25 dihydroxyc$olecalciferol*':ti,ab,kw OR (('24,25 dihydroxyc$ole' NEXT/1 calciferol*):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 c$olecalciferol*):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 c?ole NEXT/1 calciferol*):ti,ab,kw)

56. 1,25dihydroxyc$olecalciferol*:ti,ab,kw OR ((1,25dihydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw)

57. 24,25dihydroxyc$olecalciferol*:ti,ab,kw OR ((24,25dihydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 c$olecalciferol*):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw)

58. ((1,25dihydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((1,25dihydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((1,25dihydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((1,25dihydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((1,25dihydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25dihydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25dihydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

59. ((24,25dihydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((24,25dihydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((24,25dihydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((24,25dihydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((24,25dihydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25dihydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25dihydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

60. (('1,25 dihydroxyvitamin*' NEXT/1 d):ti,ab,kw) OR (('1,25 dihydroxyvitamin*' NEXT/1 d1):ti,ab,kw) OR (('1,25 dihydroxyvitamin*' NEXT/1 d2):ti,ab,kw) OR (('1,25 dihydroxyvitamin*' NEXT/1 d3):ti,ab,kw) OR (('1,25 dihydroxyvitamin*' NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 dihydroxyvitamin*' NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 dihydroxyvitamin*' NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d1):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d2):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d3):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 dihydroxyvitamin*' NEXT/1 d NEXT/1 3):ti,ab,kw)

61. (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

62. (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

63. ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

64. (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR (('24,25 di'

NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

65. (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

66. ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

67. (('1,25 dihydroxyvit' NEXT/1 d):ti,ab,kw) OR (('1,25 dihydroxyvit' NEXT/1 d1):ti,ab,kw) OR (('1,25 dihydroxyvit' NEXT/1 d2):ti,ab,kw) OR (('1,25 dihydroxyvit' NEXT/1 d3):ti,ab,kw) OR (('1,25 dihydroxyvit' NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 dihydroxyvit' NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 dihydroxyvit' NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d1):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d2):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d3):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 dihydroxyvit' NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

68. (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

69. ((1,25dihydroxyvit NEXT/1 d):ti,ab,kw) OR ((1,25dihydroxyvit NEXT/1 d1):ti,ab,kw) OR ((1,25dihydroxyvit NEXT/1 d2):ti,ab,kw) OR ((1,25dihydroxyvit

NEXT/1 d3):ti,ab,kw) OR ((1,25dihydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25dihydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25dihydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

70. ((24,25dihydroxyvit NEXT/1 d):ti,ab,kw) OR ((24,25dihydroxyvit NEXT/1 d1):ti,ab,kw) OR ((24,25dihydroxyvit NEXT/1 d2):ti,ab,kw) OR ((24,25dihydroxyvit NEXT/1 d3):ti,ab,kw) OR ((24,25dihydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25dihydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25dihydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxyvit NEXT/1 d NEXT/1 3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

71. (('1,25 oh2' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vitamin*

NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 oh2' NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('1,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

72. (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 oh2' NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d1):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d1):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d2):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d3):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d NEXT/1 1):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d NEXT/1 2):ti,ab,kw) OR (('24,25 oh' NEXT/1 2 NEXT/1 vit NEXT/1 d NEXT/1 3):ti,ab,kw)

73. '1,25 dihydroxyvitamind':ti,ab,kw OR '1,25 dihydroxyvitamind1':ti,ab,kw OR '1,25 dihydroxyvitamind2':ti,ab,kw OR '1,25 dihydroxyvitamind3':ti,ab,kw OR '24,25 dihydroxyvitamind':ti,ab,kw OR '24,25 dihydroxyvitamind1':ti,ab,kw OR '24,25 dihydroxyvitamind2':ti,ab,kw OR '24,25 dihydroxyvitamind3':ti,ab,kw

74. '1,25 dihydroxyvitd':ti,ab,kw OR '1,25 dihydroxyvitd1':ti,ab,kw OR '1,25 dihydroxyvitd2':ti,ab,kw OR '1,25 dihydroxyvitd3':ti,ab,kw OR '24,25

dihydroxyvitd':ti,ab,kw OR '24,25 dihydroxyvitd1':ti,ab,kw OR '24,25 dihydroxyvitd2':ti,ab,kw OR '24,25 dihydroxyvitd3':ti,ab,kw

75. ((1,25dihydroxy NEXT/1 vitamind):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitd):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitd1):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitd2):ti,ab,kw) OR ((1,25dihydroxy NEXT/1 vitd3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamind):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitd):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitd1):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitd2):ti,ab,kw) OR ((1,25di NEXT/1 hydroxy NEXT/1 vitd3):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamind):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitd):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitd1):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitd2):ti,ab,kw) OR ((24,25dihydroxy NEXT/1 vitd3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamind):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamind1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamind2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitamind3):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitd):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitd1):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitd2):ti,ab,kw) OR ((24,25di NEXT/1 hydroxy NEXT/1 vitd3):ti,ab,kw)

76. (('1,25 dihydroxy' NEXT/1 vitamind):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamind1):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamind2):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitamind3):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitd):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitd1):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitd2):ti,ab,kw) OR (('1,25 dihydroxy' NEXT/1 vitd3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamind):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamind1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamind2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitamind3):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitd):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitd1):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitd2):ti,ab,kw) OR (('1,25 di' NEXT/1 hydroxy NEXT/1 vitd3):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamind):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamind1):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamind2):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitamind3):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitd):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitd1):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitd2):ti,ab,kw) OR (('24,25 dihydroxy' NEXT/1 vitd3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamind):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamind1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamind2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitamind3):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitd):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitd1):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitd2):ti,ab,kw) OR (('24,25 di' NEXT/1 hydroxy NEXT/1 vitd3):ti,ab,kw)

77. '50-14-6':ti,ab,kw OR calciferol*:ti,ab,kw OR ergocalciferol*:ti,ab,kw OR vs041h42xc:ti,ab,kw

78. '67-96-9':ti,ab,kw OR calcamin$:ti,ab,kw OR dihydrotachysterin*:ti,ab,kw OR dihydrotachysterol*:ti,ab,kw OR r5lm3h112r:ti,ab,kw

79. ((dihydro NEXT/1 tachysterin*):ti,ab,kw) OR ((dehydro NEXT/1 tachysterol*):ti,ab,kw) OR ((di NEXT/1 hydro NEXT/1 tachysterin):ti,ab,kw) OR ((di NEXT/1 hydro NEXT/1 tachysterol*):ti,ab,kw) OR ((di NEXT/1 hydrotachysterin*):ti,ab,kw) OR ((di NEXT/1 hydrotachysterol*):ti,ab,kw)

80. '21343-40-8':ti,ab,kw OR 25hydroxycalciferol*:ti,ab,kw OR ((25 NEXT/1 hydroxycalciferol*):ti,ab,kw) OR ((25 NEXT/1 hdroxy NEXT/1 calciferol*):ti,ab,kw) OR ((25hydroxy NEXT/1 calciferol*):ti,ab,kw)

81. 25hydroxyergocalciferol*:ti,ab,kw OR ((25 NEXT/1 hydroxyergocalciferol*):ti,ab,kw) OR ((25 NEXT/1 hydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw) OR ((25 NEXT/1 hydroxyergo NEXT/1 calciferol*):ti,ab,kw)

82. ((25 NEXT/1 hydroxy NEXT/1 ergocalciferol*):ti,ab,kw) OR ((25hydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw) OR ((25hydroxyergo NEXT/1 calciferol*):ti,ab,kw) OR ((25hydroxy NEXT/1 ergocalciferol*):ti,ab,kw) OR ercalcidiol*:ti,ab,kw

83. '9,10 secocholesta 5,7,10(19),16 tetraen 23 yne 1,3,25 triol':ti,ab,kw OR 'ro 23 7553':ti,ab,kw

84. '9,10 secocholesta 5,7,10(19),22 tetraene 1,3,25,26 tetrol':ti,ab,kw OR 'ro 23 4319':ti,ab,kw OR 'ro 23 8525':ti,ab,kw

85. '1,23,25 trihydroxyc$olecalciferol*':ti,ab,kw OR '1,24,25 trihydroxyc$olecalciferol*':ti,ab,kw OR '1alpha,24,25 trihydroxyc$olecalciferol*':ti,ab,kw

86. (('1,23,25 tri' NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxy NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw)

87. (('1,23,25 trihydroxyc$ole' NEXT/1 calciferol*):ti,ab,kw) OR (('1,24,25 trihydroxyc$ole' NEXT/1 calciferol*):ti,ab,kw) OR (('1alpha,24,25 trihydroxyc$ole' NEXT/1 calciferol*):ti,ab,kw) OR (('1,23,25 trihydroxy' NEXT/1 c?olecalciferol*):ti,ab,kw) OR (('1,24,25 trihydroxy' NEXT/1 c?olecalciferol*):ti,ab,kw) OR (('1alpha,24,25 trihydroxy' NEXT/1 c?olecalciferol*):ti,ab,kw)

88. (('1,23,25 tri' NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxyc$olecalciferol*):ti,ab,kw)

89. (('1,23,25 tri' NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxyc$ole NEXT/1 calciferol*):ti,ab,kw)

90. (('1,23,25 trihydroxy' NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1,24,25 trihydroxy' NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1alpha,24,25 trihydroxy' NEXT/1 c$ole NEXT/1 calciferol*):ti,ab,kw) OR (('1,23,25 tri' NEXT/1 hydroxy NEXT/1 c?olecalciferol*):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxy NEXT/1 c?olecalciferol*):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxy NEXT/1 c?olecalciferol*):ti,ab,kw)

91. (('1,23,25 trihydroxyvitamin*' NEXT/1 d):ti,ab,kw) OR (('1,23,25 trihydroxyvitamin*' NEXT/1 d3):ti,ab,kw) OR (('1,23,25 trihydroxyvitamin*' NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,24,25 trihydroxyvitamin*' NEXT/1 d):ti,ab,kw) OR (('1,24,25 trihydroxyvitamin*' NEXT/1 d3):ti,ab,kw) OR (('1,24,25 trihydroxyvitamin*' NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1alpha,24,25 trihydroxyvitamin*' NEXT/1 d):ti,ab,kw) OR (('1alpha,24,25 trihydroxyvitamin*' NEXT/1 d3):ti,ab,kw) OR (('1alpha,24,25 trihydroxyvitamin*' NEXT/1 d NEXT/1 3):ti,ab,kw)

92. (('1,23,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,23,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,23,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,24,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,24,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,24,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1alpha,24,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1alpha,24,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1alpha,24,25 trihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

93. (('1,23,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR (('1,23,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR (('1,23,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d3):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

94. (('1,23,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,23,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,23,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1,24,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d3):ti,ab,kw) OR (('1alpha,24,25 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 3):ti,ab,kw)

95. (('1,25,28 trihydroxyvitamin*' NEXT/1 d):ti,ab,kw) OR (('1,25,28 trihydroxyvitamin*' NEXT/1 d2):ti,ab,kw) OR (('1,25,28 trihydroxyvitamin*' NEXT/1 d NEXT/1 2):ti,ab,kw)

96. (('1,25,28 trihydroxy' NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,25,28 trihydroxy' NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25,28 trihydroxy' NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw)

