Anthony W Norman, PhD

Memorial lecture

presented on behalf of the Vitamin D workshop

&

Roger Bouillon

MD, PhD, FRCP (London)

Clinic and Laboratory for Experimental Medicine and Endocrinology

Katholieke Universiteit Leuven

Belgium

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

1. Journal of Bone and Mineral Research,
   = American Society for Bone and Mineral Research
   J Bone Miner Res. **2019** Aug 28. doi: 10.1002/jbmr.3840

2. Journal of Steroid Biochemistry and Molecular Biology
   to be published with the Proceedings
   of the Vitamin D Workshop held in NYC May 2019

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Mark R Haussler, PhD

Department of Basic Medical Sciences, College of Medicine-Phoenix, The University of Arizona, Phoenix, AZ, USA

Sylvia Christakos, PhD

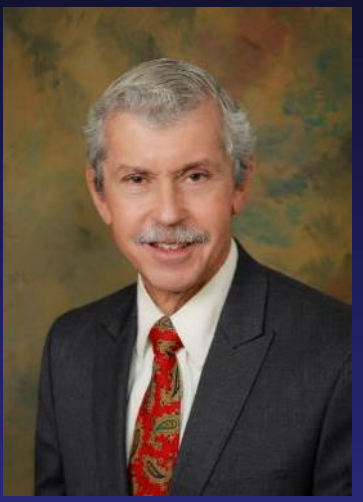
Departments of Microbiology, Biochemistry, and Molecular Genetics, Rutgers New Jersey Medical School, The State University of New Jersey, Newark, NJ, USA

Roger Bouillon, MD, PhD, FRCP

Laboratory of Clinical and Experimental Endocrinology, Department of Chronic Diseases, Metabolism and Ageing, KU Leuven, Leuven, Belgium

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)



In memoriam AW Norman to be published in JSBMB 2020

Daniel Bikle, MD, University of California San Francisco and VA Medical Center, CA, USA

JoEllen Welsh, PhD SUNY Distinguished Professor & Empire Innovation Professor, Environmental Health Sciences University at Albany Cancer Research Center, Rensselaer, NY 12144

Roger Bouillon, MD, PhD, FRCP
Laboratory of Clinical and Experimental Endocrinology, Department of Chronic Diseases, Metabolism and Ageing, KU Leuven, Leuven, Belgium

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

- Born in Ames, Iowa in 1938
- BS from Oberlin College in 1959

- MS (1961), from the University of Wisconsin, Madison
- PhD (1963) from the University of Wisconsin, Madison

  (fellow in Biochemistry & research assistant)

- Postdoctoral Fellow Dept Chemistry , UCLA 1963-64
- A member of the UCR faculty since 1963

  assistant professor and assistant biochemist ➔ ➔ professor & chairman department of biochemistry

  divisional dean Biomedical sciences

  emeritus professor

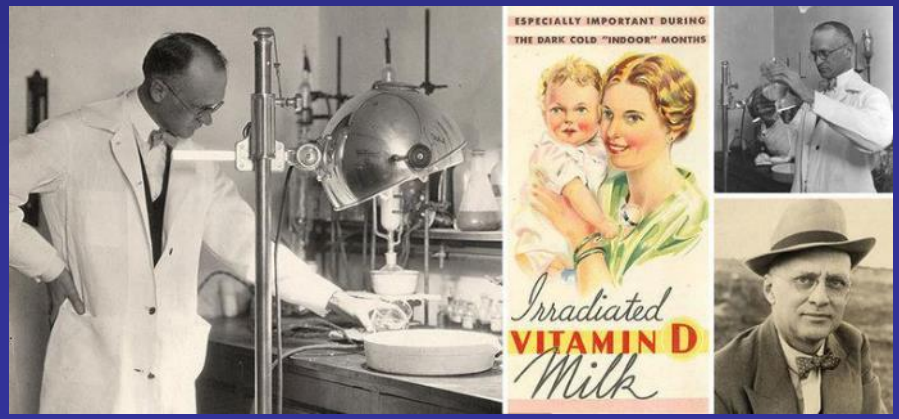
Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

- PhD research in Madison
- Mentor: Hector F DeLuca

= Laboratory of Biochemistry of the Master of vitamin D:

~~ Tony = the “grand-student” of the famous Harry Steenbock, a pioneer in vitamin D research at Wisconsin who discovered that irradiation with ultraviolet light increased the vitamin D content of foods.



Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

PhD research in Madison/Wisconsin (1961-1963)

Mentor: Hector F DeLuca

Publications:

BIOLOGICALLY ACTIVE FORMS OF **VITAMIN** D3 IN KIDNEY AND INTESTINE.
NORMAN AW, LUND J, **DELUCA** HF. Arch Biochem Biophys. 1964;108:12-21.

THE SUBCELLULAR LOCATION OF H3 **VITAMIN** D3 IN KIDNEY AND INTESTINE.
NORMAN AW, **DELUCA** HF. Arch Biochem Biophys. 1964;107:69-77

Vitamin D and the incorporation of [1-14C]acetate into the organic acids of bone.
Norman AW, **DeLuca** HF. Biochem J. 1964 91:124-30.

THE PREPARATION OF H3-**VITAMINS** D2 AND D3--THEIR LOCALIZATION IN THE RAT.
NORMAN AW, **DELUCA** HF.
Biochemistry. 1963;2:1160-8.

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Early independent research in UCR (1963 onwards)

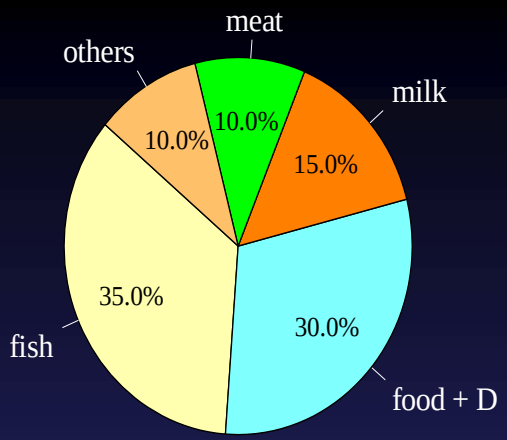
!!! Combined with postdoctoral research in the area of oxidative phosphorylation in the laboratory of Nobel Laureate Paul D Boyer at the University of LA

Choice of research area:

Biochemical, cellular and molecular endocrinology, and physiology of the vitamin D endocrine system

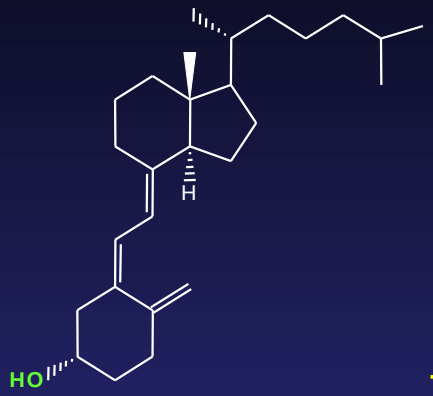
Why his choice of vitamin D was very wise ???

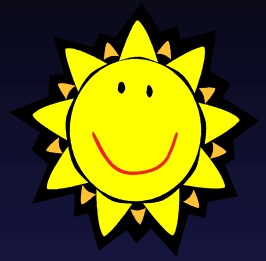
➔ End of the present lecture



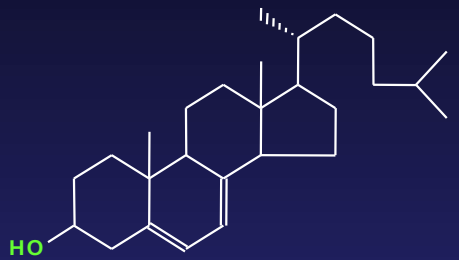
nutrition

Cholecalciferol





7-Dehydroxycholecalciferol

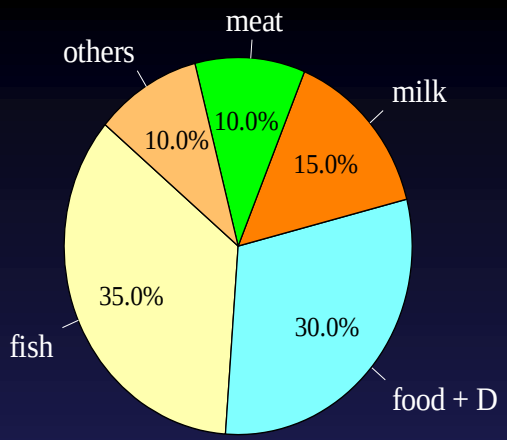


++ skin (UV)
-- 7DHC-delta-7-reductase

Black box

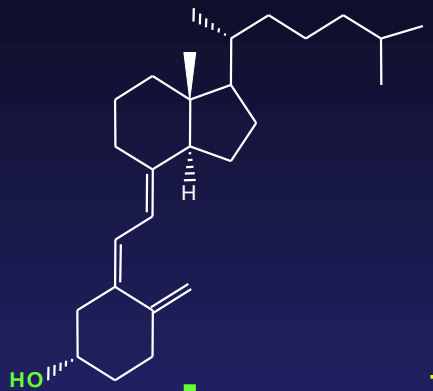
Status 1920-1930’s

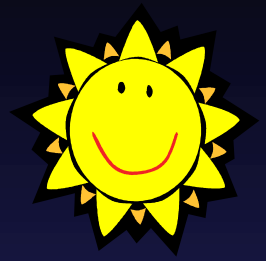
Cures rickets



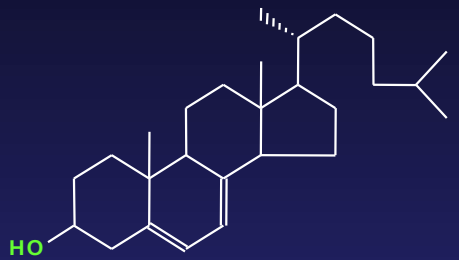
nutrition

Cholecalciferol





7-Dehydroxycholecalciferol



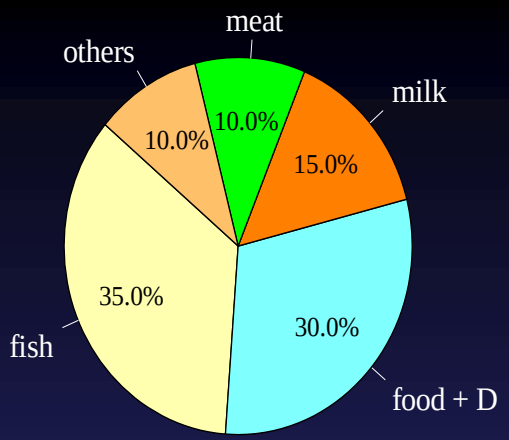
++ skin (UV)
-- 7DHC-delta-7-reductase

Improves intestinal calcium absorption

Status 1940-1960's

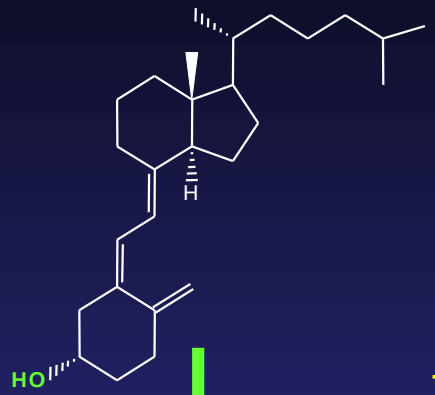
Black box

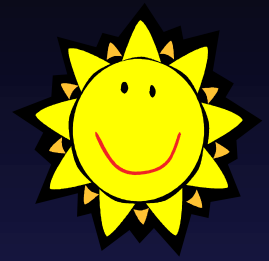
Cures rickets



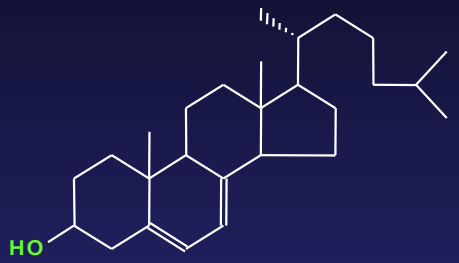
nutrition

Cholecalciferol





7-Dehydroxycholecalciferol



++ skin (UV)
-- 7DHC-delta-7-reductase

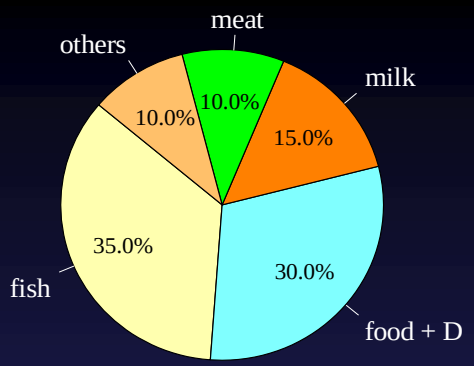
25-hydroxylation in liver

Improves intestinal calcium absorption

Status 1960's-

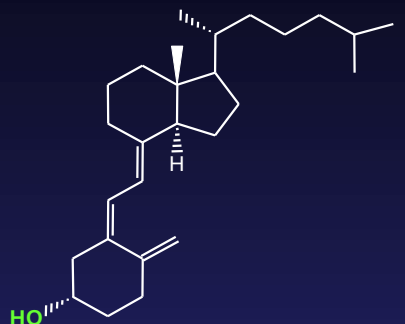
Black box

Cures rickets

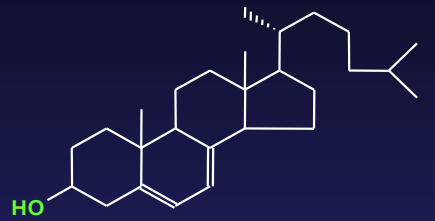


nutrition

Cholecalciferol



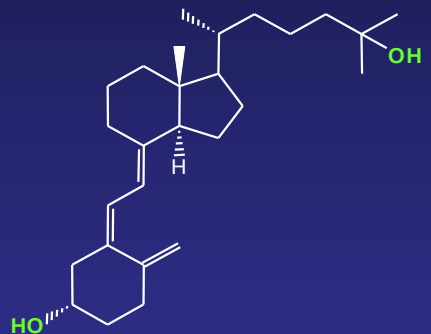
7-Dehydroxycholecalciferol

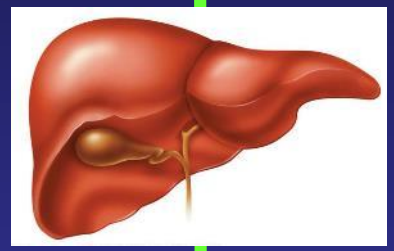


++ skin (UV)
-- 7DHC-de-7-reductase

liver

(mitoch CYP27A1)
(micros CYP2D5)
(micros CYP2R1)