97. (('1,25,28 tri' NEXT/1 hydroxyvitamin* NEXT/1 d):ti,ab,kw) OR (('1,25,28 tri' NEXT/1 hydroxyvitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25,28 tri' NEXT/1 hydroxyvitamin* NEXT/1 d NEXT/1 2):ti,ab,kw)

98. (('1,25,28 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d):ti,ab,kw) OR (('1,25,28 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d2):ti,ab,kw) OR (('1,25,28 tri' NEXT/1 hydroxy NEXT/1 vitamin* NEXT/1 d NEXT/1 2):ti,ab,kw) OR 'ro 23 6474':ti,ab,kw

99. '20 epi 22 ethoxy 24a,26a,27a trihomo 9,10 secocholesta 5,7,10(19) trien 23 yne 1alpha,3beta,25 triol':ti,ab,kw

100. ((cb NEXT/1 '1093'):ti,ab,kw) OR 'cb1093':ti,ab,kw

101. ('1 alpha,25' NEXT/1 dihydroxyvitamin* NEXT/1 d3):ti,ab,kw

102. ('1 alpha,25' NEXT/1 dihydroxyvitamin* NEXT/1 d NEXT/1 3):ti,ab,kw

103. ('1 alpha,25dihydroxyvitamin*' NEXT/1 d NEXT/1 3):ti,ab,kw

104. ('1 alpha,25dihydroxyvitamin*' NEXT/1 d3):ti,ab,kw

105. '9, 10 secocholesta 5, 7, 10 (19) trien 3 ol':ti,ab,kw OR 'activated 7 dehydrocholesterol$':ti,ab,kw OR arachitol:ti,ab,kw OR 'd tracetten':ti,ab,kw OR 'd3 vicotrat':ti,ab,kw OR ddrops:ti,ab,kw OR desunin:ti,ab,kw OR devaron:ti,ab,kw OR duphafral:ti,ab,kw OR uvedose:ti,ab,kw OR 'vi-de 3':ti,ab,kw

106. vigantol:ti,ab,kw OR vigorsan:ti,ab,kw OR calcifediol*:ti,ab,kw OR calcidiol$:ti,ab,kw OR calderol$:ti,ab,kw OR dedrogyl:ti,ab,kw OR hidroferol$:ti,ab,kw OR p6yz13c99q:ti,ab,kw OR t0wxw8f54e:ti,ab,kw OR alderol:ti,ab,kw OR delakmin:ti,ab,kw OR didrogyl:ti,ab,kw OR dydrogil:ti,ab,kw OR rayaldee:ti,ab,kw OR 'u 32070':ti,ab,kw OR u32070:ti,ab,kw

107. '19356-17-3':ti,ab,kw OR calcitriol*:ti,ab,kw OR '1 alpha, 25-dihydroxy-20-epi-vitamin d3':ti,ab,kw OR '32222-06-3':ti,ab,kw OR decostriol*:ti,ab,kw OR fxc9231jvh:ti,ab,kw OR mc1288:ti,ab,kw OR ((mc NEXT/1 '1288'):ti,ab,kw) OR osteotriol*:ti,ab,kw OR renatriol*:ti,ab,kw OR rocaltrol*:ti,ab,kw OR silkis:ti,ab,kw OR sitriol*:ti,ab,kw OR soltriol*:ti,ab,kw OR tirocal:ti,ab,kw OR bocatriol*:ti,ab,kw OR calcijex:ti,ab,kw OR at10:ti,ab,kw OR 'at 10':ti,ab,kw

108. '22 oxacalcitriol*':ti,ab,kw OR maxacalcitol*:ti,ab,kw OR oxarol*:ti,ab,kw OR becocalcidiol*:ti,ab,kw OR asord:ti,ab,kw OR 'qrx 101':ti,ab,kw OR qrx101:ti,ab,kw OR daivobet:ti,ab,kw OR dovobet:ti,ab,kw OR enstilar:ti,ab,kw OR 'leo 80185':ti,ab,kw OR leo80185:ti,ab,kw OR taclonex:ti,ab,kw OR xamiol*:ti,ab,kw OR calcipotriol*:ti,ab,kw

109. '1alpha, 24 dihydroxy 26, 27 cyclo 22, 23 didehydrocholecalciferol*':ti,ab,kw OR '24 cyclopropyl 9, 10 secochola 5, 7, 10 (19), 22 tetraene 1alpha, 3beta, 24 triol':ti,ab,kw OR '26, 27 cyclo 9, 10 seco 5, 7, 10 (19), 22 cholestatetraene 1, 3, 24 triol':ti,ab,kw

110. calcipotriene:ti,ab,kw OR daivonex:ti,ab,kw OR davonex:ti,ab,kw OR divonex:ti,ab,kw OR dovonex:ti,ab,kw OR ((mc NEXT/1 '903'):ti,ab,kw) OR mc903:ti,ab,kw OR psorcutan:ti,ab,kw OR psotriol:ti,ab,kw OR sorilux:ti,ab,kw OR bonky:ti,ab,kw OR 'caraben sc':ti,ab,kw OR cicarol*:ti,ab,kw OR citrihexal:ti,ab,kw OR 'c decostriol*':ti,ab,kw OR difix:ti,ab,kw OR ((dn NEXT/1 '101'):ti,ab,kw) OR dn101:ti,ab,kw

111. ecatrol*:ti,ab,kw OR hitrol*:ti,ab,kw OR kolkatriol*:ti,ab,kw OR kosteo:ti,ab,kw OR lemytriol*:ti,ab,kw OR meditrol*:ti,ab,kw OR poscal:ti,ab,kw OR rexamat:ti,ab,kw OR 'ro 21 5535':ti,ab,kw OR 'ro 215535':ti,ab,kw OR ro215535:ti,ab,kw OR roical:ti,ab,kw OR rolsical:ti,ab,kw OR tariol*:ti,ab,kw

112. topitriol*:ti,ab,kw OR triocalcit:ti,ab,kw OR vectical:ti,ab,kw OR 'fortipan combi d':ti,ab,kw OR 'norsed combi':ti,ab,kw OR '9, 10 secocholesta 5, 7, 10 (19) trien 3 ol':ti,ab,kw OR 'baby d':ti,ab,kw OR bonesyl:ti,ab,kw OR 'd muslin':ti,ab,kw OR desunin:ti,ab,kw OR dupharinterfran:ti,ab,kw OR irradia:ti,ab,kw OR irradiant:ti,ab,kw OR 'kora liquid':ti,ab,kw OR ostoforte:ti,ab,kw OR uvedose:ti,ab,kw OR ecalcidene:ti,ab,kw OR eldecalcitol*:ti,ab,kw

113. ((ed NEXT/1 '71'):ti,ab,kw) OR ed71:ti,ab,kw OR elocalcitol*:ti,ab,kw OR ((bxl NEXT/1 '628'):ti,ab,kw) OR bxl628:ti,ab,kw OR ((ro NEXT/1 '26 9228'):ti,ab,kw) OR ((ro26 NEXT/1 '9228'):ti,ab,kw) OR falecalcitriol*:ti,ab,kw OR "1, 25 dihydroxy 26, 26, 26, 27, 27, 27 hexafluoroc$olecalciferol*":ti,ab,kw OR '26, 26, 26, 27, 27, 27 hexafluorocalcitriol*':ti,ab,kw OR flocalcitriol*:ti,ab,kw OR fulstan:ti,ab,kw OR hornel:ti,ab,kw

114. (('ro 23' NEXT/1 4194):ti,ab,kw) OR ((ro23 NEXT/1 4194):ti,ab,kw) OR 'st 630':ti,ab,kw OR st630:ti,ab,kw OR inecalcitol*:ti,ab,kw OR lexacalcitol*:ti,ab,kw OR ((kh NEXT/1 '1060'):ti,ab,kw) OR kh1060:ti,ab,kw OR pefcalcitol*:ti,ab,kw OR ((m NEXT/1 '5181'):ti,ab,kw) OR m5181:ti,ab,kw OR secalciferol*:ti,ab,kw OR 24hydroxycalcidiol*:ti,ab,kw OR (('24' NEXT/1 hydroxycalcidiol*):ti,ab,kw) OR (('24' NEXT/1 hydroxy NEXT/1 calcidiol*):ti,ab,kw) OR ((24hydroxy NEXT/1 calcidiol*):ti,ab,kw)

115. 'osteo d':ti,ab,kw OR (('ro 21' NEXT/1 '5816'):ti,ab,kw) OR ((ro21 NEXT/1 '5816'):ti,ab,kw) OR seocalcitol*:ti,ab,kw OR ((eb NEXT/1 '1089'):ti,ab,kw) OR eb1089:ti,ab,kw OR tacalcitol*:ti,ab,kw OR bonalfa:ti,ab,kw OR bonealpha:ti,ab,kw OR curatoderm:ti,ab,kw OR 'tv 02':ti,ab,kw OR tisocalcitate:ti,ab,kw OR '10, 19 dihydroercalciol*':ti,ab,kw OR antitanil:ti,ab,kw OR antitetanin$:ti,ab,kw OR atecen:ti,ab,kw OR calcinosefaktor:ti,ab,kw OR 'dht intensol':ti,ab,kw

116. dichistrolum:ti,ab,kw OR dichysterol:ti,ab,kw OR dichystrol:ti,ab,kw OR dihydral:ti,ab,kw OR dihydrotachysterin$:ti,ab,kw OR dikystrol:ti,ab,kw OR dygratyl:ti,ab,kw OR hytakerol:ti,ab,kw OR manipal:ti,ab,kw OR parterol:ti,ab,kw OR tachidon:ti,ab,kw OR tachystin$:ti,ab,kw OR tachystol:ti,ab,kw OR tetilan:ti,ab,kw

117. hydroxyergocalciferol*:ti,ab,kw OR ((hydroxy NEXT/1 ergocalciferol*):ti,ab,kw) OR ((hydroxyergo NEXT/1 calciferol*):ti,ab,kw) OR ((hydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw)

118. doxercalciferol*:ti,ab,kw OR dihydroxyergocalciferol*:ti,ab,kw OR ((di NEXT/1 hydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw) OR ((di NEXT/1 hydroxyergo NEXT/1 calciferol*):ti,ab,kw) OR ((dihydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw)

119. 'ro 17 6218':ti,ab,kw OR trihydroxyergocalciferol*:ti,ab,kw OR ((tri NEXT/1 hydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw) OR ((tri NEXT/1 hydroxyergo NEXT/1 calciferol*):ti,ab,kw) OR ((trihydroxy NEXT/1 ergo NEXT/1 calciferol*):ti,ab,kw)

120. ((euro NEXT/1 d):ti,ab,kw) OR hectorol:ti,ab,kw OR alfacalcidiol*:ti,ab,kw OR alfacalcidol*:ti,ab,kw OR alphacalcidol*:ti,ab,kw OR paricalcitol*:ti,ab,kw OR ((abt NEXT/1 '358'):ti,ab,kw) OR abt358:ti,ab,kw OR paracalcin:ti,ab,kw OR zemplar:ti,ab,kw OR 'bonesil d flas':ti,ab,kw OR 'cacit d3':ti,ab,kw OR 'cal d vita':ti,ab,kw OR 'cal-d-or':ti,ab,kw

121. 'cal-d-vita':ti,ab,kw OR calceos:ti,ab,kw OR 'calci chew d3':ti,ab,kw OR 'calcial d':ti,ab,kw OR 'calcichew d3':ti,ab,kw OR calcigran:ti,ab,kw OR 'calcimagon d3':ti,ab,kw OR 'calcimagon extra d3':ti,ab,kw OR 'calcio d':ti,ab,kw OR 'calcioral d3':ti,ab,kw OR 'calcium d':ti,ab,kw OR 'calcium wyeth':ti,ab,kw OR 'calcivit d':ti,ab,kw

122. caldefix:ti,ab,kw OR caldevita:ti,ab,kw OR calisvit:ti,ab,kw OR 'calperos d3':ti,ab,kw OR 'citrokalcium d':ti,ab,kw OR 'd-vital':ti,ab,kw OR 'dagravit d calcium':ti,ab,kw OR disnal:ti,ab,kw OR 'eurocal d3':ti,ab,kw OR ideos:ti,ab,kw OR 'kombi kalz':ti,ab,kw OR 'mastical d':ti,ab,kw OR 'nycoplus calcigran':ti,ab,kw OR 'orocal d3':ti,ab,kw

123. orotre:ti,ab,kw OR 'osseans d3':ti,ab,kw OR osteomerck:ti,ab,kw OR reliveran:ti,ab,kw OR 'sandocal-d':ti,ab,kw OR 'steovit d3':ti,ab,kw OR 'steovit forte':ti,ab,kw OR 'tacal d3':ti,ab,kw OR 'tepox cal d':ti,ab,kw OR 'versical d':ti,ab,kw OR 'alfarol':ti,ab,kw

124. ((alpha NEXT/1 calcidiol):ti,ab,kw) OR ((alpha NEXT/1 calcidol):ti,ab,kw) OR ((alpha NEXT/1 d3):ti,ab,kw) OR ((alpha NEXT/1 'd 3'):ti,ab,kw)

125. etalpha:ti,ab,kw OR onealfa:ti,ab,kw OR einsalpha:ti,ab,kw OR ((one NEXT/1 alpha):ti,ab,kw) OR unalfa:ti,ab,kw OR unalpha:ti,ab,kw OR oxidevite:ti,ab,kw OR oxydevit:ti,ab,kw OR cabone:ti,ab,kw OR ((dn NEXT/1 '101'):ti,ab,kw) OR dn101:ti,ab,kw OR meditrol:ti,ab,kw OR 'ro 21 5535':ti,ab,kw OR ro215535:ti,ab,kw OR soltriol:ti,ab,kw OR topitriol:ti,ab,kw OR vectical:ti,ab,kw OR condol:ti,ab,kw OR 'd vital':ti,ab,kw OR 'davitamon d':ti,ab,kw OR davitin:ti,ab,kw OR decaps:ti,ab,kw OR 'dee osterol':ti,ab,kw OR 'dee ron':ti,ab,kw

126. dekristol:ti,ab,kw OR deltalin:ti,ab,kw OR deratol:ti,ab,kw OR detalup:ti,ab,kw OR diactol:ti,ab,kw OR 'divit urto':ti,ab,kw OR drisdol:ti,ab,kw OR 'endo d':ti,ab,kw OR ercalciol:ti,ab,kw OR ergorone:ti,ab,kw OR 'ergosterina irradiate':ti,ab,kw OR ertron:ti,ab,kw OR fortodyl:ti,ab,kw OR genevis:ti,ab,kw OR infron:ti,ab,kw OR metadee:ti,ab,kw OR 'mina d2':ti,ab,kw

127. mulsiferol:ti,ab,kw OR mykostin:ti,ab,kw OR oldevit:ti,ab,kw OR 'oleovitamin d2':ti,ab,kw OR ostelin:ti,ab,kw OR osteovit:ti,ab,kw OR radiostol:ti,ab,kw OR

radsterin:ti,ab,kw OR raquiferol:ti,ab,kw OR 'shock ferol':ti,ab,kw OR sterodin:ti,ab,kw OR sterogyl:ti,ab,kw OR ultranol:ti,ab,kw OR 'uvesterol d':ti,ab,kw OR 'vi de':ti,ab,kw OR 'vi di':ti,ab,kw OR vide:ti,ab,kw OR vidi:ti,ab,kw OR 'vio d':ti,ab,kw OR viosterol:ti,ab,kw OR vitaminol:ti,ab,kw OR 'vitavel d':ti,ab,kw OR '10,19 dihydroercalciol':ti,ab,kw

128. dichystrol:ti,ab,kw OR dihydral:ti,ab,kw OR dygratyl:ti,ab,kw OR hytakerol:ti,ab,kw OR calcitetrol*:ti,ab,kw OR tevabone:ti,ab,kw OR valebo:ti,ab,kw OR adrovance:ti,ab,kw OR fosavance:ti,ab,kw OR vantavo:ti,ab,kw OR '9, 10 secocholesta 5, 7, 10 (19) triene 1alpha, 3beta diol':ti,ab,kw

129. 'avitaminosis d':ti,ab,kw OR ((d NEXT/1 avitaminosis):ti,ab,kw) OR ((hypo NEXT/1 vitaminosis NEAR/1 d):ti,ab,kw) OR ((hypovitaminosis NEAR/1 d):ti,ab,kw)

130. #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11

131. #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74 OR #75 OR #76 OR #77 OR #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91 OR #92 OR #93 OR #94 OR #95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101 OR #102 OR #103 OR #104 OR #105 OR #106 OR #107 OR #108 OR #109 OR #110 OR #111 OR #112 OR #113 OR #114 OR #115 OR #116 OR #117 OR #118 OR #119 OR #120 OR #121 OR #122 OR #123 OR #124 OR #125 OR #126 OR #127 OR #128 OR #129

132. #130 AND #131

APPENDIX 3

Search strategy- CINAHL

1. (MH "Placenta+")
2. (MH "Cell Differentiation")
3. (MH "Epithelial-Mesenchymal Transition")
4. TI ((placent* OR transplacent* OR (trans W0 placent*) OR f#etoplacent* OR (f#eto W0 placent*) OR uteroplacent* OR (utero W0 placent*) OR chorionic villi OR chorionic villus OR basal plate#)) OR AB ((placent* OR transplacent* OR (trans W0 placent*) OR f#etoplacent* OR (f#eto W0 placent*) OR uteroplacent* OR (utero W0 placent*) OR chorionic villi OR chorionic villus OR basal plate#)) OR MW ((placent* OR transplacent* OR (trans W0 placent*) OR f#etoplacent* OR (f#eto W0 placent*) OR uteroplacent* OR (utero W0 placent*) OR chorionic villi OR chorionic villus OR basal plate#))
5. TI (((cell* W0 (lineage# OR differentiation# OR fate# OR elongation# OR specificity)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR AB (((cell* W0 (lineage# OR differentiation# OR fate# OR elongation# OR specificity)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR MW (((cell* W0 (lineage# OR differentiation# OR fate# OR elongation# OR specificity)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#)))
6. TI ((((assymetric OR as-symetric) W0 (cell* division# OR cell* differentiation#)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR AB ((((assymetric OR as-symetric) W0 (cell* division# OR cell* differentiation#)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR MW ((((assymetric OR as-symetric) W0 (cell* division# OR cell* differentiation#)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#)))
7. TI ((((nuclear W0 reprogram*) OR (nuclear W0 re W0 program*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR AB ((((nuclear W0 reprogram*) OR (nuclear W0 re W0 program*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR MW ((((nuclear W0 reprogram*) OR (nuclear W0 re W0 program*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#)))
8. TI ((decidua* OR deciduoma* OR deciduum OR (deciduous N1 membrane#))) OR AB ((decidua* OR deciduoma* OR deciduum OR (deciduous N1

membrane#))) OR MW ((decidu* OR deciduoma* OR deciduum OR (deciduous N1 membrane#)))

9. TI ((cytotrophoblast* OR (cyto W0 trophoblast*) OR (Langhans N2 layer#) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR trophoblast*)) OR AB ((cytotrophoblast* OR (cyto W0 trophoblast*) OR (Langhans N2 layer#) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR trophoblast*)) OR MW ((cytotrophoblast* OR (cyto W0 trophoblast*) OR (Langhans N2 layer#) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR trophoblast*))
10. TI (((Induced Pluripotent Stem Cell# OR ips cell# OR hipsc OR directed differentiation technique#) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR AB (((Induced Pluripotent Stem Cell# OR ips cell# OR hipsc OR directed differentiation technique#) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR MW (((Induced Pluripotent Stem Cell# OR ips cell# OR hipsc OR directed differentiation technique#) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#)))
11. TI (((cell* W0 (transdifferentiat* OR (trans W0 differentiat*) OR plasticit* OR reprogram* OR (re W0 program*) OR program*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR AB (((cell* W0 (transdifferentiat* OR (trans W0 differentiat*) OR plasticit* OR reprogram* OR (re W0 program*) OR program*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR MW (((cell* W0 (transdifferentiat* OR (trans W0 differentiat*) OR plasticit* OR reprogram* OR (re W0 program*) OR program*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#)))
12. TI ((((epithelial W0 mesenchymal W0 (transformation* OR transition*)) OR (epithelial to mesenchymal W0 (transformation* OR transition*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR AB ((((epithelial W0 mesenchymal W0 (transformation* OR transition*)) OR (epithelial to mesenchymal W0 (transformation* OR transition*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#))) OR MW ((((epithelial W0 mesenchymal W0 (transformation* OR transition*)) OR (epithelial to mesenchymal W0 (transformation* OR transition*)) AND (placent* OR trophoblast* OR cytotrophoblast* OR (cyto W0 trophoblast*) OR syncytiotrophoblast* OR (syncytio W0 trophoblast*) OR decidua#)))
13. TI (("1406-16-2" OR VitaminD OR VitaminD1 OR VitaminD2 OR VitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3 OR ((Vitamin* OR Vit) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR AB (("1406-16-2" OR VitaminD OR VitaminD1 OR VitaminD2 OR VitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3 OR ((Vitamin* OR Vit) W0 (D OR

D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR MW (("1406-16-2" OR VitaminD OR VitaminD1 OR VitaminD2 OR VitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3 OR ((Vitamin* OR Vit) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))))