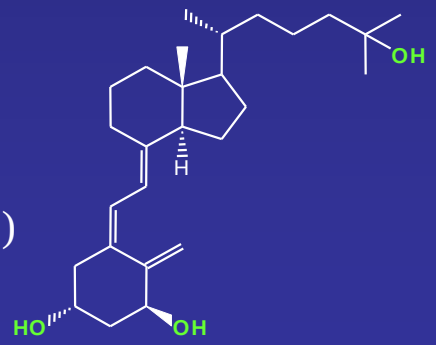


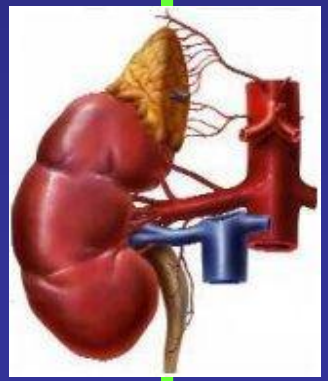


25- Hydroxycholecalciferol

Kidney

(Mitoch CYP27B1)





1α,25(OH)2D●DBP

1µg

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

The first research advances from AW Norman's laboratory with M Haussler as his first PhD student:

- The effect of vitamin D to stimulate intestinal calcium absorption in rachitic chickens was inhibited by actinomycin D, suggesting that unlike the water-soluble vitamins which functioned as enzyme cofactors, vitamin D action required *mRNA/protein* synthesis. (Science 1965)

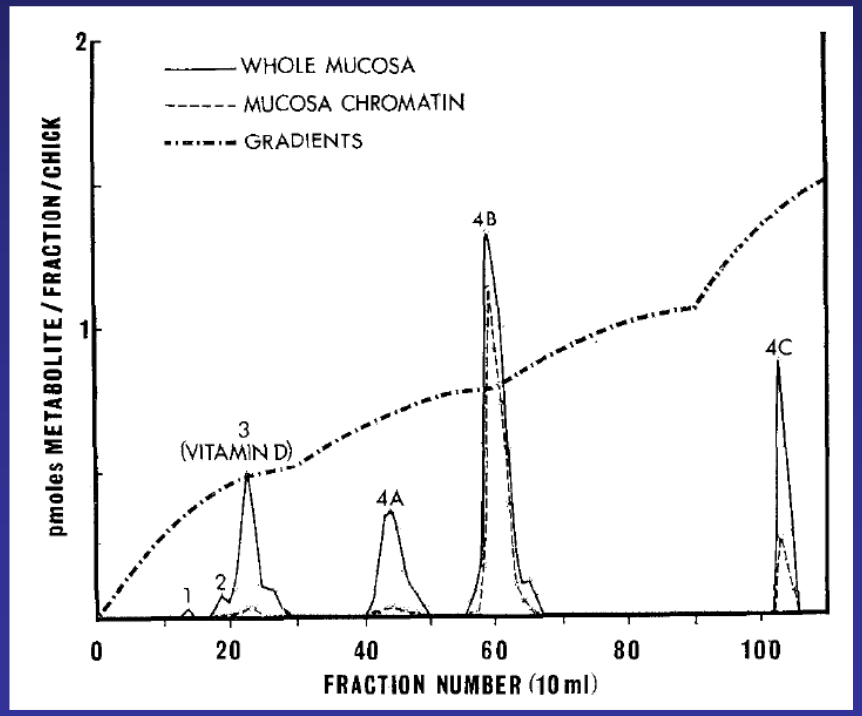
- Dr. Norman's group reported that after intracardiac injection of radioactively labeled vitamin D into vitamin D - deficient chickens, the predominant subcellular fraction of the small intestine containing the radioactive tag was the nucleus ~ consistent with a *genomic mechanism* of action for vitamin D or a metabolite (Archives of Biochemistry and Biophysics,1967)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Radioactive vitamin D (metabolite) localized exclusively to purified chromatin, further supporting a role for DNA-driven gene transcription in the molecular response to vitamin D.

The chromatin-associated, labeled sterol was extracted from intestinal chromatin and analyzed chromatographically in numerous systems, and proven to be a *metabolite of vitamin D more polar than 25(OH)D and biologically active* (Journal of Biological Chemistry in August 1968)



Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

As reported in January 1969 in the Proceedings of the National Academy of Sciences of the United States of America (Proc Natl Acad Sci USA), we* discovered a

"Chromosomal Receptor for a Vitamin D Metabolite,"

This DNA-binding and vitamin D metabolite–binding protein has become known as the vitamin D receptor (VDR)

* *Chromosomal receptor for a vitamin D metabolite by Mark R. Haussler and Anthony W. Norman, Department of Biochemistry, University of California (Riverside)*

Identification of 1,25-Dihydroxycholecalciferol, a New Kidney Hormone controlling Calcium Metabolism

D. E. M. LAWSON*, D. R. FRASER*, E. KODICEK*, H. R. MORRIS† & DUDLEY H. WILLIAMS†

*Dunn Nutritional Laboratory, University of Cambridge, and Medical Research Council, Milton Road, Cambridge

†University Chemical Laboratory, Lensfield Road, Cambridge

Nature **230**, 228 - 230 (26 March 1971)

Identification of 1,25-Dihydroxycholecalciferol, a Form of Vitamin D_3 Metabolically Active in the Intestine

M. F. HOLICK, H. K. SCHNOES, AND H. F. DeLUCA*

Department of Biochemistry, University of Wisconsin, Madison, Wis. 53706

Proc. Nat. Acad. Sci. USA
Vol. 68, No. 4, pp. 803–804, April 1971

1,25-Dihydroxycholecalciferol: Identification of the Proposed Active Form of Vitamin D3 in the Intestine

Anthony W. Norman [1], James F. Myrtle [1], Ronald J. Miogett [1], Henry G. Nowicki [1], Vincent Williams [2], and G. Popjaák [2]

[1] Department of Biochemistry, University of California, Riverside 92502
[2] Department of Biological Chemistry, School of Medicine, University of California, Los Angeles 90024

Science 2 July 1971: Vol. 173. no. 3991, pp. 51 - 54

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Chemical identification of the more polar metabolite:

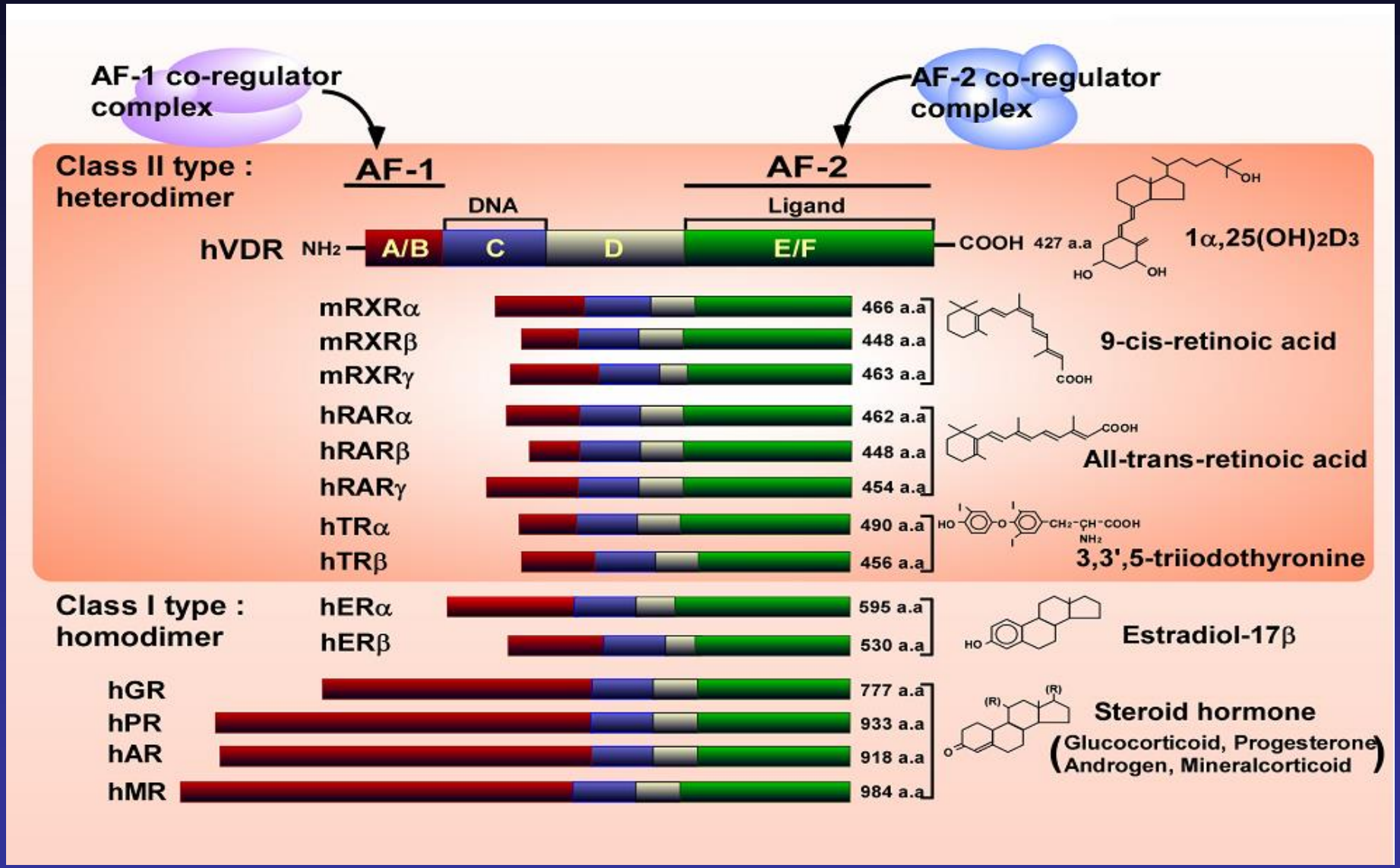
1,25-dihydroxyvitamin D_3 or $1,25(OH)_2D_3$

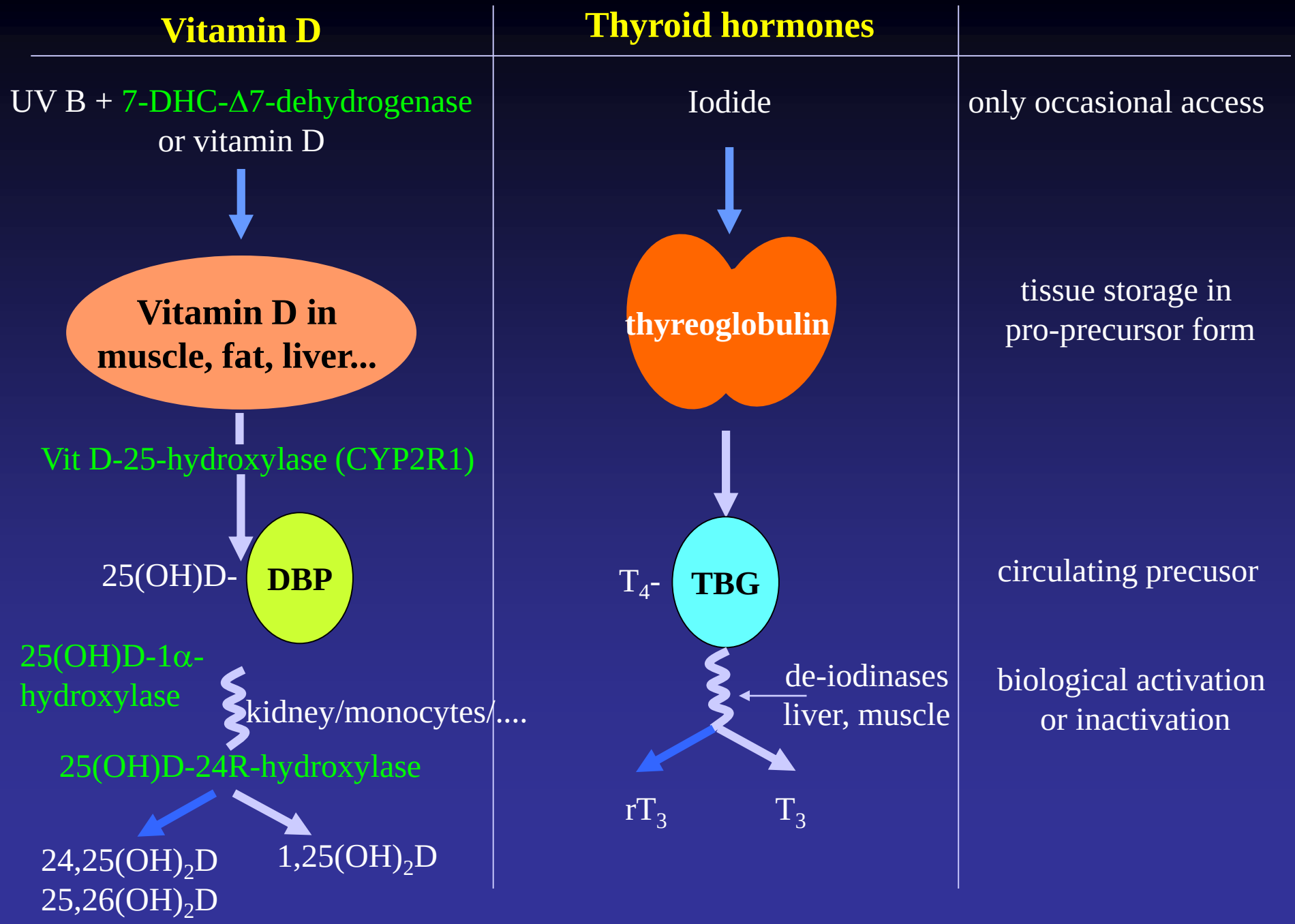
Discovery of a nuclear receptor for the active vitamin D metabolite