14. TI ((c#olecalciferol* OR (c#ole W0 calciferol*) OR 1c6v77qf41 OR 67-97-0 OR calciol* OR hydroxycalciol* OR (hydroxy W0 calciol*))) OR AB ((c#olecalciferol* OR (c#ole W0 calciferol*) OR 1c6v77qf41 OR 67-97-0 OR calciol* OR hydroxycalciol* OR (hydroxy W0 calciol*))) OR MW ((c#olecalciferol* OR (c#ole W0 calciferol*) OR 1c6v77qf41 OR 67-97-0 OR calciol* OR hydroxycalciol* OR (hydroxy W0 calciol*)))
15. TI ((hydroxyc#olecalciferol* OR (hydoxy W0 c#olecalciferol*) OR (hydroxy W0 c#ole W0 calciferol*) OR (hydroxyc#ole W0 calciferol*))) OR AB ((hydroxyc#olecalciferol* OR (hydoxy W0 c#olecalciferol*) OR (hydroxy W0 c#ole W0 calciferol*) OR (hydroxyc#ole W0 calciferol*))) OR MW ((hydroxyc#olecalciferol* OR (hydoxy W0 c#olecalciferol*) OR (hydroxy W0 c#ole W0 calciferol*) OR (hydroxyc#ole W0 calciferol*)))
16. TI (((hydroxyvitamin* OR (hydroxy W0 vitamin*) OR hydroxyvit OR (hydroxy W0 vit) OR (OH W0 vitamin*) OR (OH W0 vit) OR OHvitamin* OR OHvit) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB (((hydroxyvitamin* OR (hydroxy W0 vitamin*) OR hydroxyvit OR (hydroxy W0 vit) OR (OH W0 vitamin*) OR (OH W0 vit) OR OHvitamin* OR OHvit) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW (((hydroxyvitamin* OR (hydroxy W0 vitamin*) OR hydroxyvit OR (hydroxy W0 vit) OR (OH W0 vitamin*) OR (OH W0 vit) OR OHvitamin* OR OHvit) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))
17. TI ((hydroxyvitaminD OR hydroxyvitaminD1 OR hydroxyvitaminD2 OR hydroxyvitaminD3 OR hydroxyvitD OR hydroxyvitD1 OR hydroxyvitD2 OR hydroxyvitD3)) OR AB ((hydroxyvitaminD OR hydroxyvitaminD1 OR hydroxyvitaminD2 OR hydroxyvitaminD3 OR hydroxyvitD OR hydroxyvitD1 OR hydroxyvitD2 OR hydroxyvitD3)) OR MW ((hydroxyvitaminD OR hydroxyvitaminD1 OR hydroxyvitaminD2 OR hydroxyvitaminD3 OR hydroxyvitD OR hydroxyvitD1 OR hydroxyvitD2 OR hydroxyvitD3))
18. TI ((hydroxy W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3))) OR AB ((hydroxyvitaminD OR (hydroxy W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3))OR hydroxyvitaminD2 OR hydroxyvitaminD3 OR hydroxyvitD OR hydroxyvitD1 OR hydroxyvitD2 OR hydroxyvitD3)) OR MW ((hydroxy W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3)))
19. TI ((25hydroxyc#olecalciferol* OR ("25" W0 hydroxyc#olecalciferol*) OR ("25" W0 hydroxy W0 c#ole W0 calciferol*) OR (25hydroxy W0 c#ole W0 calciferol*) OR ("25" W0 hydroxyc#ole W0 calciferol*) OR (25hydroxyc#ole W0 calciferol*) OR ("25" W0 hydroxy W0 c#olecalciferol*) OR (25hydroxy W0 c#olecalciferol*))) OR AB ((25hydroxyc#olecalciferol* OR ("25" W0 hydroxyc#olecalciferol*) OR ("25" W0 hydroxy W0 c#ole W0 calciferol*) OR (25hydroxy W0 c#ole W0 calciferol*) OR ("25" W0 hydroxyc#ole W0 calciferol*) OR (25hydroxyc#ole W0 calciferol*) OR ("25" W0 hydroxy W0

c#olecalciferol*) OR (25hydroxy W0 c#olecalciferol*))) OR MW ((25hydroxyc#olecalciferol* OR ("25" W0 hydroxyc#olecalciferol*) OR ("25" W0 hydroxy W0 c#ole W0 calciferol*) OR (25hydroxy W0 c#ole W0 calciferol*) OR ("25" W0 hydroxyc#ole W0 calciferol*) OR (25hydroxyc#ole W0 calciferol*) OR ("25" W0 hydroxy W0 c#olecalciferol*) OR (25hydroxy W0 c#olecalciferol*)))

20. TI (((25hydroxyvitamin* OR ("25" W0 hydroxyvitamin*) OR ("25" W0 hydroxy W0 vitamin*) OR (25hydroxy W0 vitamin*) OR ("25" W0 hydroxyvit) OR ("25" W0 hydroxy W0 vit) OR (25hydroxy W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB (((25hydroxyvitamin* OR ("25" W0 hydroxyvitamin*) OR ("25" W0 hydroxy W0 vitamin*) OR (25hydroxy W0 vitamin*) OR ("25" W0 hydroxyvit) OR ("25" W0 hydroxy W0 vit) OR (25hydroxy W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW (((25hydroxyvitamin* OR ("25" W0 hydroxyvitamin*) OR ("25" W0 hydroxy W0 vitamin*) OR (25hydroxy W0 vitamin*) OR ("25" W0 hydroxyvit) OR ("25" W0 hydroxy W0 vit) OR (25hydroxy W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))
21. TI ((("25" W0 hydroxyvitaminD) OR ("25" W0 hydroxyvitaminD1) OR ("25" W0 hydroxyvitaminD2) OR ("25" W0 hydroxyvitaminD3) OR ("25" W0 hydroxy W0 vitaminD) OR ("25" W0 hydroxy W0 vitaminD1) OR ("25" W0 hydroxy W0 vitaminD2) OR ("25" W0 hydroxy W0 vitaminD3) OR (25hydroxy W0 vitaminD) OR (25hydroxy W0 vitaminD1) OR (25hydroxy W0 vitaminD2) OR (25hydroxy W0 vitaminD3))) OR AB ((("25" W0 hydroxyvitaminD) OR ("25" W0 hydroxyvitaminD1) OR ("25" W0 hydroxyvitaminD2) OR ("25" W0 hydroxyvitaminD3) OR ("25" W0 hydroxy W0 vitaminD) OR ("25" W0 hydroxy W0 vitaminD1) OR ("25" W0 hydroxy W0 vitaminD2) OR ("25" W0 hydroxy W0 vitaminD3) OR (25hydroxy W0 vitaminD) OR (25hydroxy W0 vitaminD1) OR (25hydroxy W0 vitaminD2) OR (25hydroxy W0 vitaminD3))) OR MW ((("25" W0 hydroxyvitaminD) OR ("25" W0 hydroxyvitaminD1) OR ("25" W0 hydroxyvitaminD2) OR ("25" W0 hydroxyvitaminD3) OR ("25" W0 hydroxy W0 vitaminD) OR ("25" W0 hydroxy W0 vitaminD1) OR ("25" W0 hydroxy W0 vitaminD2) OR ("25" W0 hydroxy W0 vitaminD3) OR (25hydroxy W0 vitaminD) OR (25hydroxy W0 vitaminD1) OR (25hydroxy W0 vitaminD2) OR (25hydroxy W0 vitaminD3)))
22. TI ("25(OH)D") OR AB ("25(OH)D") OR MW ("25(OH)D")
23. TI ((("25" W0 OH W0 vitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OH W0 vitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR AB ((("25" W0 OH W0 vitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OH W0 vitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR MW ((("25" W0 OH W0 vitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OH W0 vitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))))
24. TI ((("25" W0 OHvitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OHvitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR AB ((("25" W0

OHvitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OHvitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR MW ((("25" W0 OHvitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OHvitamin* W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))))

25. TI ((("25" W0 OH W0 vit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OH W0 vit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR AB ((("25" W0 OH W0 vit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OH W0 vit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR MW ((("25" W0 OH W0 vit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OH W0 vit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))))
26. TI ((("25" W0 OHvit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OHvit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR AB ((("25" W0 OHvit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OHvit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))) OR MW ((("25" W0 OHvit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))) OR (25OHvit W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))))
27. TI ((dihydroxyc#olecalciferol* OR (di W0 hydroxy W0 c#ole W0 calciferol*) OR (dihydroxyc#ole W0 calciferol*) OR (dihydroxy W0 c#olecalciferol*) OR (di W0 hydroxyc#olecalciferol*) OR (di W0 hydroxy W0 c#olecalciferol*) OR (di W0 hydroxyc#ole W0 calciferol*) OR (dihydroxy W0 c#ole W0 calciferol*))) OR AB ((dihydroxyc#olecalciferol* OR (di W0 hydroxy W0 c#ole W0 calciferol*) OR (dihydroxyc#ole W0 calciferol*) OR (dihydroxy W0 c#olecalciferol*) OR (di W0 hydroxyc#olecalciferol*) OR (di W0 hydroxy W0 c#olecalciferol*) OR (di W0 hydroxyc#ole W0 calciferol*) OR (dihydroxy W0 c#ole W0 calciferol*))) OR MW ((dihydroxyc#olecalciferol* OR (di W0 hydroxy W0 c#ole W0 calciferol*) OR (dihydroxyc#ole W0 calciferol*) OR (dihydroxy W0 c#olecalciferol*) OR (di W0 hydroxyc#olecalciferol*) OR (di W0 hydroxy W0 c#olecalciferol*) OR (di W0 hydroxyc#ole W0 calciferol*) OR (dihydroxy W0 c#ole W0 calciferol*)))
28. TI (((dihydroxyvitamin* OR (dihydroxy W0 vitamin*) OR (di W0 hydroxy W0 vitamin*) OR (di W0 hydroxyvitamin*) OR dihydroxyvit OR (di W0 hydroxy W0 vit) OR (di W0 hydroxyvit) OR (dihydroxy W0 vit) OR (OH2 W0 vitamin*) OR (OH2 W0 vit) OR (OH W0 "2" W0 vitamin*) OR (OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB (((dihydroxyvitamin* OR (dihydroxy W0 vitamin*) OR (di W0 hydroxy W0 vitamin*) OR (di W0 hydroxyvitamin*) OR dihydroxyvit OR (di W0 hydroxy W0 vit) OR (di W0 hydroxyvit) OR (dihydroxy W0 vit) OR (OH2 W0 vitamin*) OR (OH2 W0 vit) OR (OH W0 "2" W0 vitamin*) OR (OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW (((dihydroxyvitamin* OR (dihydroxy W0 vitamin*) OR (di W0 hydroxy W0 vitamin*) OR (di W0 hydroxyvitamin*) OR

dihydroxyvit OR (di W0 hydroxy W0 vit) OR (di W0 hydroxyvit) OR (dihydroxy W0 vit) OR (OH2 W0 vitamin*) OR (OH2 W0 vit) OR (OH W0 "2" W0 vitamin*) OR (OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))

29. TI ((dihydroxyvitaminD OR dihydroxyvitaminD1 OR dihydroxyvitaminD2 OR dihydroxyvitaminD3 OR dihydroxyvitD OR dihydroxyvitD1 OR dihydroxyvitD2 OR dihydroxyvitD3)) OR AB ((dihydroxyvitaminD OR dihydroxyvitaminD1 OR dihydroxyvitaminD2 OR dihydroxyvitaminD3 OR dihydroxyvitD OR dihydroxyvitD1 OR dihydroxyvitD2 OR dihydroxyvitD3)) OR MW ((dihydroxyvitaminD OR dihydroxyvitaminD1 OR dihydroxyvitaminD2 OR dihydroxyvitaminD3 OR dihydroxyvitD OR dihydroxyvitD1 OR dihydroxyvitD2 OR dihydroxyvitD3))
30. TI (((dihydroxy OR (di W0 hydroxy)) W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3))) OR AB (((dihydroxy OR (di W0 hydroxy)) W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3))) OR MW (((dihydroxy OR (di W0 hydroxy)) W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3)))
31. TI (((di W0 hydrovitamin W0 (D OR D2 OR (D W0 "2"))) OR (di W0 hydro W0 vitamin W0 (D OR D2 OR (D W0 "2"))))) OR AB (((di W0 hydrovitamin W0 (D OR D2 OR (D W0 "2"))) OR (di W0 hydro W0 vitamin W0 (D OR D2 OR (D W0 "2"))))) OR MW (((di W0 hydrovitamin W0 (D OR D2 OR (D W0 "2"))) OR (di W0 hydro W0 vitamin W0 (D OR D2 OR (D W0 "2")))))
32. TI (((dihydro W0 vitamin W0 (D OR D2 OR (D W0 "2"))) OR (dihydrovitamin W0 (D OR D2 OR (D W0 "2"))) OR (vitamin W0 (D W0 "4")) OR (vitamin W0 D4))) OR AB (((dihydro W0 vitamin W0 (D OR D2 OR (D W0 "2"))) OR (dihydrovitamin W0 (D OR D2 OR (D W0 "2"))) OR (vitamin W0 (D W0 "4")) OR (vitamin W0 D4))) OR MW (((dihydro W0 vitamin W0 (D OR D2 OR (D W0 "2"))) OR (dihydrovitamin W0 (D OR D2 OR (D W0 "2"))) OR (vitamin W0 (D W0 "4")) OR (vitamin W0 D4)))
33. TI (("(24r)-24,25-dihydroxyvitamin d3" OR “40013-87-4” OR "55721-11-4 ((3beta,5z,7e,24r)-isomer)")) OR AB (("(24r)-24,25-dihydroxyvitamin d3" OR “40013-87-4” OR "55721-11-4 ((3beta,5z,7e,24r)-isomer)")) OR MW (("(24r)-24,25-dihydroxyvitamin d3" OR “40013-87-4” OR "55721-11-4 ((3beta,5z,7e,24r)-isomer)"))
34. TI ((((1,25 OR 24,25) W0 dihydroxyc#olecalciferol*) OR ((1,25 OR 24,25) W0 dihydroxyc#ole W0 calciferol*) OR ((1,25 OR 24,25) W0 dihydroxy W0 c#olecalciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxyc#olecalciferol*) OR ((1,25 OR 24,25) W0 dihydroxy W0 c#ole W0 calciferol*))) OR AB ((((1,25 OR 24,25) W0 dihydroxyc#olecalciferol*) OR ((1,25 OR 24,25) W0 dihydroxyc#ole W0 calciferol*) OR ((1,25 OR 24,25) W0 dihydroxy W0 c#olecalciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxyc#olecalciferol*) OR ((1,25 OR 24,25) W0 dihydroxy W0 c#ole W0 calciferol*))) OR MW ((((1,25 OR 24,25) W0 dihydroxyc#olecalciferol*) OR ((1,25 OR 24,25) W0 dihydroxyc#ole W0 calciferol*) OR ((1,25 OR 24,25) W0 dihydroxy W0 c#olecalciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxyc#olecalciferol*) OR ((1,25 OR 24,25) W0 dihydroxy W0 c#ole W0 calciferol*)))

35. TI ((((1,25 OR 24,25) W0 di W0 hydroxyc#ole W0 calciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 c#olecalciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 c#ole W0 calciferol*) OR 1,25dihydroxyc#olecalciferol* OR (1,25dihydroxyc#ole W0 calciferol*))) OR AB ((((1,25 OR 24,25) W0 di W0 hydroxyc#ole W0 calciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 c#olecalciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 c#ole W0 calciferol*) OR 1,25dihydroxyc#olecalciferol* OR (1,25dihydroxyc#ole W0 calciferol*))) OR MW ((((1,25 OR 24,25) W0 di W0 hydroxyc#ole W0 calciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 c#olecalciferol*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 c#ole W0 calciferol*) OR 1,25dihydroxyc#olecalciferol* OR (1,25dihydroxyc#ole W0 calciferol*)))
36. TI (((1,25dihydroxy W0 c#olecalciferol*) OR (1,25di W0 hydroxyc#olecalciferol*) OR (1,25dihydroxy W0 c#ole W0 calciferol*) OR (1,25di W0 hydroxyc#ole W0 calciferol*) OR (1,25di W0 hydroxy W0 c#olecalciferol*) OR (1,25di W0 hydroxy W0 c#ole W0 calciferol*) OR 24,25dihydroxyc#olecalciferol*)) OR AB (((1,25dihydroxy W0 c#olecalciferol*) OR (1,25di W0 hydroxyc#olecalciferol*) OR (1,25dihydroxy W0 c#ole W0 calciferol*) OR (1,25di W0 hydroxyc#ole W0 calciferol*) OR (1,25di W0 hydroxy W0 c#olecalciferol*) OR (1,25di W0 hydroxy W0 c#ole W0 calciferol*) OR 24,25dihydroxyc#olecalciferol*)) OR MW (((1,25dihydroxy W0 c#olecalciferol*) OR (1,25di W0 hydroxyc#olecalciferol*) OR (1,25dihydroxy W0 c#ole W0 calciferol*) OR (1,25di W0 hydroxyc#ole W0 calciferol*) OR (1,25di W0 hydroxy W0 c#olecalciferol*) OR (1,25di W0 hydroxy W0 c#ole W0 calciferol*) OR 24,25dihydroxyc#olecalciferol*))
37. TI (((24,25dihydroxyc#ole W0 calciferol*) OR (24,25dihydroxy W0 c#olecalciferol*) OR (24,25di W0 hydroxyc#olecalciferol*) OR (24,25dihydroxy W0 c#ole W0 calciferol*) OR (24,25di W0 hydroxyc#ole W0 calciferol*) OR (24,25di W0 hydroxy W0 c#olecalciferol*) OR (24,25di W0 hydroxy W0 c#ole W0 calciferol*))) OR AB (((24,25dihydroxyc#ole W0 calciferol*) OR (24,25dihydroxy W0 c#olecalciferol*) OR (24,25di W0 hydroxyc#olecalciferol*) OR (24,25dihydroxy W0 c#ole W0 calciferol*) OR (24,25di W0 hydroxyc#ole W0 calciferol*) OR (24,25di W0 hydroxy W0 c#olecalciferol*) OR (24,25di W0 hydroxy W0 c#ole W0 calciferol*))) OR MW (((24,25dihydroxyc#ole W0 calciferol*) OR (24,25dihydroxy W0 c#olecalciferol*) OR (24,25di W0 hydroxyc#olecalciferol*) OR (24,25dihydroxy W0 c#ole W0 calciferol*) OR (24,25di W0 hydroxyc#ole W0 calciferol*) OR (24,25di W0 hydroxy W0 c#olecalciferol*) OR (24,25di W0 hydroxy W0 c#ole W0 calciferol*)))
38. TI (((1,25dihydroxyvitamin* OR 24,25dihydroxyvitamin* OR ((1,25 OR 24,25) W0 dihydroxyvitamin*) OR ((1,25 OR 24,25) W0 dihydroxy W0 vitamin*) OR (1,25dihydroxy W0 vitamin*)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB (((1,25dihydroxyvitamin* OR 24,25dihydroxyvitamin* OR ((1,25 OR 24,25) W0 dihydroxyvitamin*) OR ((1,25 OR 24,25) W0 dihydroxy W0 vitamin*) OR (1,25dihydroxy W0 vitamin*)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW (((1,25dihydroxyvitamin* OR 24,25dihydroxyvitamin* OR ((1,25 OR 24,25) W0 dihydroxyvitamin*) OR ((1,25 OR 24,25) W0 dihydroxy W0 vitamin*) OR (1,25dihydroxy W0

vitamin*)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))

39. TI ((((24,25dihydroxy W0 vitamin*) OR ((1,25 OR 24,25) W0 di W0 hydroxyvitamin*) OR (1,25di W0 hydroxyvitamin*) OR (24,25di W0 hydroxyvitamin*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 vitamin*)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB ((((24,25dihydroxy W0 vitamin*) OR ((1,25 OR 24,25) W0 di W0 hydroxyvitamin*) OR (1,25di W0 hydroxyvitamin*) OR (24,25di W0 hydroxyvitamin*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 vitamin*)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW ((((24,25dihydroxy W0 vitamin*) OR ((1,25 OR 24,25) W0 di W0 hydroxyvitamin*) OR (1,25di W0 hydroxyvitamin*) OR (24,25di W0 hydroxyvitamin*) OR ((1,25 OR 24,25) W0 di W0 hydroxy W0 vitamin*)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))
40. TI ((((1,25di W0 hydroxy W0 vitamin*) OR (24,25di W0 hydroxy W0 vitamin*) OR ((1,25 OR 24,25) W0 dihydroxyvit) OR ((1,25 OR 24,25) W0 dihydroxy W0 vit) OR ((1,25 OR 24,25) W0 di W0 hydroxyvit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB ((((1,25di W0 hydroxy W0 vitamin*) OR (24,25di W0 hydroxy W0 vitamin*) OR ((1,25 OR 24,25) W0 dihydroxyvit) OR ((1,25 OR 24,25) W0 dihydroxy W0 vit) OR ((1,25 OR 24,25) W0 di W0 hydroxyvit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW ((((1,25di W0 hydroxy W0 vitamin*) OR (24,25di W0 hydroxy W0 vitamin*) OR ((1,25 OR 24,25) W0 dihydroxyvit) OR ((1,25 OR 24,25) W0 dihydroxy W0 vit) OR ((1,25 OR 24,25) W0 di W0 hydroxyvit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))
41. TI (((((1,25 OR 24,25) W0 di W0 hydroxy W0 vit) OR 1,25dihydroxyvit OR (1,25dihydroxy W0 vit) OR (1,25di W0 hydroxyvit) OR (1,25di W0 hydroxy W0 vit) OR 24,25dihydroxyvit OR (24,25dihydroxy W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB (((((1,25 OR 24,25) W0 di W0 hydroxy W0 vit) OR 1,25dihydroxyvit OR (1,25dihydroxy W0 vit) OR (1,25di W0 hydroxyvit) OR (1,25di W0 hydroxy W0 vit) OR 24,25dihydroxyvit OR (24,25dihydroxy W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW (((((1,25 OR 24,25) W0 di W0 hydroxy W0 vit) OR 1,25dihydroxyvit OR (1,25dihydroxy W0 vit) OR (1,25di W0 hydroxyvit) OR (1,25di W0 hydroxy W0 vit) OR 24,25dihydroxyvit OR (24,25dihydroxy W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))
42. TI ((((24,25di W0 hydroxyvit) OR (24,25di W0 hydroxy W0 vit) OR (1,25 W0 OH2 W0 vitamin*) OR (1,25 W0 OH2 W0 vit) OR (1,25 W0 OH W0 "2" W0 vitamin*) OR (1,25 W0 OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB ((((24,25di W0 hydroxyvit) OR (24,25di W0 hydroxy W0 vit) OR (1,25 W0 OH2 W0 vitamin*) OR (1,25 W0 OH2 W0 vit) OR (1,25 W0 OH W0 "2" W0 vitamin*) OR (1,25 W0 OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW ((((24,25di W0 hydroxyvit) OR (24,25di W0 hydroxy W0 vit) OR (1,25 W0 OH2 W0 vitamin*) OR (1,25 W0 OH2 W0 vit) OR (1,25 W0 OH W0 "2" W0 vitamin*) OR (1,25 W0 OH W0 "2" W0 vit))

W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))
)