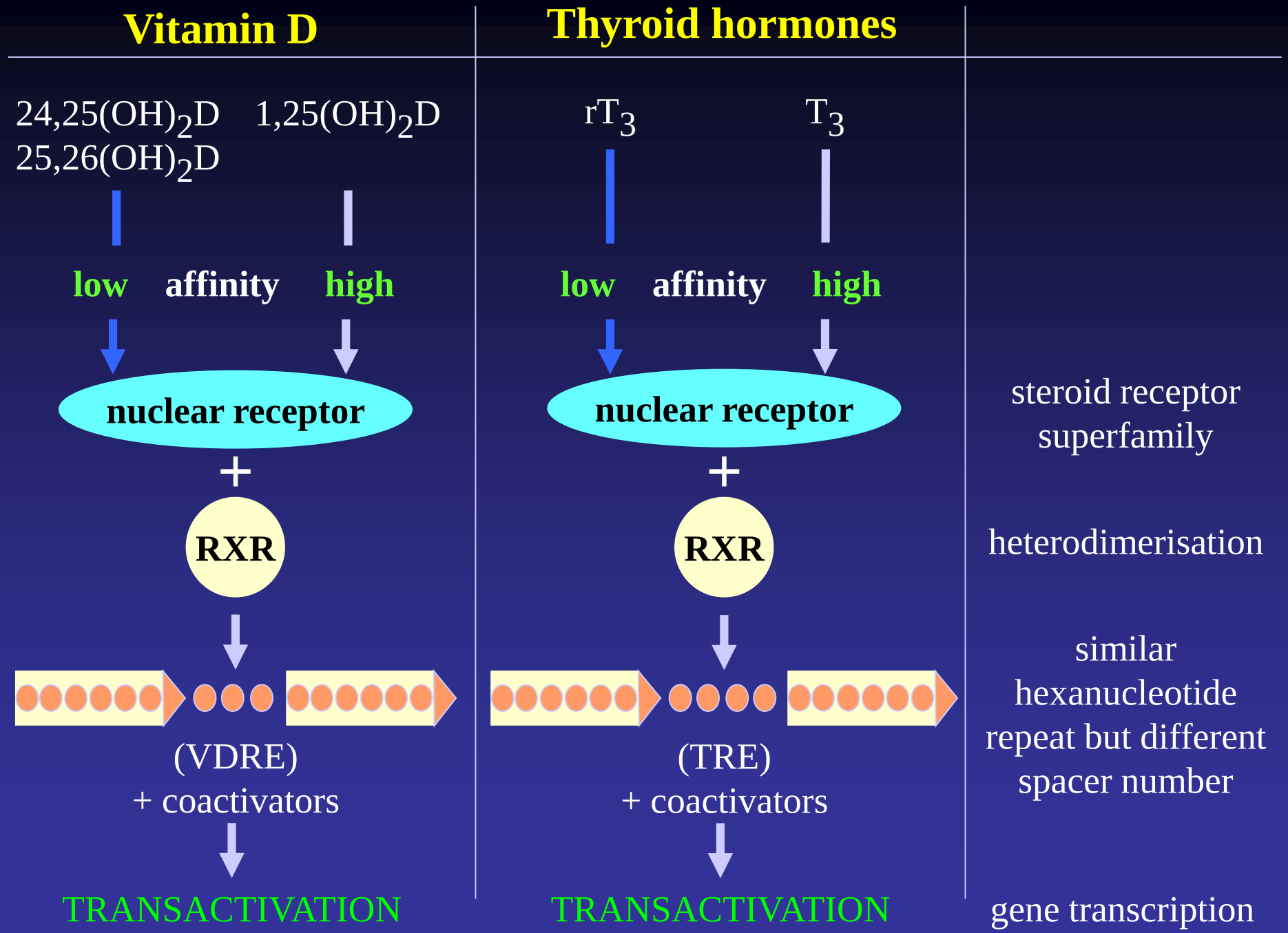
➔ ➔

So by the end of 1971, $1,25(OH)_2D_3$ became known as the vitamin D hormone, with the kidney as its primary endocrine gland, and active by binding and activating a nuclear receptor.

Nuclear receptor superfamily




Vitamin D
Thyroid hormones
UV B + 7-DHC-Δ7-dehydrogenase
or vitamin D
Iodide
only occasional access
Vitamin D in
muscle, fat, liver...
thyreoglobulin
tissue storage in
pro-precursor form
Vit D-25-hydroxylase (CYP2R1)
25(OH)D-
DBP
T4-
TBG
circulating precusor
25(OH)D-1α-
hydroxylase
kidney/monocytes/....
de-iodinases
liver, muscle
biological activation
or inactivation
25(OH)D-24R-hydroxylase
rT3
T3
24,25(OH)2D
25,26(OH)2D
1,25(OH)2D


Vitamin D
Thyroid hormones
24,25(OH)2D
25,26(OH)2D
1,25(OH)2D
rT3
T3
low
affinity
high
low
affinity
high
nuclear receptor
nuclear receptor
+
+
RXR
RXR
(VDRE)
+ coactivators
(TRE)
+ coactivators
TRANSACTIVATION
TRANSACTIVATION
steroid receptor superfamily
heterodimerisation
similar hexanucleotide repeat but different spacer number
gene transcription

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Overview of the major contributions of Anthony W Norman (1)

- Discovery and chemical characterization of $1,25(OH)_2D_3$, the vitamin D hormone

- Discovery and characterization of the vitamin D receptor (VDR)

- Description of the vitamin D-mediated intestinal calcium transport

…/…

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Identification of the molecular actions of vitamin D in the intestine (1)

- Friedlander E J, Henry H L and Norman A W, Studies on the mode of action of calciferol. XII.. Effects of dietary calcium and phosphorus on the relationship between the 25-hydroxyvitamin D_3-1-hydroxylase and production of *chick intestinal calcium binding protein*, J Biol Chem 252: 8677, 1977.

- Tsai H C, Wong R G and Norman A W, Studies on calciferol metabolism. IV. Subcellular localization of 1,25-dihydroxyvitamin D_3 in intestinal mucosa and *correlation with increased calcium transport*, J Biol Chem 247: 5511,1972

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Identification of the molecular actions of vitamin D in the intestine (2)

Sylvia Christakos as PostDoc (1976-1980)
in AW Norman's lab:

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Christakos Silvia, postdoc at AW Norman's lab (1976-1980)

- Vitamin D3-induced calcium binding protein in bone tissue.
  Christakos S and Norman AW. Science. 1978 Oct 6;202(4363):70-1

- Studies on the mode of action of calciferol. XIII. Development of a radioimmunoassay for vitamin D-dependent chick intestinal calcium-binding protein and tissue distribution.
  Christakos S, Friedlander EJ, Frandsen BR and Norman AW. Endocrinology. 1979 May;104(5):1495-503

- Studies on the mode of action of calciferol. XVIII. Evidence for a specific high affinity binding protein for 1,25 dihydroxyvitamin D_3 *(VDR)* in chick kidney and pancreas.
  Christakos S and Norman AW. Biochem Biophys Res Commun. 1979 Jul 12;89(1):56-63

- Radioimmunoassay for chick intestinal calcium-binding protein.
  Christakos S and Norman AW. Methods Enzymol. 1980;67:500-3

- Localization of immunoreactive vitamin D-dependent calcium binding protein in chick nephron.
  Christakos S, Brunette MG and Norman AW. Endocrinology. 1981 Jul;109(1):322-4

CaBP in chicks

Group	Bone CaBP (ng/mg protein)	Duodenal CaBP (ng/mg protein)	Serum CaBP (ng/ml)	Serum Ca^{2+} (mg/100 ml)	N
		Experiment A			
−D	4.4 ± 1.4	36 ± 0.014	0	5.4 ± 0.36	6
+D	109.0 ± 22*	25,000 ± 4,400	49 ± 8†	8.0 ± 0.26	6
		Experiment B			
Low calcium	460 ± 55	12,000 ± 900	65 ± 23	6.6 ± 0.40	7
High calcium	101 ± 19*	6,400 ± 1,100	9.8 ± 1.8	9.0 ± 0.42	6

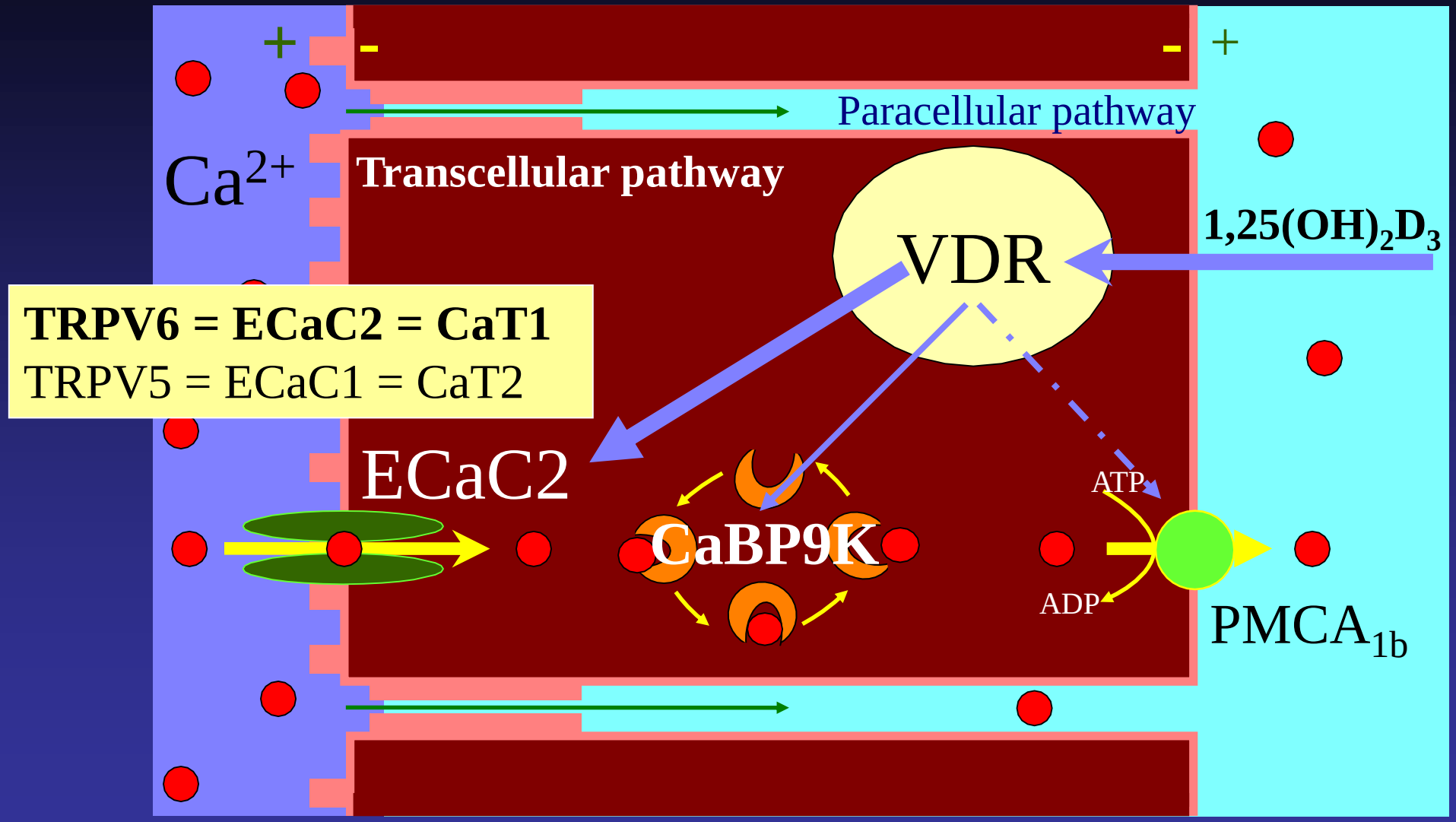
*$P < .001$. †This concentration of CaBP in the serum is equivalent to 1.4 ng per milligram of serum protein.

A: Fed a rachitogenic diet for 6 w +/- vitamin D

B: Fed a rachitogenic diet for 6 w and then R/ vitamin D and a low or high calcium diet

Christakos & Norman, Science 1978

VDR dependent active calcium absorption



Van Cromphaut et al., PNAS, 2001

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Overview of the major contributions of Anthony W Norman (2)

- Metabolism of vitamin D

- Chemistry of vitamin D analogs & structure function analysis

…/…

Anthony W Norman, PhD,

Biochemist, Mentor, Distinguished Professor,
and Principal Steward of Vitamin D Science (1938–2019)

Regulation of the key enzyme, 1alpha-hydroxylase (CYP27B1)

- Henry, H. L., and A. W. Norman, Studies on calciferol metabolism. IX. Characteristics of the renal 25-hydroxyvitamin D3-l-hydroxylase, J Biol Chem 249: 7529, 1974.

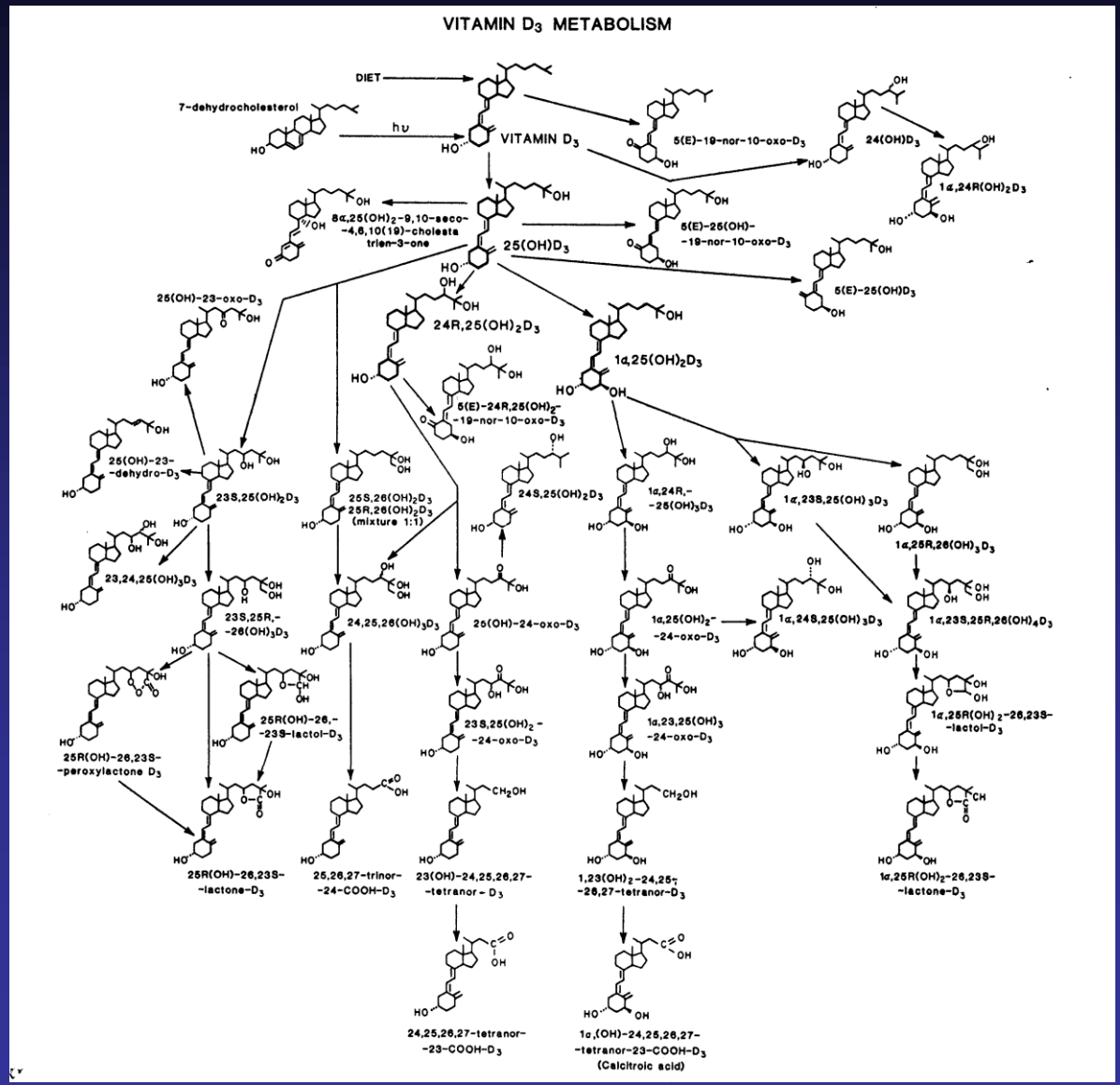
- Henry, H. L., R. J. Midgett, and A. W. Norman, Regulation of 25- hydroxyvitamin D3-l-hydroxylase, in vivo, J Biol Chem 249: 7584, 1974.

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

METABOLISM OF VITAMIN D
&
Structure function analysis of vitamin D analogs

Bouillon, Okamura & Norman,
Endo Rev 1995
cited more than 1000 times up to 2019



Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Overview of the major contributions of Anthony W Norman (3)

- Vitamin D’s action beyond the intestine:

  - endocrine pancreas

  - immune system

  - parathyroid gland

- Discovery of the biological importance of $24,25(OH)_2D_3$

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Identification of action of the vitamin D endocrine system beyond the intestine

1. Endocrine pancreas

- Studies on the mode of action of calciferol. XXIX. Biochemical characterization of 1,25-dihydroxyvitamin D_3 receptors in chick pancreas and kidney cytosol.(Christakos S, Norman AW. Endocrinology. 1981 Jan;108(1):140-9)

- Vitamin D and normal insulin secretion (Journal of Clinical Investigation, 1981)

2. Immune system

- Role of 1,25$(OH)_2D_3$ in human peripheral blood lymphocytes (Journal of Clinical Investigation, 1987), with Koeffler P

- Regulation of granulocyte-macrophage colony stimulating factor (GM-CSF) by inhibition of interferon-γ synthesis by 1,25$(OH)_2D_3$ (Proc Natl Acad Sci U S A, 1987)

- Stimulation of 1,25$(OH)_2D_3$ synthesis in human bone marrow and alveolar macrophages by interferon-γ (Journal of Biological Chemistry, 1987)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Clinical implications of new discoveries of the vitamin D endocrine system (4)

Showing that $1,25(OH)_2D_3$ was efficacious in treating *patients* ***with renal osteodystro*****phy**
(New England J Medicine 1972) (In collaboration with nephrologist Jack Coburn at UCLA)

Actions of $1,25(OH)_2D_3$ in patients with hypophosphatemic, **vitamin D resistant rickets**
(New England J Medicine 1973)

Actions of $1,25(OH)_2D_3$ in patients with **chronic renal failure**
(Ann Intern Med 1974)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Clinical implications of new discoveries of the vitamin D endocrine system (2)

…/…

2. Therapeutic effect of $1,25(OH)_2D_3$ in patients with **hypoparathyroidism** (Lancet 1974)

3. Extra renal production of $1,25(OH)_2D_3$ in patients with **sarcoidosis** (New England J Medicine 1981)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Overview of the major contributions of Anthony W Norman (5)

…/…

- Paracrine system of $1,25(OH)_2D_3$ local extra-renal production of $1,25(OH)_2D_3$

- Structure function of vitamin D (metabolites/analogs)

- ***Non-genomic actions of vitamin D / $1,25(OH)_2D_3$ (metabolites/analogs)***

Example: lecture AW Norman in Maastricht vitamin D workshop meeting 2003

A MECHANISTIC CONUNDRUM:

HOW CAN 1α,25(OH)$_2$D$_3$ MEDIATE BOTH GENOMIC RESPONSES AND RAPID RESPONSES?

A.W. Norman, L.P. Zanello, J. Huhtakangas,
C.M. Bula, M.T. Mizwicki, C.J. Olivera, X. Zhang,
W.H. Okamura, J.E. Bishop, and H.L. Henry

Departments of Biochemistry & Chemistry
University of California
Riverside, CA

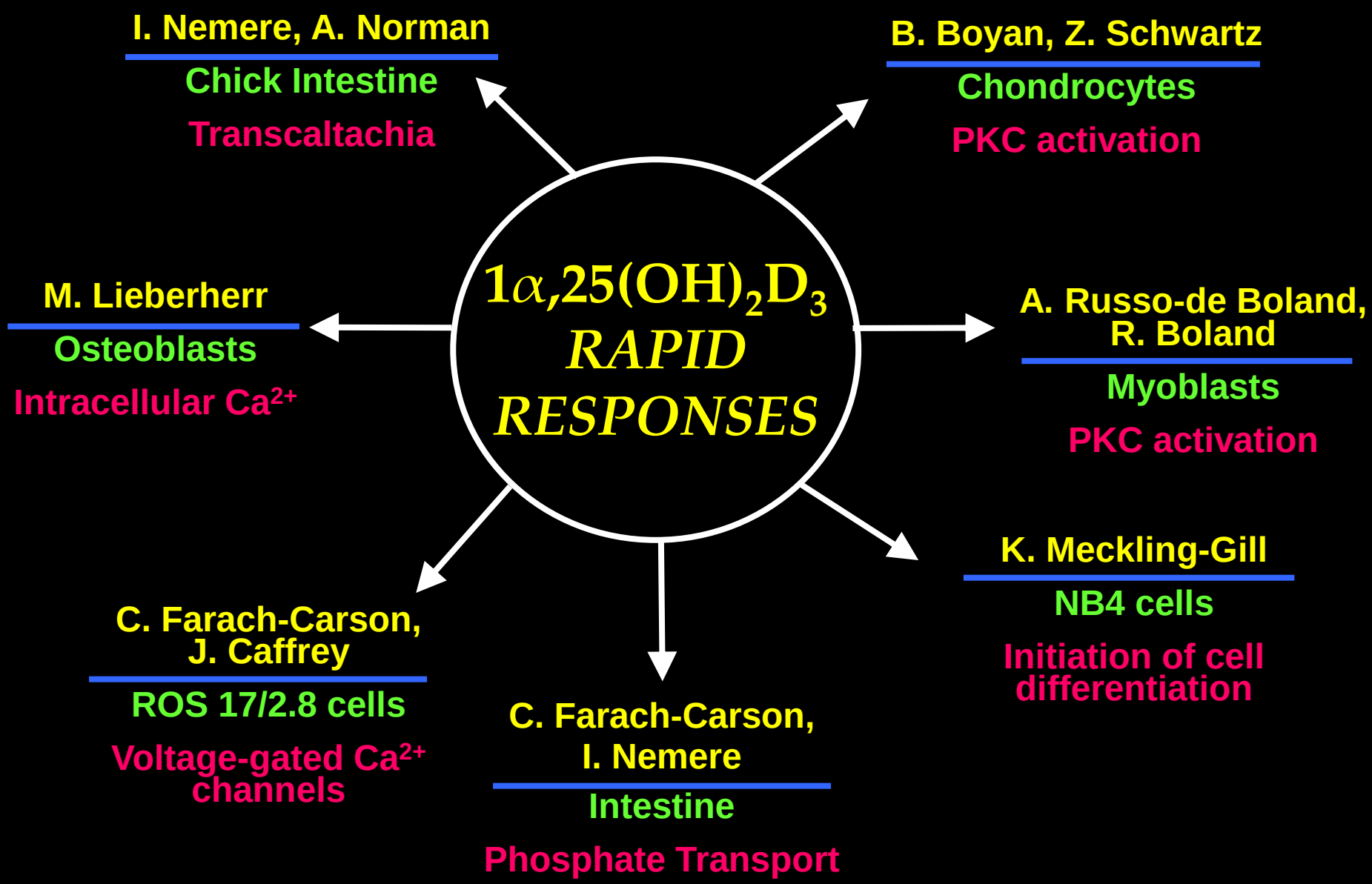
CONUNDRUM:

“A problem that is difficult to deal with.”.

Cambridge Dictionary online

“An intricate and difficult problem.”

Merriam Webster online


I. Nemere, A. Norman
Chick Intestine
Transcaltachia
B. Boyan, Z. Schwartz
Chondrocytes
PKC activation
M. Lieberherr
Osteoblasts
Intracellular Ca2+
1α,25(OH)2D3
RAPID
RESPONSES
A. Russo-de Boland,
R. Boland
Myoblasts
PKC activation
C. Farach-Carson,
J. Caffrey
ROS 17/2.8 cells
Voltage-gated Ca2+
channels
K. Meckling-Gill
NB4 cells
Initiation of cell
differentiation
C. Farach-Carson,
I. Nemere
Intestine
Phosphate Transport

SUMMARY

- *The CMF VDR_{Mem} is the classic VDR*
  - *Western blot analysis*
  - *VDR KO abrogates rapid responses*
  - *VDR KO greatly reduces $1\alpha,25(OH)_2D_3$ in vitro*
  - *CFM VDR_{Mem} has ligand specificity close to classic VDR*

- *Computer modeling of classic VDR-LBD suggests presence of binding mechanisms in the LBD for genomic and rapid responses*

CONCLUSION

The classical VDR, or a slightly modified form of the VDR, when localized to the CMF, is responsible for many 1α,25(OH)$_2$D$_3$ non-genomic rapid responses

ACKNOWLEDGEMENTS

UC-Riverside

- June Bishop
- Craig Bula
- Helen Henry
- Johanna Huhtakangas
- Christopher Olivera
- Matthew Mizwicki
- Bill Okamura
- Laura Zanello
- Xiaoyu Zhang

Other Institutions

- Fatima Silva (Univ. Santa Catarina, Brazil)
- Seiichi Ishizuka (Teijin-Japan)
- Roger Bouillon (KU-Leuven, Belgium)
- Hitoshi Ishida (Kyorin U., Tokyo)
- Jim Liao, (Harvard Medical School)
- Barbara Boyan (Georgia Tech/Emory)
- Zvi Schwartz (Georgia Tech/Emory)

PowerPoint >> Nancy Day


I
D3I
Thank You !!
D3

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Vitamin D science: research and publications of original data and reviews

Training of MS and PhD’s

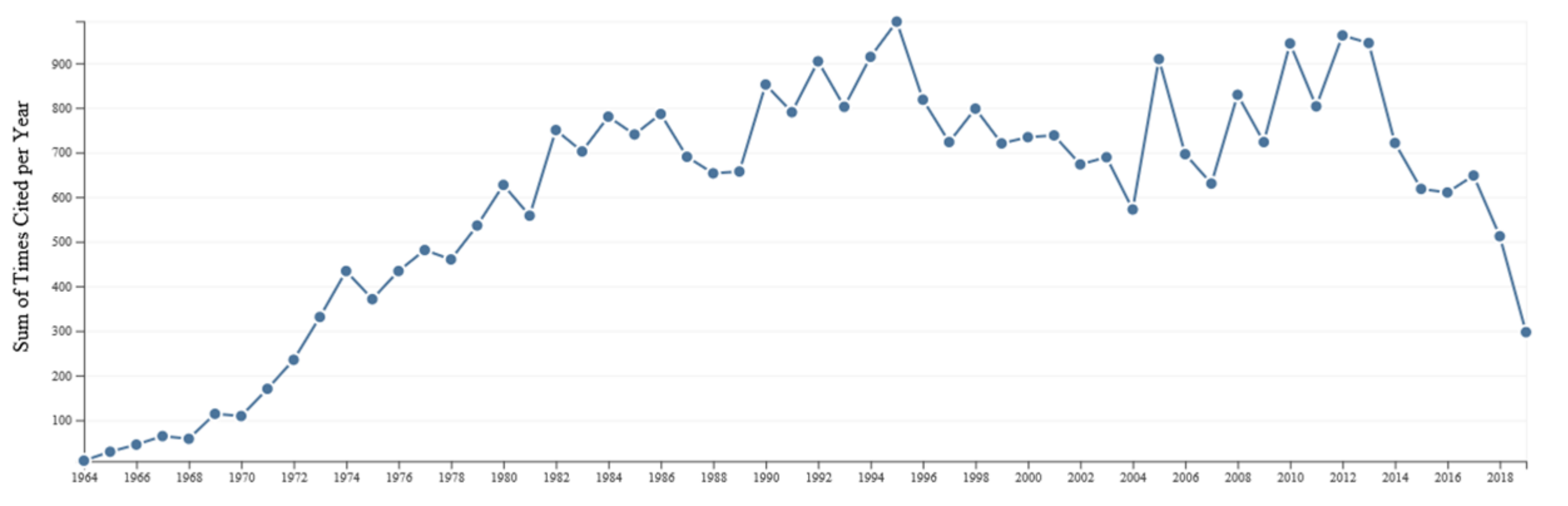
…/…

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Vitamin D science: research and publications of original data and reviews

Total publications in WoS: 768 (more than one per month for 50 yrs)



h-index *96* Average citations per item *43.48* Sum of Times Cited *33,390 (nearly 2 per day for 50 yrs)*

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Tony mentored 23 students who received PhD's during his career at UCR

List of Individuals Associated with
Anthony W. Norman Laboratory
Department of Biochemistry
University of California
Riverside, CA 92521

Former and Current Graduate Students)

1964 – 2007

Dr.= Ph.D. dissertation in Norman Laboratory
@ = M.S. Thesis in Norman Laboratory

Graduate Student DATE	Graduate Student	Position [PPU = Present position unknown]
1964-68	Dr. Aileen Foung	Professor of Biochemistry, San Diego State Univ.
1964-68	Dr. Mark R. Haussler	Regents Professor of Biochemistry, Univ. Arizona
1965-69	Dr. Tom A. Adams	Chairman & CEO, Leucadia Technolgies & Chairman Emeritus, Genta, Inc., Leucadia, CA
1967-71	Dr. James F. Myrtle	Research Scientist, Unilabs, Los Angeles, CA.
1969-71	Mr. Helmar Dollwet@	Professor Biology, Akron State University
1969-73	Dr. Richard G. Wong	Professor Biology, Marharishi International University, Fairfield, Iowa.
1972-73	Ms. Irene Podolan-Katzenstein@	PPU
1972-74	Mr. John Hamman@	Crime Laboratory, Riverside County Sheriffs, PPU
1972-76	Dr. Ronald J. Midgett	PPU
1973-74	Dr. Anna M. Spielvogel, MD	Psychiatrist, San Francisco, CA private practice
1973-77	Dr. Richard L. Johnson	Research Chemist, PPU
1973-77	Dr. Terry Osborn*	President and CEO of Gene Expression, Toledo, OH
1974-78	Dr. Wayne R. Wecksler	Research Director, Unilabs, retired; golf professional
1974-78	Dr. Ernest Friedlander	Research Scientist, UCSF; PPU
1978-79	Mr. Nathan Adams@	PPU
1978-82	Dr. John A. Putkey	Professor Biochemistry, Univ. Texas Medical School, Houston, TX
1979-83	Dr. Paul Siebert	Researcher, CloneTech, Palo Alto, CA
1979-84	Dr. Barbara E. Miller	Director Research, Procter & Gamble, Cincinnati, OH
1981-82	Mr. Herbert Axelrod	Ph.D. with Dr. Alex McPherson, UC-Riverside
1981-84	Dr. Michael W. King	Professor Biochemistry & Molecular Biology, Indiana State University and Indiana School of Medicine
1983-84	Dr. Francois E. Wilhelm, MD*	Unknown pharmaceutical company {Research for his Ph.D. conducted in my laboratory; Degree awarded in Paris, France}
1984-88	Dr. Valerie Leathers	Biotech company in Maine; PPU
1985-86	Ms. Tsuey-Dawn Yean	Transferred to Ohio State University
1986-87	Mr. Holme Peters	Ph.D. with Dr. J. A. Traugh, UC-Riverside.
1988-97	Dr. Elaine D. Collins	Associate Professor Chemistry, San Jose State University