43. TI ((((24,25 W0 OH2 W0 vitamin*) OR (24,25 W0 OH2 W0 vit) OR (24,25 W0 OH W0 "2" W0 vitamin*) OR (24,25 W0 OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR AB ((((24,25 W0 OH2 W0 vitamin*) OR (24,25 W0 OH2 W0 vit) OR (24,25 W0 OH W0 "2" W0 vitamin*) OR (24,25 W0 OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3")))) OR MW ((((24,25 W0 OH2 W0 vitamin*) OR (24,25 W0 OH2 W0 vit) OR (24,25 W0 OH W0 "2" W0 vitamin*) OR (24,25 W0 OH W0 "2" W0 vit)) W0 (D OR D1 OR D2 OR D3 OR (D W0 "1") OR (D W0 "2") OR (D W0 "3"))))
44. TI (((1,25 OR 24,25) W0 (dihydroxyvitaminD OR dihydroxyvitaminD1 OR dihydroxyvitaminD2 OR dihydroxyvitaminD3 OR dihydroxyvitD OR dihydroxyvitD1 OR dihydroxyvitD2 OR dihydroxyvitD3))) OR AB (((1,25 OR 24,25) W0 (dihydroxyvitaminD OR dihydroxyvitaminD1 OR dihydroxyvitaminD2 OR dihydroxyvitaminD3 OR dihydroxyvitD OR dihydroxyvitD1 OR dihydroxyvitD2 OR dihydroxyvitD3))) OR MW (((1,25 OR 24,25) W0 (dihydroxyvitaminD OR dihydroxyvitaminD1 OR dihydroxyvitaminD2 OR dihydroxyvitaminD3 OR dihydroxyvitD OR dihydroxyvitD1 OR dihydroxyvitD2 OR dihydroxyvitD3)))
45. TI (((1,25dihydroxy OR (1,25di W0 hydroxy) OR 24,25dihydroxy OR (24,25di W0 hydroxy) OR (1,25 dihydroxy OR (1,25 di W0 hydroxy) OR 24,25 dihydroxy OR (24,25 di W0 hydroxy)) W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3))) OR AB (((1,25dihydroxy OR (1,25di W0 hydroxy) OR 24,25dihydroxy OR (24,25di W0 hydroxy) OR (1,25 dihydroxy OR (1,25 di W0 hydroxy) OR 24,25 dihydroxy OR (24,25 di W0 hydroxy)) W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3))) OR MW (((1,25dihydroxy OR (1,25di W0 hydroxy) OR 24,25dihydroxy OR (24,25di W0 hydroxy) OR (1,25 dihydroxy OR (1,25 di W0 hydroxy) OR 24,25 dihydroxy OR (24,25 di W0 hydroxy)) W0 (vitaminD OR vitaminD1 OR vitaminD2 OR vitaminD3 OR VitD OR VitD1 OR VitD2 OR VitD3)))
46. TI ((“50-14-6” OR calciferol* OR ergocalciferol* OR vs041h42xc)) OR AB ((“50-14-6” OR calciferol* OR ergocalciferol* OR vs041h42xc)) OR MW ((“50-14-6” OR calciferol* OR ergocalciferol* OR vs041h42xc))
47. TI ((“67-96-9” OR calcamin# OR dihydrotachysterin* OR dihydrotachysterol* OR (dihydro W0 (tachysterin* OR tachysterol*)) OR (di W0 hydro W0 (tachysterin* OR tachysterol*)) OR (di W0 (hydrotachysterin* OR hydrotachysterol*)) OR r5lm3h112r)) OR AB ((“67-96-9” OR calcamin# OR dihydrotachysterin* OR dihydrotachysterol* OR (dihydro W0 (tachysterin* OR tachysterol*)) OR (di W0 hydro W0 (tachysterin* OR tachysterol*)) OR (di W0 (hydrotachysterin* OR hydrotachysterol*)) OR r5lm3h112r)) OR MW ((“67-96-9” OR calcamin# OR dihydrotachysterin* OR dihydrotachysterol* OR (dihydro W0 (tachysterin* OR tachysterol*)) OR (di W0 hydro W0 (tachysterin* OR tachysterol*)) OR (di W0 (hydrotachysterin* OR hydrotachysterol*)) OR r5lm3h112r))
48. TI ((“21343-40-8” OR 25hydroxycalciferol* OR ("25" W0 hydroxycalciferol*) OR ("25" W0 hdroxy W0 calciferol*) OR (25hydroxy W0 calciferol*) OR

25hydroxyergocalciferol* OR ("25" W0 hydroxyergocalciferol*) OR ("25" W0 hydroxy W0 ergo W0 calciferol*))) OR AB ((“21343-40-8” OR 25hydroxycalciferol* OR ("25" W0 hydroxycalciferol*) OR ("25" W0 hdroxy W0 calciferol*) OR (25hydroxy W0 calciferol*) OR 25hydroxyergocalciferol* OR ("25" W0 hydroxyergocalciferol*) OR ("25" W0 hydroxy W0 ergo W0 calciferol*))) OR MW ((“21343-40-8” OR 25hydroxycalciferol* OR ("25" W0 hydroxycalciferol*) OR ("25" W0 hdroxy W0 calciferol*) OR (25hydroxy W0 calciferol*) OR 25hydroxyergocalciferol* OR ("25" W0 hydroxyergocalciferol*) OR ("25" W0 hydroxy W0 ergo W0 calciferol*)))

49. TI ((("25" W0 hydroxyergo W0 calciferol*) OR ("25" W0 hydroxy W0 ergocalciferol*) OR (25hydroxy W0 ergo W0 calciferol*) OR (25hydroxyergo W0 calciferol*) OR (25hydroxy W0 ergocalciferol*) OR ercalcidiol*)) OR AB ((("25" W0 hydroxyergo W0 calciferol*) OR ("25" W0 hydroxy W0 ergocalciferol*) OR (25hydroxy W0 ergo W0 calciferol*) OR (25hydroxyergo W0 calciferol*) OR (25hydroxy W0 ergocalciferol*) OR ercalcidiol*)) OR MW ((("25" W0 hydroxyergo W0 calciferol*) OR ("25" W0 hydroxy W0 ergocalciferol*) OR (25hydroxy W0 ergo W0 calciferol*) OR (25hydroxyergo W0 calciferol*) OR (25hydroxy W0 ergocalciferol*) OR ercalcidiol*))
50. TI (("9,10 secocholesta 5,7,10(19),16 tetraen 23 yne 1,3,25 triol" OR ro 23 7553)) OR AB (("9,10 secocholesta 5,7,10(19),16 tetraen 23 yne 1,3,25 triol" OR ro 23 7553)) OR MW (("9,10 secocholesta 5,7,10(19),16 tetraen 23 yne 1,3,25 triol" OR ro 23 7553))
51. TI (("9,10 secocholesta 5,7,10(19),22 tetraene 1,3,25,26 tetrol" OR ro 23 4319 OR ro 23 8525)) OR AB (("9,10 secocholesta 5,7,10(19),22 tetraene 1,3,25,26 tetrol" OR ro 23 4319 OR ro 23 8525)) OR MW (("9,10 secocholesta 5,7,10(19),22 tetraene 1,3,25,26 tetrol" OR ro 23 4319 OR ro 23 8525))
52. TI ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyc#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 c#ole W0 calciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyc#ole W0 calciferol*))) OR AB ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyc#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 c#ole W0 calciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyc#ole W0 calciferol*))) OR MW ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyc#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 c#ole W0 calciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyc#ole W0 calciferol*)))
53. TI ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 c#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyc#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 c#olecalciferol*))) OR AB ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 c#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyc#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 c#olecalciferol*))) OR MW ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 c#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyc#olecalciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 c#olecalciferol*)))

54. TI ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyc#ole W0 calciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 c#ole W0 calciferol*))) OR AB ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyc#ole W0 calciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 c#ole W0 calciferol*))) OR MW ((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyc#ole W0 calciferol*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 c#ole W0 calciferol*)))
55. TI (((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyvitamin*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 vitamin*) W0 (D OR D3 OR (D W0 "3")))) OR AB (((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyvitamin*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 vitamin*) W0 (D OR D3 OR (D W0 "3")))) OR MW (((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxyvitamin*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 trihydroxy W0 vitamin*) W0 (D OR D3 OR (D W0 "3"))))
56. TI (((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyvitamin*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 vitamin*)) W0 (D OR D3 OR (D W0 "3")))) OR AB (((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyvitamin*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 vitamin*)) W0 (D OR D3 OR (D W0 "3")))) OR MW (((((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxyvitamin*) OR ((1,23,25 OR 1,24,25 OR 1alpha,24,25) W0 tri W0 hydroxy W0 vitamin*)) W0 (D OR D3 OR (D W0 "3"))))
57. TI (((1,25,28 W0 trihydroxyvitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 trihydroxy W0 vitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 tri W0 hydroxyvitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 tri W0 hydroxy W0 vitamin* W0 (D OR D2 OR (D W0 "2"))) OR ro 23 6474)) OR AB (((1,25,28 W0 trihydroxyvitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 trihydroxy W0 vitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 tri W0 hydroxyvitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 tri W0 hydroxy W0 vitamin* W0 (D OR D2 OR (D W0 "2"))) OR ro 23 6474)) OR MW (((1,25,28 W0 trihydroxyvitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 trihydroxy W0 vitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 tri W0 hydroxyvitamin* W0 (D OR D2 OR (D W0 "2"))) OR (1,25,28 W0 tri W0 hydroxy W0 vitamin* W0 (D OR D2 OR (D W0 "2"))) OR ro 23 6474))
58. TI (("20 epi 22 ethoxy 24a,26a,27a trihomo 9,10 secocholesta 5,7,10(19) trien 23 yne 1alpha,3beta,25 triol" OR (cb W0 "1093") OR cb1093)) OR AB (("20 epi 22 ethoxy 24a,26a,27a trihomo 9,10 secocholesta 5,7,10(19) trien 23 yne 1alpha,3beta,25 triol" OR (cb W0 "1093") OR cb1093)) OR MW (("20 epi 22 ethoxy 24a,26a,27a trihomo 9,10 secocholesta 5,7,10(19) trien 23 yne 1alpha,3beta,25 triol" OR (cb W0 "1093") OR cb1093))
59. TI (((1 alpha,25 W0 dihydroxyvitamin* W0 d3) OR (1 alpha,25 W0 dihydroxyvitamin* W0 (d W0 "3")) OR (1 alpha,25dihydroxyvitamin* W0 (d W0 "3")) OR (1 alpha,25dihydroxyvitamin* W0 d3))) OR AB (((1 alpha,25 W0 dihydroxyvitamin* W0 d3) OR (1 alpha,25 W0 dihydroxyvitamin* W0 (d W0 "3")) OR (1 alpha,25dihydroxyvitamin* W0 (d W0 "3")) OR (1

alpha,25dihydroxyvitamin* W0 d3))) OR MW (((1 alpha,25 W0 dihydroxyvitamin* W0 d3) OR (1 alpha,25 W0 dihydroxyvitamin* W0 (d W0 "3")) OR (1 alpha,25dihydroxyvitamin* W0 (d W0 "3")) OR (1 alpha,25dihydroxyvitamin* W0 d3)))