Visiting Scientists to A. W. Norman Laboratory
1975 – 2003

1975	Dr. Alan Taylor	Dallas, Texas
1978	Dr. Murray J. Favus	Chicago, IL
1978;1984;1988	Dr. F. Patrick Ross	Johannesburg, South Africa
1980	Dr. Arie Bar	Bet Dagan, Israel
1981 1983	Dr. Norio Ohnuma.	Osaka, Japan
1982,1985	Dr. Roman Lorenc	Warsaw, Poland
1983	Dr. Ole Sorensen	Copenhagen, Denmark
1984;1989;1991	Dr. Ricardo Boland	Bahia Blanca, Argentina
1987	Dr. Seiichi Ishizuka	Tokyo, Japan
1989;1991; 1997	Dr. Ana de Boland	Bahia Blanca, Argentina
1990	Dr. Igor Sergeev	Moscow, USSR
1990	Dr. Kristina Sundell	Goteborg, Sweden
1992	Dr. Shmuel Hurwitz	Bet Dagan, Israel
1992	Dr. Esther Hurwitz	Rehovot, Israel
1993	Ms. Susana Zanello	Bahia Blanca, Argentina
1995-97	Dr. Akira Kato	Tokyo, Japan
1995	Ms. Tiana Michel	Giessen, Germany
1996	Dr. Robert Blair	Vancouver, B.C., Canada
2000; 2002	Dr. Fatima Silva	University of ? Brazil

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

His honors include

Mead Johnson Award from the American Institute of Nutrition (1977)

MERIT award from the National Institutes of Health (1986-93)

William F. Neuman Award from the American Society for Bone and Mineral Research, (1995)

Fellow of the American Association for the Advancement of Science (1995)

Presidential Chair in the UCR Biochemistry Department (1999-2009)

Career Award from the Vitamin D Workshop science community (2009)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

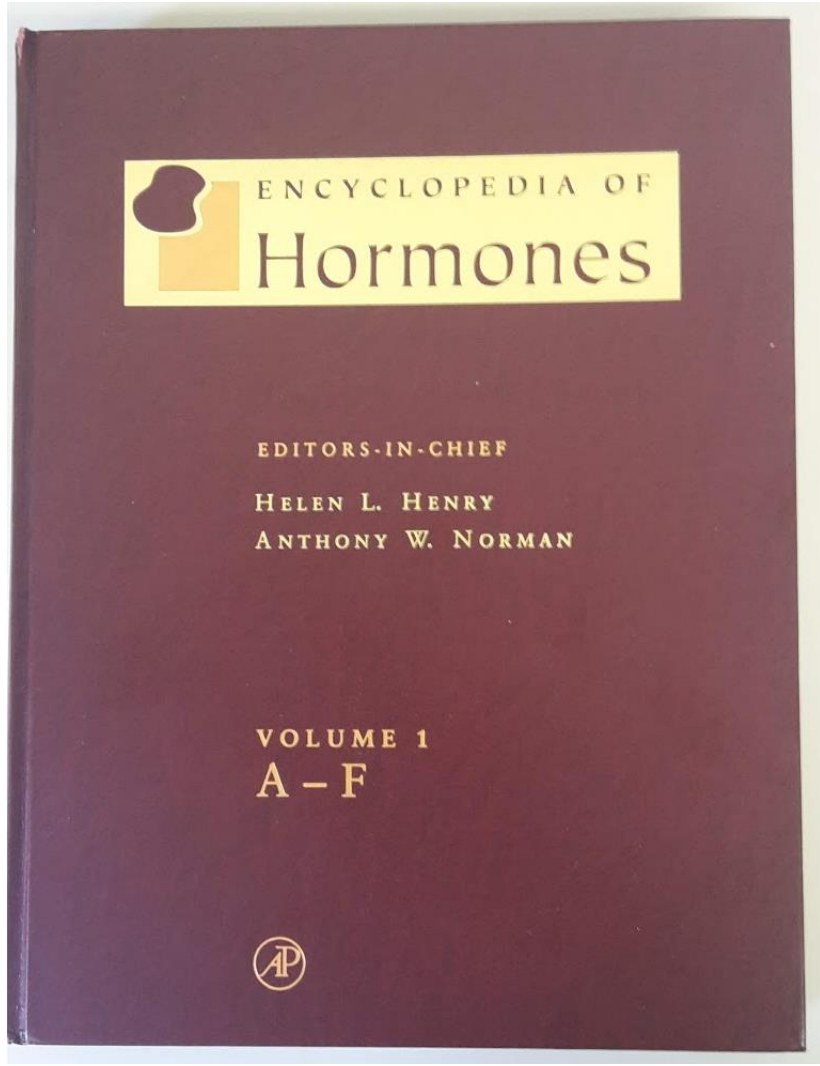
1. Vitamin D science: research and publications of original data and reviews
   training of MS & PhD's

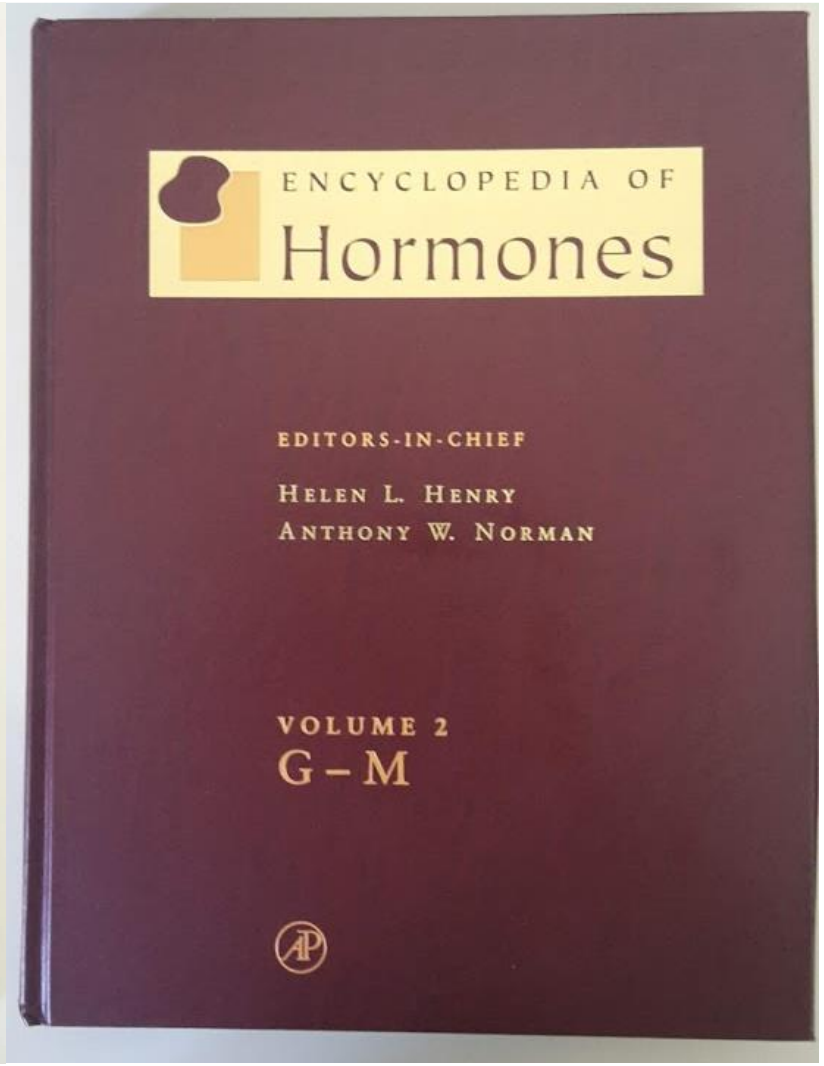
2. Creation of a vitamin D community:

   - lectures on vitamin D
   - vitamin D workshops
   - vitamin D sessions at the ASBMR
   - vitamin D meeting in NIH on deltanoids and cancer 2004
   - meetings on non-genomic actions of steroid hormones

3. Vitamin D science policy

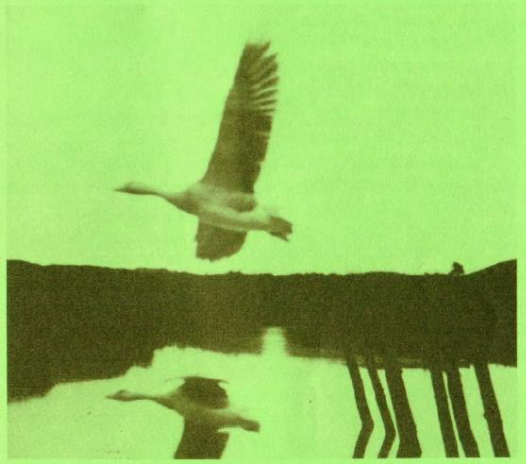
4. Role in UCR


ENCYCLOPEDIA OF
Hormones
EDITORS-IN-CHIEF
HELEN L. HENRY
ANTHONY W. NORMAN
VOLUME 1
A – F


ENCYCLOPEDIA OF
Hormones
EDITORS-IN-CHIEF
HELEN L. HENRY
ANTHONY W. NORMAN
VOLUME 2
G – M

XVI ESCT
Knokke 1981

XVIth EUROPEAN SYMPOSIUM ON CALCIFIED TISSUES



KNOKKE, BELGIUM
13 - 17 SEPTEMBER 1981

SECOND ANNOUNCEMENT AND CALL FOR PAPERS

Sunday
Sep. 13, 1981

Monday
Sep. 14, 1981

08.30 Opening remarks:
M. VERBANCK

PLENARY SESSION I
VITAMIN D

08.45 *A.W. NORMAN*
Vitamin D metabolism

09.30 Oral presentations

11.00 Poster presentations


EXIT
EXIT

Cancer Chemoprevention & Cancer Treatment: Is there a role for vitamin D, $1\alpha,25(OH)_2$-vitamin D_3, or new analogs (deltanoids)?

Sponsored by The National Cancer Institute, NIH and
The Vitamin D Workshop

Wednesday, November 17 – Friday, November 19, 2004
Natcher Auditorium
National Institutes of Health
Bethesda, MD

NO REGISTRATION FEE

Abstract Deadline Date: Monday, September 27, 2004

The Scientific Program includes:
30 Invited Speaker Presentations
8 Promoted Speaker Presentations (to be chosen from submitted abstracts)
4 Poster Sessions (poster board size = 4' x 6')
6 Young Investigator Travel Awards

Organizing Committee:
Anthony Norman, Riverside, CA, USA
J. Carl Barrett, National Cancer Inst., Bethesda, MD USA
Roger Bouillon, Leuven, Belgium
Michael Sporn, Hanover, NH, USA

Check the website for meeting updates including travel and housing information and all necessary forms:
http://vitamind.ucr.edu/Cancer&CancerChemo.htm

Contact Information: vitamind@ucr.edu

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

1. Vitamin D science: research and publications of original data and reviews
   training of MS & PhD's

2. Creation of a vitamin D community:

   - lectures on vitamin D
   - Vitamin D Workshops
   - vitamin D sessions at the ASBMR
   - vitamin D meeting in NIH on deltanoids and cancer 2004
   - meetings on non-genomic actions of steroid hormones

3. Vitamin D science policy

4. Role in UCR

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

History of Vitamin D Workshop

Vitamin D Workshop = Non-profit organization established in 1974.

Dedicated to disseminating scientific research and policy on the biology and health implications of Vitamin D and Vitamin D deficiency.

State of California

OFFICE OF THE SECRETARY OF STATE

I, *MARCH FONG EU*, Secretary of State of the State of California, hereby certify:

That the annexed transcript has been compared with the record on file in this office, of which it purports to be a copy, and that same is full, true and correct.

IN WITNESS WHEREOF, I execute this certificate and affix the Great Seal of the State of California this

APR 15 1977

March Fong Eu

Secretary of State

STATE FORM CE-107 (REV. 1-75)

ARTICLES OF INCORPORATION

OF

VITAMIN D WORKSHOP

Article I

The name of this corporation is Vitamin D Workshop.

Article II

This is a nonprofit corporation organized solely for scientific and educational purposes pursuant to the General Nonprofit Corporation Law of the State of California, specifically, Part 1 of Division 2 of Title 1 of the Corporations Code.

Name	Residence
Anthony W. Norman, Ph.D.	2099 Elsinore Road Riverside, California
Jack W. Coburn, M.D.	627 Lachman Lane Pacific Palisades, California 90272
Helen L. Henry, Ph.D.	2099 Elsinore Road Riverside, California

IN WITNESS HEREOF, we, the undersigned, being the persons named above as first trustees, have executed these Articles this day of April, 1977.

Anthony W. Norman, Ph.D.

Jack W. Coburn, M.D.

Helen L. Henry, Ph.D.

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

The Vitamin D workshop mission

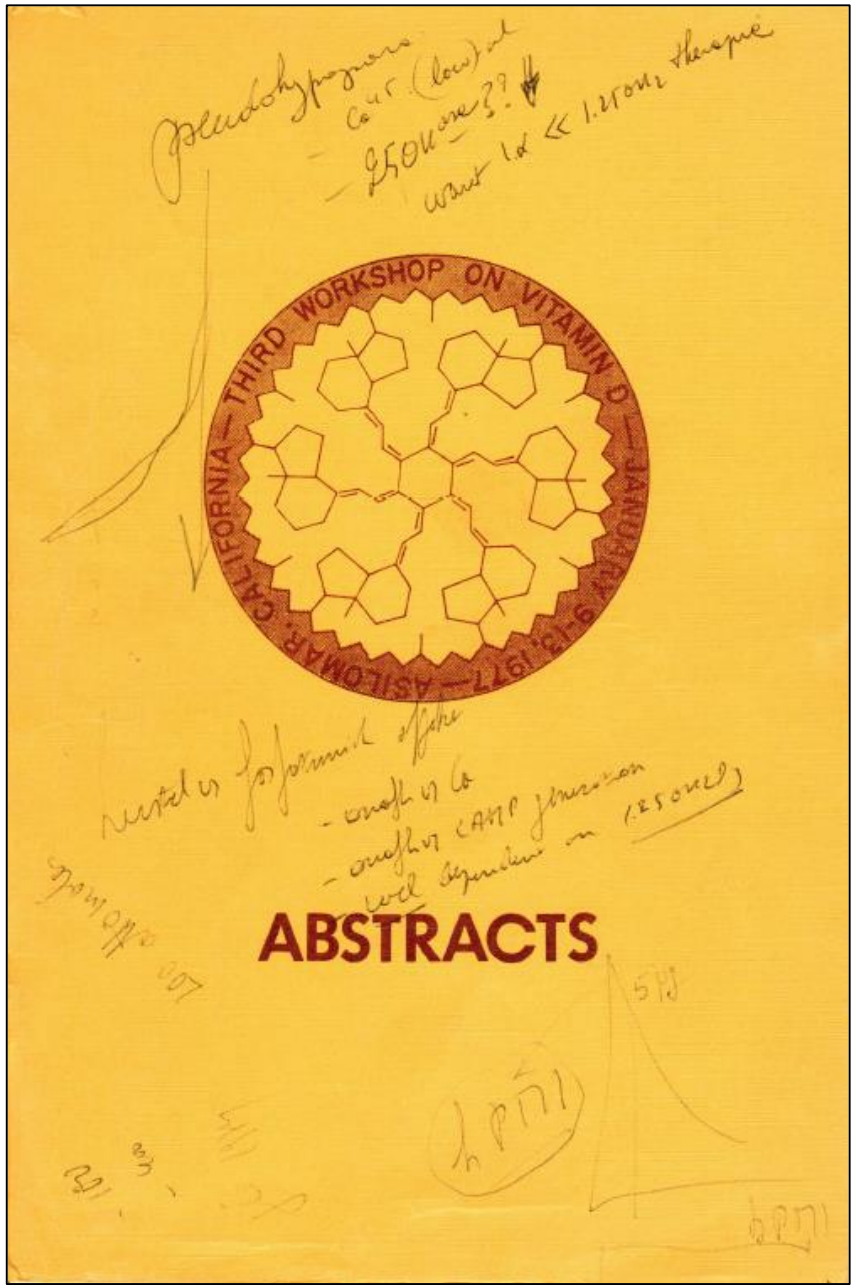
"Facilitate communication between chemists, biologists, biochemists, nutritionists, veterinary experts and physicians from all medical disciplines, including not only those treating bone and mineral diseases, but virtually all subspecialists from dermatologists to epidemiologists, and from pediatricians to geriatricians.

To bring together these groups of people with different "languages - literally and figuratively" and make them understand the message of togetherness rather than division is a mission that Tony again and again fulfilled with compassion and brilliance."*

* JBMR in memoriam 2019

History of vitamin D worskhops

- **1st - Frankfurt, West Germany (1973)**
- **2nd - Wiesbaden, West Germany (1974)**
- **3rd - Asilomar, CA, USA (1977)**



ABSTRACTS

ORGANIZING COMMITTEE

A. W. Norman, Ph.D., Chairman
Department of Biochemistry
University of California
Riverside, CA 92502

J. W. Coburn, M.D., Secretary
Veterans Administration
VA Hospital, Wadsworth
Wilshire and Sawtelle Blvds.
Los Angeles, CA 90073

H. F. DeLuca, Ph.D.
Department of Biochemistry
University of Wisconsin-Madison
College of Agricultural and Life Sciences
Madison, WI 53706

D. Fraser, M.D.
The Hospital for Sick Children
555 University Avenue
Toronto, 2, Canada

H. G. Grigoleit, M.D.
Medizinische Abteilung
Hoechst AG Werk Albert
Postfach 12 9101
D - 62 Wiesbaden 12 West Germany

K. Schaefer, M.D.
St. Joseph-Krankenhaus 1
Medizinische Abteilung II mit
Nephrologie und Dialyse
1 Berlin 42 (Tempelhof)
Baumerplan 24, West Germany


7th WORKSHOP ON VITAMIN D
April 24-29, 1988
Rancho Mirage, California

History of vitamin D worskhops

- **1st - Frankfurt, West Germany (1973)**
- **2nd - Wiesbaden, West Germany (1974)**
- **3rd - Asilomar, CA, USA (1977)**
- **4th - Berlin, West Germany (1979)**
- **5th - Williamsburg, VA, USA (1982)**
- **6th - Merano, Italy (1985)**
- **7th - Rancho Mirage, CA, USA (1988)**

1-7th: co-organizors include: AW Norman, HF DeLuca, J Coburn, D Fraser, HG Grigoleit, D v Herrath , T Suda

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

History of Vitamin D Workshops (2)

8th - Paris, France (1991)

Last minute rescheduled from February to July 1991 because of Gulf War

…/…


8th WORKSHOP
ON VITAMIN D

Anthony W Norman, PhD

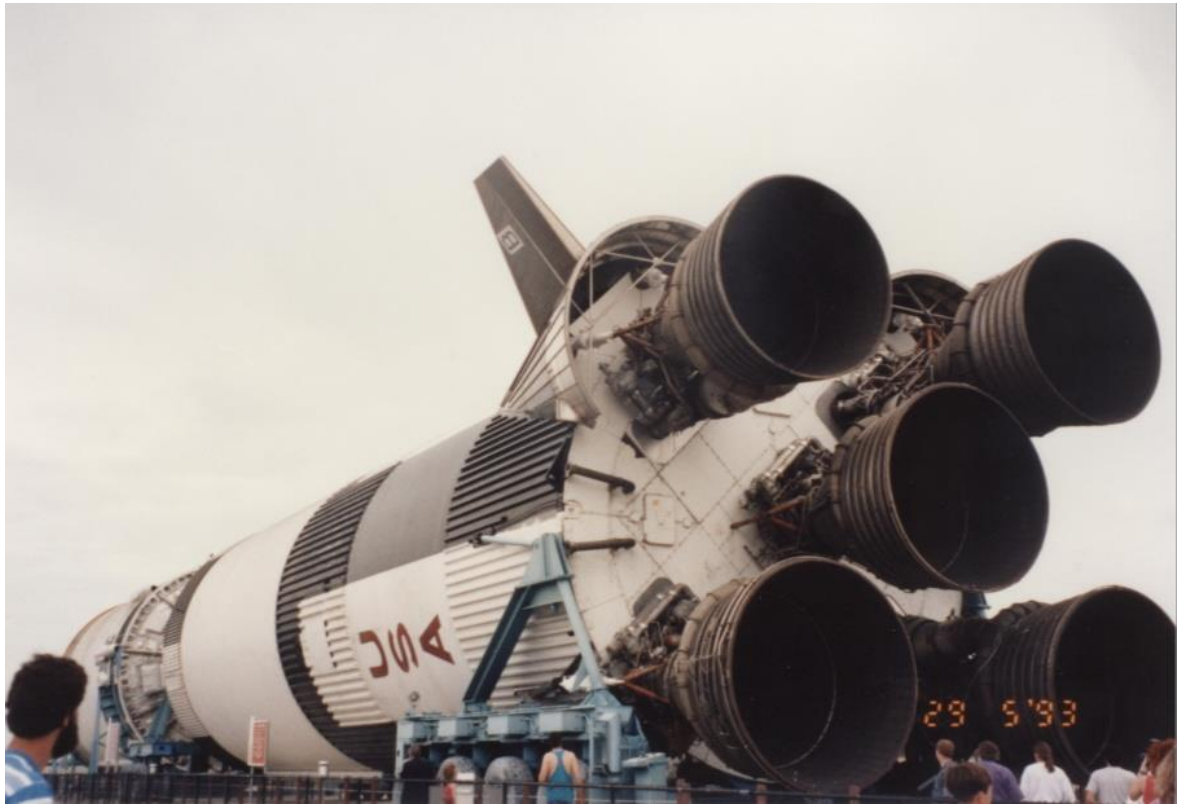
Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

History of Vitamin D Workshops (3)

8th - Paris, France (1991)

9th - Orlando, FL, USA (1994)

…/…


29 5'93


OUTSTANDING
CAREER AWARDS
ELEVENTH WORKSHOP ON VITAMIN D
11th
Pierre J. Meunier, France
E. Barbara Mawer, UK
Tatsuo Suda, Japan
Pekka H. Mäenpää, Finland

Leuven lab dinner during the Nashville meeting

History of vitamin D worskhops

- **8th - Paris, France (1991)**
- **9th - Orlando, FL, USA (1994)**
- **10th - Strasbourg, France (1997)**
- **11th - Nashville, TN, USA (2000)**
- **12th - Maastricht, Netherlands (2003)**
- **13th - Victoria, BC, Canada (2006)**
- **14th - Brugge, Belgium (2009)**

- **8th-15th: co-organizors include: AWNorman, M Thomasset and R Bouillon**


TONY
NORMAN


14th
VITAMIN D
WORKSHOP

14th VITAMIN D WORKSHOP

Workshop number	Date	Number of delegates	Number of countries
I	October 1973 Frankfurt, West Germany	56	3
II	October 1974 Wiesbaden, West Germany	221	22
III	January 1977 Asilomar, California, USA	332	20
IV	February 1979 Berlin, West Germany	402	26
V	February 1982 Williamsburg, Virginia, USA	455	25
VI	March 1985 Merano, Italy	474	27
VII	April 1988 Rancho Mirage, California, USA	381	24
VIII	July 1991 Paris, France	595	32
IX	May 1994 Orlando, Florida, USA	502	31
X	May 1997 Strasbourg, France	571	37
XI	May 2000 Nashville, Tennessee, USA	376	30
XII	July 2003 Maastricht, The Netherlands	323	30
XIII	April 2006 Victoria, BC, Canada	332	24
XIV	October 2009 Brugge, Belgium	420	35


Vitamin D
Vitamin D and Rickets
VITAMIN D
VITAMIN D
VITAMIN D
Vitamin D
Vitamin D
DE RACHITIDE
De Morbo puerili Anglorum
Vitamin D
Vitamin D
Vitamin D
VITAMIN D


VITAMIN D
VITAMIN D
VITAMIN D
Vitamin D
Vitamin D
DE RACHITIDE
De Morbo puerili Anglorum
nutritional aspects of bone health
Vitamin D
Chemical, Biochemical and Clinical Update
Vitamin D
Molecular, Cellular and Clinical Endocrinology
Vitamin D
Gene Regulation, Structure-Function Analysis and Clinical Application
1931
Vitamin D
A Pleiotropic Hormone: Structural Studies, Molecular Endocrinology and Clinical Applications
Vitamin D
Chemistry, Biology and Clinical Applications of the Steroid Hormone
Vitamin D Endocrine System
Structural, Biological, Genetic and Clinical Aspects
BOUILLON NORMAN PASQUALINI Editors
VITAMIN D

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Renewed leadership of the Vitamin D Workshop

Planning phase: Description of the Composition and Operation of the Vitamin D

Workshop Executive Committee (WEC)

By Tony Norman, Helen Henry & Roger Bouillon
Final Version June 7, 2012

"We propose creation of a Vitamin D Workshop Executive Committee (WEC) and a Vitamin D Workshop Program Advisory Committee (PAC) that will collectively have responsibility for planning and presenting an annual 2 - 3 day Vitamin D Workshop in the days immediately preceding the US Endocrine Society meeting (at present in the month of June). We keep the option open to organize from time to time a similar type meeting in Europe instead of in North America."

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

New leadership structure of Vitamin D Workshop (2)

- The remaining funds were transferred to the new organization.

- This was emotionally not an easy decision for Tony, because the workshop was his intellectual “baby.”

- However, this magnanimous decision perfectly reflects Tony’s attitude and lifestyle: science and scientific transparency and integrity come well before personal “ego” or status.*

*** cited from JBMR 2019 “in memoriam”**

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

History of Vitamin D Workshops (5)

15th - Houston, TX, USA (2012)
16th - San Francisco, CA, USA (2013)
17th - Chicago, IL, USA (2014)
18th - Delft, Netherlands (2015)
19th - Boston, MA, USA (2016)
20th - Orlando, FL, USA (2017)
21st - Barcelona, Spain (2018)
22nd - New York City, NY (2019)

After 15th meeting: creation of a vitamin D Workshop Executive Committee of about 8 rotating members with AWNorman and R Bouillon as ex-officio non-voting members

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

History of Vitamin D Workshops (6)

The WEC is planning the next Vitamin D Workshop which will be held on the Gold Coast of Australia in August 2020.

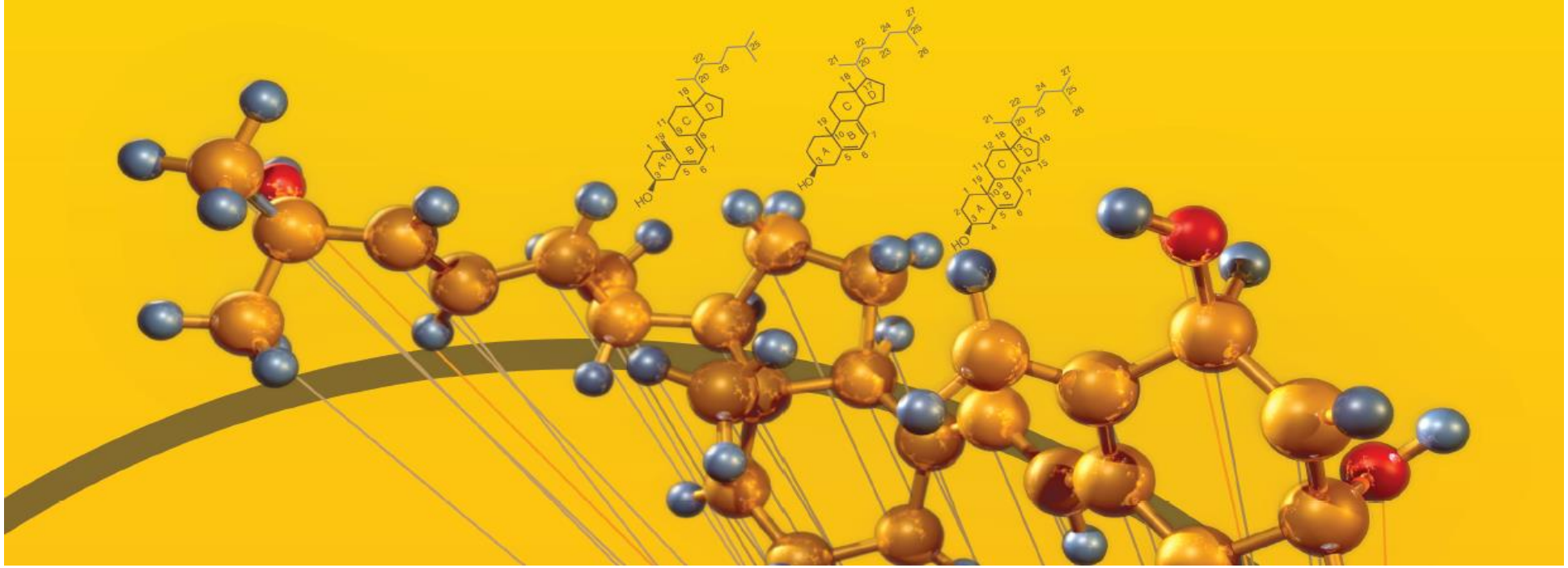
The 2020 meeting will be chaired by Dr. Peter Ebeling of Monash University, Melbourne, Australia

VITAMIN D WORKSHOP

2014 **17th Workshop**
June 17th-20th
(ENDO 2014, June 21st-24th)
Chicago, IL

2015 **18th Workshop**
April 21st-24th
Delft, The Netherlands

2016 **19th Workshop**
March 28th-31st
(ENDO 2016, April 1st-4th)
Boston, MA



Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

1. Vitamin D science: research and publications of original data and reviews

2. Creation of a vitamin D community:

3. Vitamin D science policy

4. Role in UCR

ELSEVIER
The Journal of Steroid Biochemistry and Molecular Biology
Volume 121, Issues 1–2, July 2010, Pages 4-6

Editorial

14th Vitamin D Workshop consensus on vitamin D nutritional guidelines☆

Helen L.Henry RogerBouillon Anthony W.Norman J. ChristopherGallagher PaulLips Robert P.Heaney ReinholdVieth John M.Pettifor BessDawson-Hughes Christel J.Lamberg-Allardt Peter R.Ebeling

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

VDW & WHO involvement to eradicate rickets

Joint WHO – VDW symposium in Delft 2015

Review Prevention and consequences of vitamin D deficiency in pregnant and lactating women and children:

A symposium to prioritise vitamin D on the global agenda

Inez Schoenmakers,*, John M. Pettifor, Juan-Pablo Peña-Rosas, Christel Lamberg-Allardt, Nick Shaw, Kerry S. Jones, Paul Lips, Francis H. Glorieux, Roger Bouillon

Journal of Steroid Biochemistry & Molecular Biology 164 (2016) 156–160

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Early independent research in UCR (1963 onwards)

!!! Combined with postdoctoral research in the area of oxidative phosphorylation in the laboratory of Nobel Laureate Paul D Boyer at the University of LA

Choice of research area:

Biochemical, cellular and molecular endocrinology, and physiology of the vitamin D endocrine system

Why his choice of vitamin D was very wise???