60. TI (("9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" OR activated 7 dehydrocholesterol# OR arachitol OR d tracetten OR d3 vicotrat OR ddrops OR desunin OR devaron OR duphafral OR uvedose OR vi-de 3 OR vigantol OR vigorsan OR calcifediol* OR calcidiol# OR calderol# OR dedrogyl OR hidroferol#)) OR AB (("9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" OR activated 7 dehydrocholesterol# OR arachitol OR d tracetten OR d3 vicotrat OR ddrops OR desunin OR devaron OR duphafral OR uvedose OR vi-de 3 OR vigantol OR vigorsan OR calcifediol* OR calcidiol# OR calderol# OR dedrogyl OR hidroferol#)) OR MW (("9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" OR activated 7 dehydrocholesterol# OR arachitol OR d tracetten OR d3 vicotrat OR ddrops OR desunin OR devaron OR duphafral OR uvedose OR vi-de 3 OR vigantol OR vigorsan OR calcifediol* OR calcidiol# OR calderol# OR dedrogyl OR hidroferol#))
61. TI ((p6yz13c99q OR t0wxw8f54e OR alderol OR delakmin OR didrogyl OR dydrogil OR rayaldee OR u 32070 OR u32070 OR 19356-17-3 OR calcitriol* OR "1 alpha, 25-dihydroxy-20-epi-vitamin d3" OR 32222-06-3 OR decostriol* OR fxc9231jvh OR mc1288 OR (mc W0 "1288") OR osteotriol* OR renatriol* OR rocaltrol*)) OR AB ((p6yz13c99q OR t0wxw8f54e OR alderol OR delakmin OR didrogyl OR dydrogil OR rayaldee OR u 32070 OR u32070 OR 19356-17-3 OR calcitriol* OR "1 alpha, 25-dihydroxy-20-epi-vitamin d3" OR 32222-06-3 OR decostriol* OR fxc9231jvh OR mc1288 OR (mc W0 "1288") OR osteotriol* OR renatriol* OR rocaltrol*)) OR MW ((p6yz13c99q OR t0wxw8f54e OR alderol OR delakmin OR didrogyl OR dydrogil OR rayaldee OR u 32070 OR u32070 OR 19356-17-3 OR calcitriol* OR "1 alpha, 25-dihydroxy-20-epi-vitamin d3" OR 32222-06-3 OR decostriol* OR fxc9231jvh OR mc1288 OR (mc W0 "1288") OR osteotriol* OR renatriol* OR rocaltrol*))
62. TI ((silkis OR sitriol* OR soltriol* OR tirocal OR bocatriol* OR calcijex OR at10 OR at-10)) OR AB ((silkis OR sitriol* OR soltriol* OR tirocal OR bocatriol* OR calcijex OR at10 OR at-10)) OR MW ((silkis OR sitriol* OR soltriol* OR tirocal OR bocatriol* OR calcijex OR at10 OR at-10))
63. TI (("22 oxacalcitriol*" OR maxacalcitol* OR oxarol* OR becocalcidiol* OR asord OR qrx 101 OR qrx101 OR daivobet OR dovobet OR enstilar OR leo 80185 OR leo80185 OR taclonex OR xamiol* OR calcipotriol* OR "1alpha, 24 dihydroxy 26, 27 cyclo 22, 23 didehydrocholecalciferol*")) OR AB (("22 oxacalcitriol*" OR maxacalcitol* OR oxarol* OR becocalcidiol* OR asord OR qrx 101 OR qrx101 OR daivobet OR dovobet OR enstilar OR leo 80185 OR leo80185 OR taclonex OR xamiol* OR calcipotriol* OR "1alpha, 24 dihydroxy 26, 27 cyclo 22, 23 didehydrocholecalciferol*")) OR MW (("22 oxacalcitriol*" OR maxacalcitol* OR oxarol* OR becocalcidiol* OR asord OR qrx 101 OR qrx101 OR daivobet OR dovobet OR enstilar OR leo 80185 OR leo80185 OR taclonex OR xamiol* OR calcipotriol* OR "1alpha, 24 dihydroxy 26, 27 cyclo 22, 23 didehydrocholecalciferol*"))
64. TI (("24 cyclopropyl 9, 10 secochola 5, 7, 10 (19), 22 tetraene 1alpha, 3beta, 24 triol" OR "26, 27 cyclo 9, 10 seco 5, 7, 10 (19), 22 cholestatetraene 1, 3, 24

triol" OR calcipotriene OR daivonex OR davonex OR divonex OR dovonex OR (mc W0 "903") OR mc903 OR psorcutan OR psotriol OR sorilux)) OR AB (("24 cyclopropyl 9, 10 secochola 5, 7, 10 (19), 22 tetraene 1alpha, 3beta, 24 triol" OR "26, 27 cyclo 9, 10 seco 5, 7, 10 (19), 22 cholestatetraene 1, 3, 24 triol" OR calcipotriene OR daivonex OR davonex OR divonex OR dovonex OR (mc W0 "903") OR mc903 OR psorcutan OR psotriol OR sorilux)) OR MW (("24 cyclopropyl 9, 10 secochola 5, 7, 10 (19), 22 tetraene 1alpha, 3beta, 24 triol" OR "26, 27 cyclo 9, 10 seco 5, 7, 10 (19), 22 cholestatetraene 1, 3, 24 triol" OR calcipotriene OR daivonex OR davonex OR divonex OR dovonex OR (mc W0 "903") OR mc903 OR psorcutan OR psotriol OR sorilux))

65. TI ((bonky OR "caraben sc" OR cicarol* OR citrihexal OR "c decostriol*" OR difix OR (dn W0 "101") OR dn101 OR ecatrol* OR hitrol* OR kolkatriol* OR kosteo OR lemytriol* OR meditrol* OR poscal OR rexamat OR ro 21 5535 OR ro 215535 OR ro215535 OR roical OR rolsical OR tariol*)) OR AB ((bonky OR "caraben sc" OR cicarol* OR citrihexal OR "c decostriol*" OR difix OR (dn W0 "101") OR dn101 OR ecatrol* OR hitrol* OR kolkatriol* OR kosteo OR lemytriol* OR meditrol* OR poscal OR rexamat OR ro 21 5535 OR ro 215535 OR ro215535 OR roical OR rolsical OR tariol*)) OR MW ((bonky OR "caraben sc" OR cicarol* OR citrihexal OR "c decostriol*" OR difix OR (dn W0 "101") OR dn101 OR ecatrol* OR hitrol* OR kolkatriol* OR kosteo OR lemytriol* OR meditrol* OR poscal OR rexamat OR ro 21 5535 OR ro 215535 OR ro215535 OR roical OR rolsical OR tariol*))
66. TI ((topitriol* OR triocalcit OR vectical OR "fortipan combi D" OR "norsed combi" OR "9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" OR "baby d" OR bonesyl OR "d muslin" OR desunin OR dupharinterfran OR irradia OR irradiant OR "kora liquid" OR ostoforte OR uvedose)) OR AB ((topitriol* OR triocalcit OR vectical OR "fortipan combi D" OR "norsed combi" OR "9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" OR "baby d" OR bonesyl OR "d muslin" OR desunin OR dupharinterfran OR irradia OR irradiant OR "kora liquid" OR ostoforte OR uvedose)) OR MW ((topitriol* OR triocalcit OR vectical OR "fortipan combi D" OR "norsed combi" OR "9, 10 secocholesta 5, 7, 10 (19) trien 3 ol" OR "baby d" OR bonesyl OR "d muslin" OR desunin OR dupharinterfran OR irradia OR irradiant OR "kora liquid" OR ostoforte OR uvedose))
67. TI ((ecalcidene OR eldecalcitol* OR (ed W0 "71") OR ed71 OR elocalcitol* OR (bxl W0 "628") OR bxl628 OR (ro W0 26 9228) OR (ro26 W0 "9228") OR falecalcitriol* OR "1, 25 dihydroxy 26, 26, 26, 27, 27, 27 hexafluoroc#olecalciferol*" OR "26, 26, 26, 27, 27, 27 hexafluorocalcitriol*" OR flocalcitriol*)) OR AB ((ecalcidene OR eldecalcitol* OR (ed W0 "71") OR ed71 OR elocalcitol* OR (bxl W0 "628") OR bxl628 OR (ro W0 26 9228) OR (ro26 W0 "9228") OR falecalcitriol* OR "1, 25 dihydroxy 26, 26, 26, 27, 27, 27 hexafluoroc#olecalciferol*" OR "26, 26, 26, 27, 27, 27 hexafluorocalcitriol*" OR flocalcitriol*)) OR MW ((ecalcidene OR eldecalcitol* OR (ed W0 "71") OR ed71 OR elocalcitol* OR (bxl W0 "628") OR bxl628 OR (ro W0 26 9228) OR (ro26 W0 "9228") OR falecalcitriol* OR "1, 25 dihydroxy 26, 26, 26, 27, 27, 27 hexafluoroc#olecalciferol*" OR "26, 26, 26, 27, 27, 27 hexafluorocalcitriol*" OR flocalcitriol*))
68. TI ((fulstan OR hornel OR (ro 23 W0 "4194") OR (ro23 W0 "4194") OR st 630 OR st630 OR inecalcitol* OR lexacalcitol* OR (kh W0 "1060") OR kh1060 OR

pefcalcitol* OR (m W0 "5181") OR m5181 OR secalciferol* OR 24hydroxycalcidiol* OR ("24" W0 hydroxycalcidiol*) OR ("24" W0 hydroxy W0 calcidiol*))) OR AB ((fulstan OR hornel OR (ro 23 W0 "4194") OR (ro23 W0 "4194") OR st 630 OR st630 OR inecalcitol* OR lexacalcitol* OR (kh W0 "1060") OR kh1060 OR pefcalcitol* OR (m W0 "5181") OR m5181 OR secalciferol* OR 24hydroxycalcidiol* OR ("24" W0 hydroxycalcidiol*) OR ("24" W0 hydroxy W0 calcidiol*))) OR MW ((fulstan OR hornel OR (ro 23 W0 "4194") OR (ro23 W0 "4194") OR st 630 OR st630 OR inecalcitol* OR lexacalcitol* OR (kh W0 "1060") OR kh1060 OR pefcalcitol* OR (m W0 "5181") OR m5181 OR secalciferol* OR 24hydroxycalcidiol* OR ("24" W0 hydroxycalcidiol*) OR ("24" W0 hydroxy W0 calcidiol*)))

69. TI (((24hydroxy W0 calcidiol*) OR osteo d OR (ro 21 W0 "5816") OR (ro21 W0 "5816") OR seocalcitol* OR (eb W0 "1089") OR eb1089 OR tacalcitol* OR bonalfa OR bonealpha OR curatoderm OR "tv 02" OR tisocalcitate OR "10, 19 dihydroercalciol*" OR antitanil OR antitetanin# OR atecen)) OR AB (((24hydroxy W0 calcidiol*) OR osteo d OR (ro 21 W0 "5816") OR (ro21 W0 "5816") OR seocalcitol* OR (eb W0 "1089") OR eb1089 OR tacalcitol* OR bonalfa OR bonealpha OR curatoderm OR "tv 02" OR tisocalcitate OR "10, 19 dihydroercalciol*" OR antitanil OR antitetanin# OR atecen)) OR MW (((24hydroxy W0 calcidiol*) OR osteo d OR (ro 21 W0 "5816") OR (ro21 W0 "5816") OR seocalcitol* OR (eb W0 "1089") OR eb1089 OR tacalcitol* OR bonalfa OR bonealpha OR curatoderm OR "tv 02" OR tisocalcitate OR "10, 19 dihydroercalciol*" OR antitanil OR antitetanin# OR atecen))
70. TI ((calcinosefaktor OR dht intensol OR dichistrolum OR dichysterol OR dichystrol OR dihydral OR dihydrotachysterin# OR dikystrol OR dygratyl OR hytakerol OR manipal OR parterol OR tachidon OR tachystin# OR tachystol OR tetilan)) OR AB ((calcinosefaktor OR dht intensol OR dichistrolum OR dichysterol OR dichystrol OR dihydral OR dihydrotachysterin# OR dikystrol OR dygratyl OR hytakerol OR manipal OR parterol OR tachidon OR tachystin# OR tachystol OR tetilan)) OR MW ((calcinosefaktor OR dht intensol OR dichistrolum OR dichysterol OR dichystrol OR dihydral OR dihydrotachysterin# OR dikystrol OR dygratyl OR hytakerol OR manipal OR parterol OR tachidon OR tachystin# OR tachystol OR tetilan))
71. TI ((Hydroxyergocalciferol* OR (hydroxy W0 ergocalciferol*) OR (hydroxyergo W0 calciferol*) OR (hydroxy W0 ergo W0 calciferol*) OR Doxercalciferol* OR Dihydroxyergocalciferol* OR (di W0 hydroxy W0 ergo W0 calciferol*))) OR AB ((Hydroxyergocalciferol* OR (hydroxy W0 ergocalciferol*) OR (hydroxyergo W0 calciferol*) OR (hydroxy W0 ergo W0 calciferol*) OR Doxercalciferol* OR Dihydroxyergocalciferol* OR (di W0 hydroxy W0 ergo W0 calciferol*))) OR MW ((Hydroxyergocalciferol* OR (hydroxy W0 ergocalciferol*) OR (hydroxyergo W0 calciferol*) OR (hydroxy W0 ergo W0 calciferol*) OR Doxercalciferol* OR Dihydroxyergocalciferol* OR (di W0 hydroxy W0 ergo W0 calciferol*)))
72. TI (((di W0 hydroxyergo W0 calciferol*) OR (dihydroxy W0 ergo W0 calciferol*) OR ro 17 6218 OR trihydroxyergocalciferol* OR (tri W0 hydroxy W0 ergo W0 calciferol*) OR (tri W0 hydroxyergo W0 calciferol*) OR (trihydroxy W0 ergo W0 calciferol*))) OR AB (((di W0 hydroxyergo W0 calciferol*) OR (dihydroxy W0 ergo W0 calciferol*) OR ro 17 6218 OR

trihydroxyergocalciferol* OR (tri W0 hydroxy W0 ergo W0 calciferol*) OR (tri W0 hydroxyergo W0 calciferol*) OR (trihydroxy W0 ergo W0 calciferol*))) OR MW (((di W0 hydroxyergo W0 calciferol*) OR (dihydroxy W0 ergo W0 calciferol*) OR ro 17 6218 OR trihydroxyergocalciferol* OR (tri W0 hydroxy W0 ergo W0 calciferol*) OR (tri W0 hydroxyergo W0 calciferol*) OR (trihydroxy W0 ergo W0 calciferol*)))

73. TI (((Euro W0 D) OR hectorol OR alfacalcidiol* OR alfacalcidol* OR alphacalcidol* OR paricalcitol* OR (abt W0 "358") OR abt358 OR paracalcin OR zemplar OR bonesil d flas OR cacit d3 OR cal d vita OR cal-d-OR OR cal-d-vita OR calceos OR calci chew d3 OR calcial d OR calcichew d3 OR calcigran)) OR AB (((Euro W0 D) OR hectorol OR alfacalcidiol* OR alfacalcidol* OR alphacalcidol* OR paricalcitol* OR (abt W0 "358") OR abt358 OR paracalcin OR zemplar OR bonesil d flas OR cacit d3 OR cal d vita OR cal-d-OR OR cal-d-vita OR calceos OR calci chew d3 OR calcial d OR calcichew d3 OR calcigran)) OR MW (((Euro W0 D) OR hectorol OR alfacalcidiol* OR alfacalcidol* OR alphacalcidol* OR paricalcitol* OR (abt W0 "358") OR abt358 OR paracalcin OR zemplar OR bonesil d flas OR cacit d3 OR cal d vita OR cal-d-OR OR cal-d-vita OR calceos OR calci chew d3 OR calcial d OR calcichew d3 OR calcigran))
74. TI ((calcimagon d3 OR calcimagon extra d3 OR calcio d OR calcioral d3 OR calcium d OR calcium wyeth OR calcivit d OR caldefix OR caldevita OR calisvit OR calperos d3 OR citrokalcium d OR d-vital OR dagravit d calcium OR disnal OR eurocal d3 OR ideos OR kombi kalz OR mastical d)) OR AB ((calcimagon d3 OR calcimagon extra d3 OR calcio d OR calcioral d3 OR calcium d OR calcium wyeth OR calcivit d OR caldefix OR caldevita OR calisvit OR calperos d3 OR citrokalcium d OR d-vital OR dagravit d calcium OR disnal OR eurocal d3 OR ideos OR kombi kalz OR mastical d)) OR MW ((calcimagon d3 OR calcimagon extra d3 OR calcio d OR calcioral d3 OR calcium d OR calcium wyeth OR calcivit d OR caldefix OR caldevita OR calisvit OR calperos d3 OR citrokalcium d OR d-vital OR dagravit d calcium OR disnal OR eurocal d3 OR ideos OR kombi kalz OR mastical d))
75. TI ((nycoplus calcigran OR orocal d3 OR orotre OR osseans d3 OR osteomerck OR reliveran OR sandocal-d OR steovit d3 OR steovit forte OR tacal d3 OR tepox cal d OR versical d OR alfarol OR (alpha W0 (calcidiol OR calcidol OR d3 OR d 3)) OR etalpha OR onealfa OR einsalpha)) OR AB ((nycoplus calcigran OR orocal d3 OR orotre OR osseans d3 OR osteomerck OR reliveran OR sandocal-d OR steovit d3 OR steovit forte OR tacal d3 OR tepox cal d OR versical d OR alfarol OR (alpha W0 (calcidiol OR calcidol OR d3 OR d 3)) OR etalpha OR onealfa OR einsalpha)) OR MW ((nycoplus calcigran OR orocal d3 OR orotre OR osseans d3 OR osteomerck OR reliveran OR sandocal-d OR steovit d3 OR steovit forte OR tacal d3 OR tepox cal d OR versical d OR alfarol OR (alpha W0 (calcidiol OR calcidol OR d3 OR d 3)) OR etalpha OR onealfa OR einsalpha))
76. TI (((one W0 alpha) OR unalfa OR unalpha OR oxidevite OR oxydevit OR cabone OR (dn W0 "101") OR dn101 OR meditrol OR ro 21 5535 OR ro215535 OR soltriol OR topitriol OR vectical OR condol OR d vital OR davitamon d OR davitin OR decaps OR dee osterol OR dee ron OR dekristol OR deltalin)) OR AB (((one W0 alpha) OR unalfa OR unalpha OR oxidevite OR oxydevit OR

cabone OR (dn W0 "101") OR dn101 OR meditrol OR ro 21 5535 OR ro215535 OR soltriol OR topitriol OR vectical OR condol OR d vital OR davitamon d OR davitin OR decaps OR dee osterol OR dee ron OR dekristol OR deltalin)) OR MW (((one W0 alpha) OR unalfa OR unalpha OR oxidevite OR oxydevit OR cabone OR (dn W0 "101") OR dn101 OR meditrol OR ro 21 5535 OR ro215535 OR soltriol OR topitriol OR vectical OR condol OR d vital OR davitamon d OR davitin OR decaps OR dee osterol OR dee ron OR dekristol OR deltalin))

77. TI ((deratol OR detalup OR diactol OR divit urto OR Drisdol OR endo d OR ercalciol OR ergorone OR ergosterina irradiate OR ertron OR fortodyl OR genevis OR infron OR metadee OR mina d2 OR mulsiferol OR mykostin OR oldevit OR oleovitamin d2 OR ostelin OR osteovit OR radiostol OR radsterin)) OR AB ((deratol OR detalup OR diactol OR divit urto OR Drisdol OR endo d OR ercalciol OR ergorone OR ergosterina irradiate OR ertron OR fortodyl OR genevis OR infron OR metadee OR mina d2 OR mulsiferol OR mykostin OR oldevit OR oleovitamin d2 OR ostelin OR osteovit OR radiostol OR radsterin)) OR MW ((deratol OR detalup OR diactol OR divit urto OR Drisdol OR endo d OR ercalciol OR ergorone OR ergosterina irradiate OR ertron OR fortodyl OR genevis OR infron OR metadee OR mina d2 OR mulsiferol OR mykostin OR oldevit OR oleovitamin d2 OR ostelin OR osteovit OR radiostol OR radsterin))
78. TI ((raquiferol OR shock ferol OR sterodin OR sterogyl OR ultranol OR uvesterol d OR vi de OR vi di OR vide OR vidi OR vio d OR viosterol OR vitaminol OR vitavel d OR "10,19 dihydroercalciol" OR dichystrol OR dihydral OR dygratyl OR hytakerol OR calcitetrol*)) OR AB ((raquiferol OR shock ferol OR sterodin OR sterogyl OR ultranol OR uvesterol d OR vi de OR vi di OR vide OR vidi OR vio d OR viosterol OR vitaminol OR vitavel d OR "10,19 dihydroercalciol" OR dichystrol OR dihydral OR dygratyl OR hytakerol OR calcitetrol*)) OR MW ((raquiferol OR shock ferol OR sterodin OR sterogyl OR ultranol OR uvesterol d OR vi de OR vi di OR vide OR vidi OR vio d OR viosterol OR vitaminol OR vitavel d OR "10,19 dihydroercalciol" OR dichystrol OR dihydral OR dygratyl OR hytakerol OR calcitetrol*))
79. TI ((Tevabone OR valebo OR adrovance OR fosavance OR vantavo OR "9, 10 secocholesta 5, 7, 10 (19) triene 1alpha, 3beta diol")) OR AB ((Tevabone OR valebo OR adrovance OR fosavance OR vantavo OR "9, 10 secocholesta 5, 7, 10 (19) triene 1alpha, 3beta diol")) OR MW ((Tevabone OR valebo OR adrovance OR fosavance OR vantavo OR "9, 10 secocholesta 5, 7, 10 (19) triene 1alpha, 3beta diol"))
80. TI ((avitaminosis D OR (D W0 avitaminosis) OR (hypo W0 vitaminosis N0 D) OR (hypovitaminosis N0 D))) OR AB ((avitaminosis D OR (D W0 avitaminosis) OR (hypo W0 vitaminosis N0 D) OR (hypovitaminosis N0 D))) OR MW ((avitaminosis D OR (D W0 avitaminosis) OR (hypo W0 vitaminosis N0 D) OR (hypovitaminosis N0 D)))
81. (MH "Vitamin D+")
82. (MH "Vitamin D Deficiency")
83. S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR

S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR S81 OR S82

84. S1 AND S2

85. S1 AND S3

86. S1 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S84 OR S85

87. S83 AND S86

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