➔ End of the present lecture

FRANCISCI GLISSONII,
Med. Doct. & Profess. pub. in Alma Cantab. Acad. & Collegii Medicorum Londin. Socii.

TRACTATUS DE RACHITIDE SIVE MORBO PUERILI,

Subtextis continuè Observationibus
GEORGII BATE
&
AHASUERI REGEMORTERI,
Medicinæ Doctorum ejusdemque Collegii Londinensis Sociorum.

Editio Postrema.

HAGÆ-COMITIS,
Apud ARNOLDUM LEERS.

M, DC, LXXXII.

DISPUTATIO MEDICA
INAUGVRALIS,
DE

Morbo puerili Anglorum,

quem patrio idiômate indigenæ vocant
The Rickets,
QVAM
Deo suppetias ferente,
Ex authoritate Nobilissimi Domini Rectoris Magnifici,
D. JOHANNIS POLYANDRI à KERCHOVEN
SS. Theologiæ Doctoris, ejusdemque Facultatis in Illustrissimâ Acad. Lugd. Bat. Professoris primarii,
Decreto Illustrissimæ Facultatis Medicæ, & Amplissimi Senatûs Academici consensu,
Pro Gradu Doctoratûs, summisque in Medicinâ Privilegiis consequendis,
Discutiendam proponit
DANIEL WHISTLER, Anglo-Saxonicus-Orientalis.
Ad diem 13. Octob. Horis & loco consuetis.

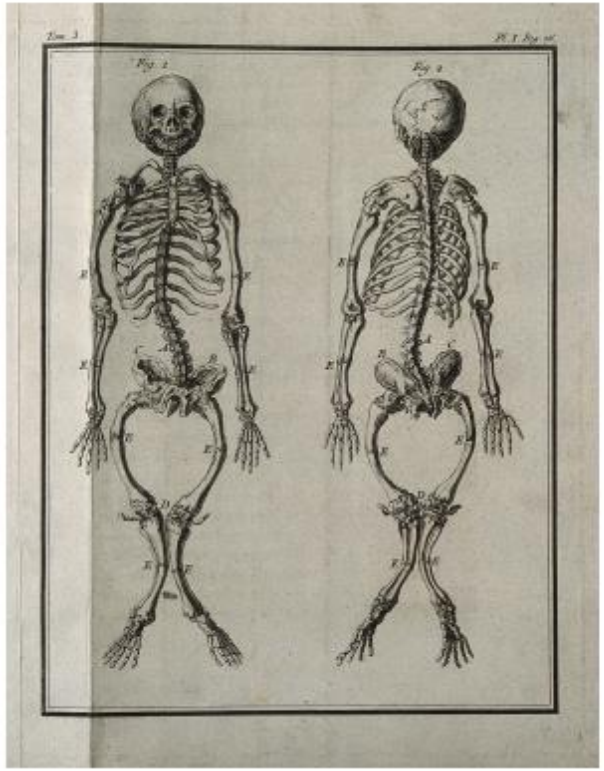
LVGDVNI BATAVORUM,
Ex Officinâ
WILHEMI CHRISTIANI BOXII. 1645.

Techniques & Technologies

Select from the menus below to find out more about a technique or technology.

- A - F
- G - L
- M - S
- T - Z

Rickets



Add image to my collection

Skeletons affected by rickets, 1749.

Credits:Wellcome Library, London.

Rickets is a deficiency disease caused by a lack of minerals in the bones. In the 1800s the disease was widespread in the poor districts of industrial cities in Great Britain and the United States.

Prevalence of rickets in early 20th century

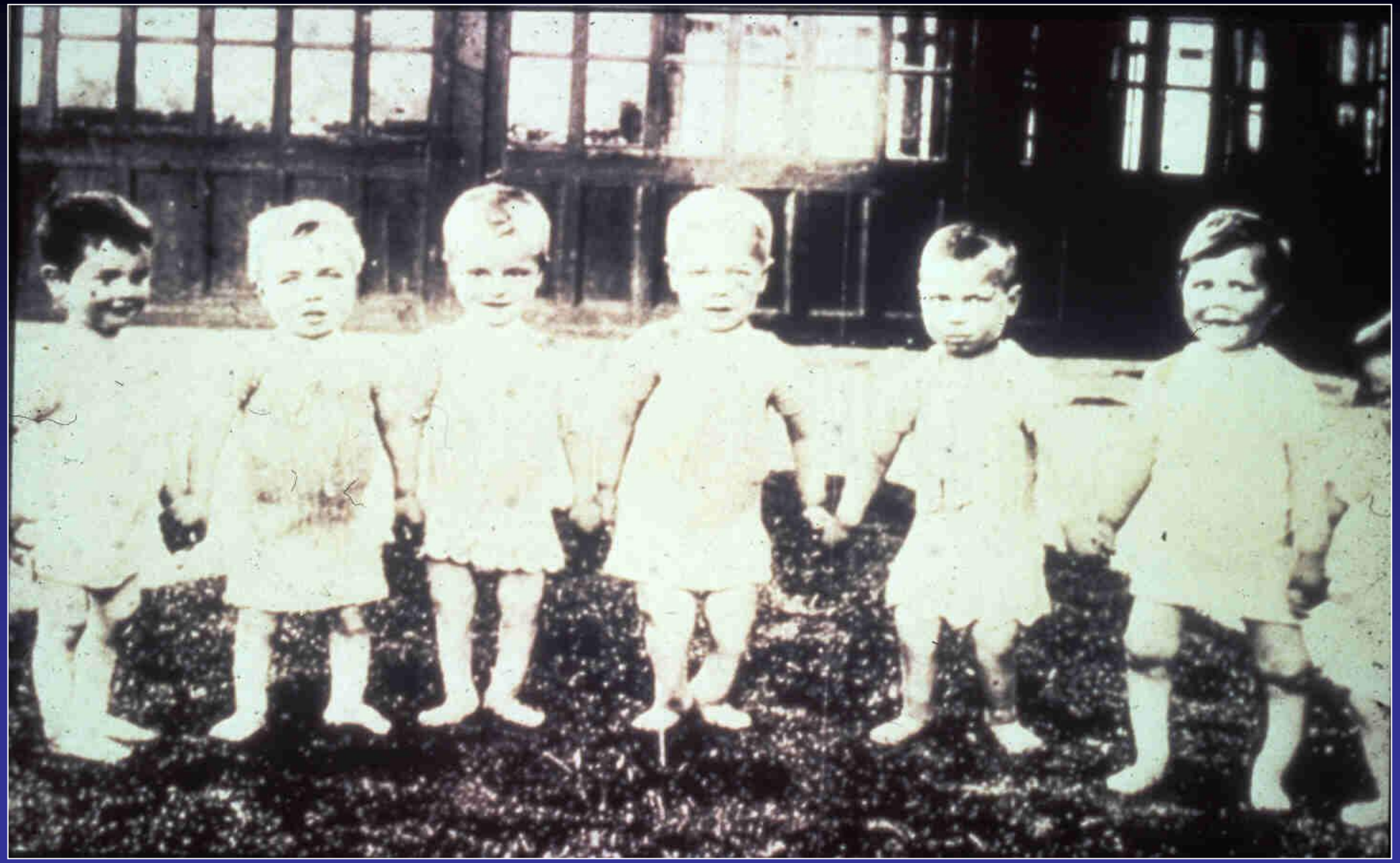
Hess 1917 :: all “negro” children living in New York have some degree of rickets

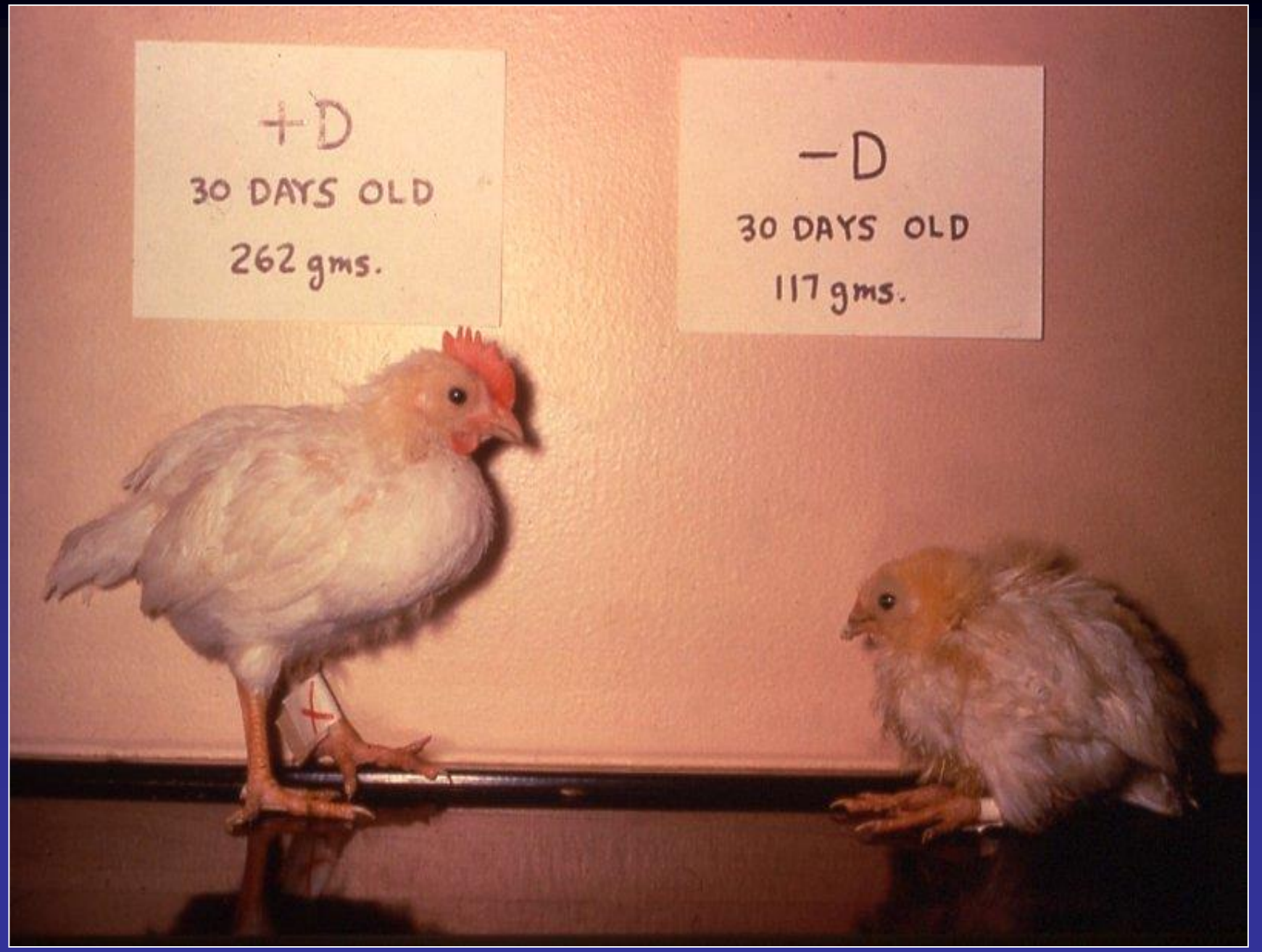
Schmorl 1909 : mild and severe rickets at autopsy (1901-1908) of young children: 94% and 45%, respectively, in Dresden (Germany)

Follis et al, 1952 : based on autopsy data of children, respectively, aged 0-2 years (Baltimore area 1926-42)

56% and 72% of all white or “negro” children have some form of rickets,

8% and 33% had severe rickets




+D
30 DAYS OLD
262 gms.
−D
30 DAYS OLD
117 gms.

Rickets in early 20th century (1)
Cod liver oil and cure of rickets

- **Hess (US) – JAMA 1917;69:1583**
  Clinical non randomized trial of AfroAmerican children in NY proved efficacy of cod liver oil to prevent/cure rickets

Confirmed by:

- **Mellanby family (UK) – Lancet 1919**
- **MacCollum (US) – J Biol Chem 1921;45:333–42**

Rickets in early 20th century (2)
UV B light and cure of rickets

- Huldschinsky, 1919 : Rickets in children can be cured by artificial UV light (mercury vapor lamp)

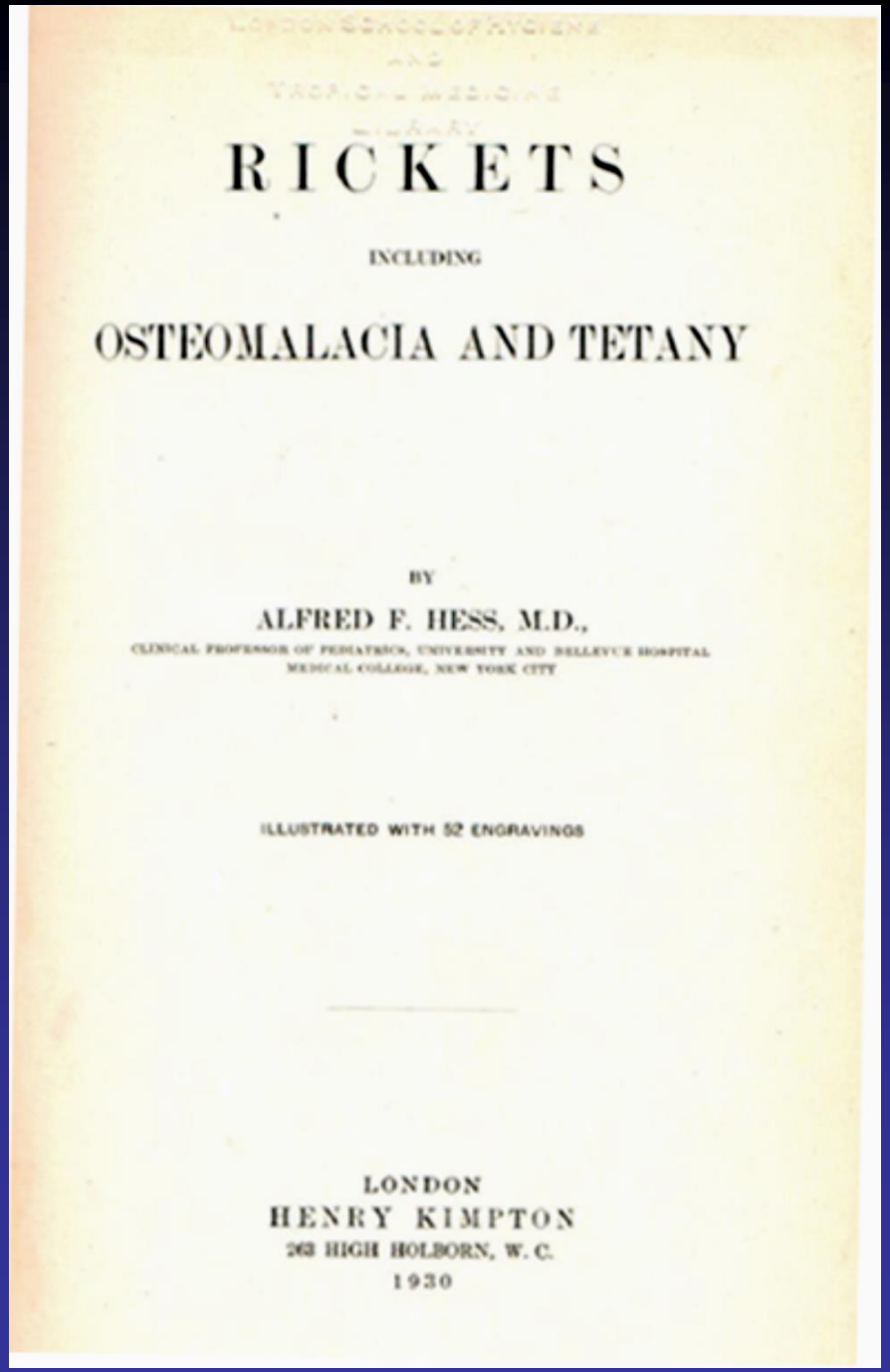
&

- Hess, 1921 JAMA, 77:39 : Infantile rickets cured by artificial light and sunlight

- Harry Steenbock (US) 1924 : UV-irradiated vegetable oil can cure rickets (patent Wisconsin University)

“within the next decade* or even sooner, it [rickets] will be almost completely eradicated,
so that it will become as rare as infantile scurvy since the wide-spread use of orange juice”

* *[text written in 1929]*



RICKETS

INCLUDING

OSTEOMALACIA AND TETANY

BY

ALFRED F. HESS, M.D.,

CLINICAL PROFESSOR OF PEDIATRICS, UNIVERSITY AND BELLEVUE HOSPITAL MEDICAL COLLEGE, NEW YORK CITY

ILLUSTRATED WITH 52 ENGRAVINGS

LONDON
HENRY KIMPTON
263 HIGH HOLBORN, W.C.
1930

Examples of reported prevalence of rickets in Africa, Middle East and Asia*

Country	Year	Rate%	Method
Mongolia	1998	70	Rickets signs
Tibet	1994	66	Rickets signs
Ethiopia	1997	42	X-rays
Yemen	1987	27	–
Turkey	1994	10	–
Nigeria	1998	9	Rickets signs
Iran	1975	15	X-rays
China	1977–83	47	Rickets signs
The Gambia (West Kiang)	2007	3.7	X-rays/biochem
		3.3	Rickets signs
Bangladesh (Chittagong)	2008	0.6	Physician exam
		2.2	Rickets signs
		1.0	X-rays

P: population sample,
H: hospital-based sample,
*H**: children admitted to hospital with pneumonia,
V: children attending for vaccination.
* Prentice

Memorandum for WHO to ERADICATE nutritional RICKETS BEFORE 2030

1st step: appoint a task force on behalf of ISE, IFMRS, US and EU Pediatric Endo Societies and vitamin D workshop to prepare a motivated memorandum for WHO

2th step: convince leadership of WHO in Geneva

3th step: a many as possible countries, member of WHO, ask WHO to implement plan to eradicate nutritional rickets in the word before 2030

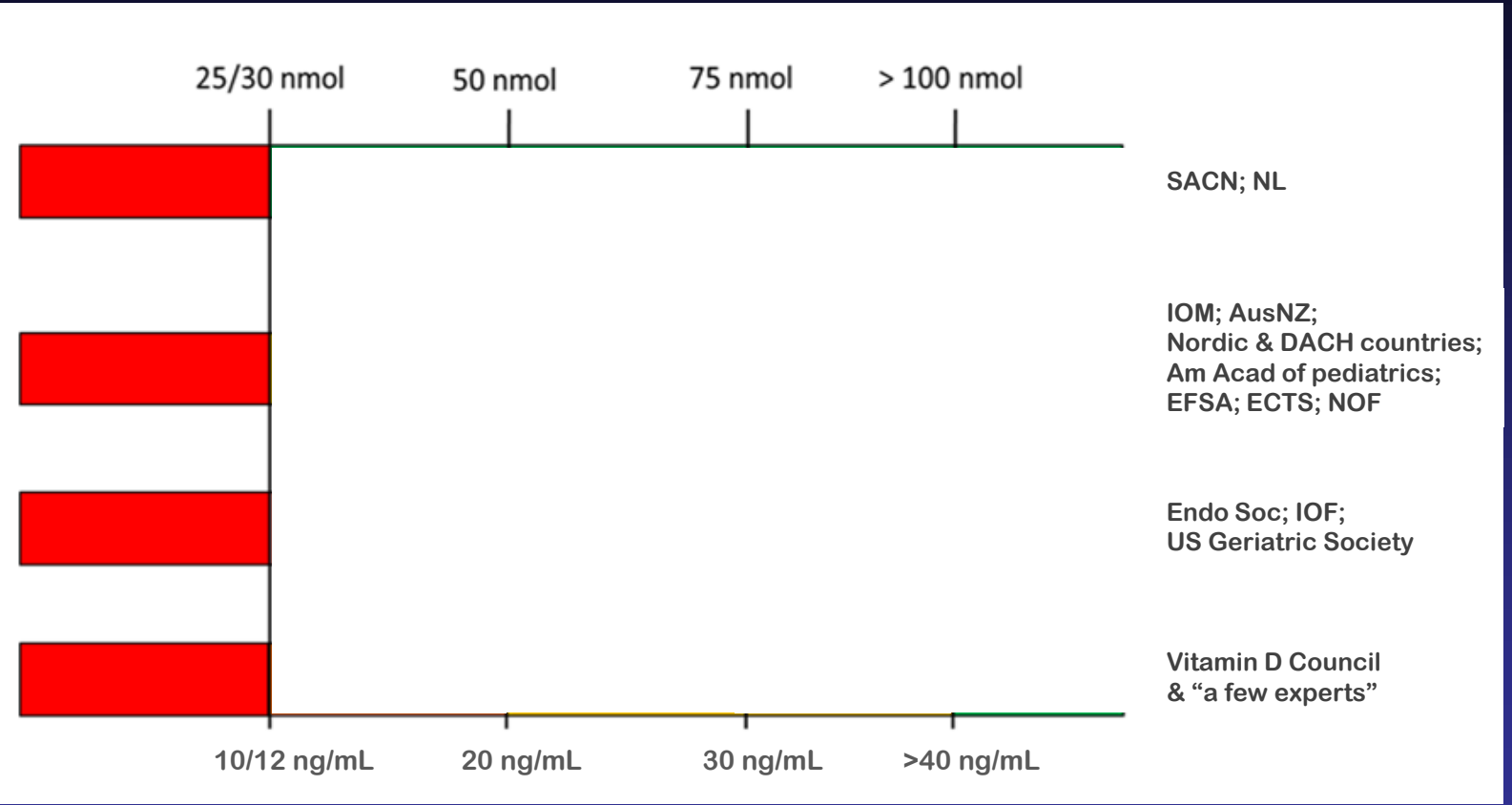
4th step: approval of implementation plan by General Assembly of WHO

5th step: support by other agencies and foundations such as UNICEF, Bill & Melinda Gates and Thrasher foundations to support the implementation of this plan

6th step: monitoring implementation plan and progress

*** ~~ project in line with the WHO and its member states project to eradicate iodine deficiency disorders

Vitamin D Bouillon, NatRevEndo 2017



*----------~~→ e.g. Chapuy et al

*----------~~>

*----------~~→ ViDA - VITAL

Vitamin D deficiency around the world

Serum 25OHD nmol/L	< 25/30	< 50
World overview [1]	6.7 %	37 %
US: NHANES 2010 data [2] (> 12 yrs)	6.7 %	26 %
EU countries (adults) [3]	13 %	40 %
Middle East/N Africa [4]		
Iran & Jordan	~ 50 %	90 %
African countries [5]	< 0.1%	7 %
China [6]	~ 37 %	~ 72 %
Mongolia [4]	~ 50 %	

[1] Hilger 2014 168,000 subjects from 44 countries
[2] Schleicher et al AJCN 2016 (adjusted 25OHD method)
[3] Cashman et al EJCN (adjusted 25OHD method)
[4] Arabi et al NatRevEndo 2014
[5] Durazo-Arvisu et al AJCN 2014 (Ghana, Seychelles)
[6] Zhang et al Nutr 2013 (estimated from meta analysis in adults)

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

1. Vitamin D science: research and publications of original data and reviews
2. Creation of a vitamin D community:
3. Vitamin D science policy
4. Role in UCR & other science organizations

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019): Summary

1. Biochemist and Scientist
2. Mentor and distinguished professor
3. Principal Steward of the vitamin D science

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019): Summary

1. Biochemist and Scientist

🡸 major contributions in clarifying the black box of how vitamin D works to cure rickets:

from a black box in 1920 to a complex endocrine system in 2020

🡸Crucial contributions in understanding of genomic and non-genomic actions of vitamin D

+ author of > 700 pubmed publications with > 30,000 citations and a H index of nearly 100

2. …/…

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019): Summary

2. Mentor and distinguished professor

- mentor of a very large number of PhD students
- author of several handbooks and book chapters
- major role in UCR and science organisations/journals

…/…

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

3 . Principal Steward of the vitamin D science

🡸 created a real vitamin D community by

Vitamin D Workshop from 1973 – today and prospering – THE leading science meeting on this nutrient and hormone

organiser of other vitamin D related meetings (NIH – ASBMR meetings – non-genomic meetings

🡸 Defining and supporting science policies for optimal use of vitamin D
- general public
- specific focus on project on eradication of rickets

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

Message from the Vitamin D Workshop

&

Dan Bikle

Memories of Tony Norman
By Daniel Bikle

- I was a medical student in the 60's working in the Rasmussen lab when I became interested in vitamin D.
- Tony had recently started his lab in Riverside having moved from Madison in 1963.
- In those days the vitamin D community was pretty small and dominated by Tony and Hector DeLuca.
- But exciting developments were emerging as vitamin D metabolism to its active metabolites, most especially $1,25(OH)_2D$, and discovery of its genomic actions such as the induction of calbindin and cloning and sequencing of the vitamin D receptor started to galvanize the field
- Thus by the early 70's Tony realized the time had come to bring the now blossoming vitamin D community together.

Memories of Tony Norman
By Daniel Bikle

- After two workshops in Europe, the Vitamin D workshop came to the States, in particular to Asilomar in 1977.

- What a lovely setting. I was now in San Francisco having completed my medical and graduate school training but still pursuing my interests in vitamin D

- Tony and Helen had recently given birth to Derek, and my wife and I to our first child. So some bonding of proud parents contributed to the atmosphere.

- The workshops starting with Asilomar were every 3 years and always in great locations. I did not miss a one. They really forged the international vitamin D community.

Memories of Tony Norman
By Daniel Bikle

- With the discovery of the vitamin D receptor in most tissues
  and recognition that vitamin D affected many physiologic
  processes with potentially wide clinical application,
  this community had grown considerably and with great diversity.

- Tony, recognizing this growth and diversity while also
  wanting to expand the leadership, decided to reorganize
  the VDW by creating the Workshop Executive Committee
  with members serving terms of 3 years,
  to help organize the workshops.

VITAMIN D WORKSHOP

SINCE 1973

Memories of Tony Norman
By Daniel Bikle

…/…

- Tony, recognizing the growth and diversity of the vitamin D field while also wanting to expand the leadership, decided to create a Workshop Executive Committee with members serving terms of 3 years, to help organize the workshops.

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

1. Summary

2. Personal notes from Roger Bouillon

From 1974 – 1981 to 2019

UNIVERSITY OF CALIFORNIA, RIVERSIDE

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO — SANTA BARBARA • SANTA CRUZ

DEPARTMENT OF BIOCHEMISTRY — RIVERSIDE, CALIFORNIA 92521

December 7, 1981

Dr. Roger Bouillon
Katholieke Universiteit te leuven
Rega-Instituut
Minderbroedersstraat 10
Leuven, BELGIUM 3000

Dear Dr. Bouillon:

This is written on behalf of the faculty of the Department of Biochemistry at the University of California, Riverside to request your assistance in evaluating the scientific record and status of one of our faculty members, Anthony W. Norman. Dr. Norman is being considered for advancement and outside opinions from outstanding individuals with knowledge of the candidate's research are an important consideration in our deliberations. Enclosed is a copy of Dr. Norman's current bibliography. We would appreciate comments based on his published record and on personal contact.

The information you submit will be maintained in confidence pursuant to University policy. Although on rare occasions, disclosure of confidential personnel records may be required by law, the University will attempt to maintain confidentiality to the fullest extent possible. I would appreciate receiving your letter by the end of the year.

Thank you for help in this matter.

Sincerely,

Jolinda A. Traugh, Chair
Department of Biochemistry

JAT:mv
Enclosure

January 15, 1982

Dr. Jolinda A. TRAUGH
Chair
Department of Biochemistry
University of California
RIVERSIDE, CAIFORNIA 92521
U.S.A.

O.Ref.:R.B.(M.V.)82/45

Dear Dr. Traugh,

the personal contributions of Professor Norman, especially :

- the discovery of 1,25-$(OH)_2$D as the vitamin D steroid hormone
- his extensive work on the characterization of the vitamin D receptor
- the discovery of the parathyroid and islet cells as possible target organs for vitamin D

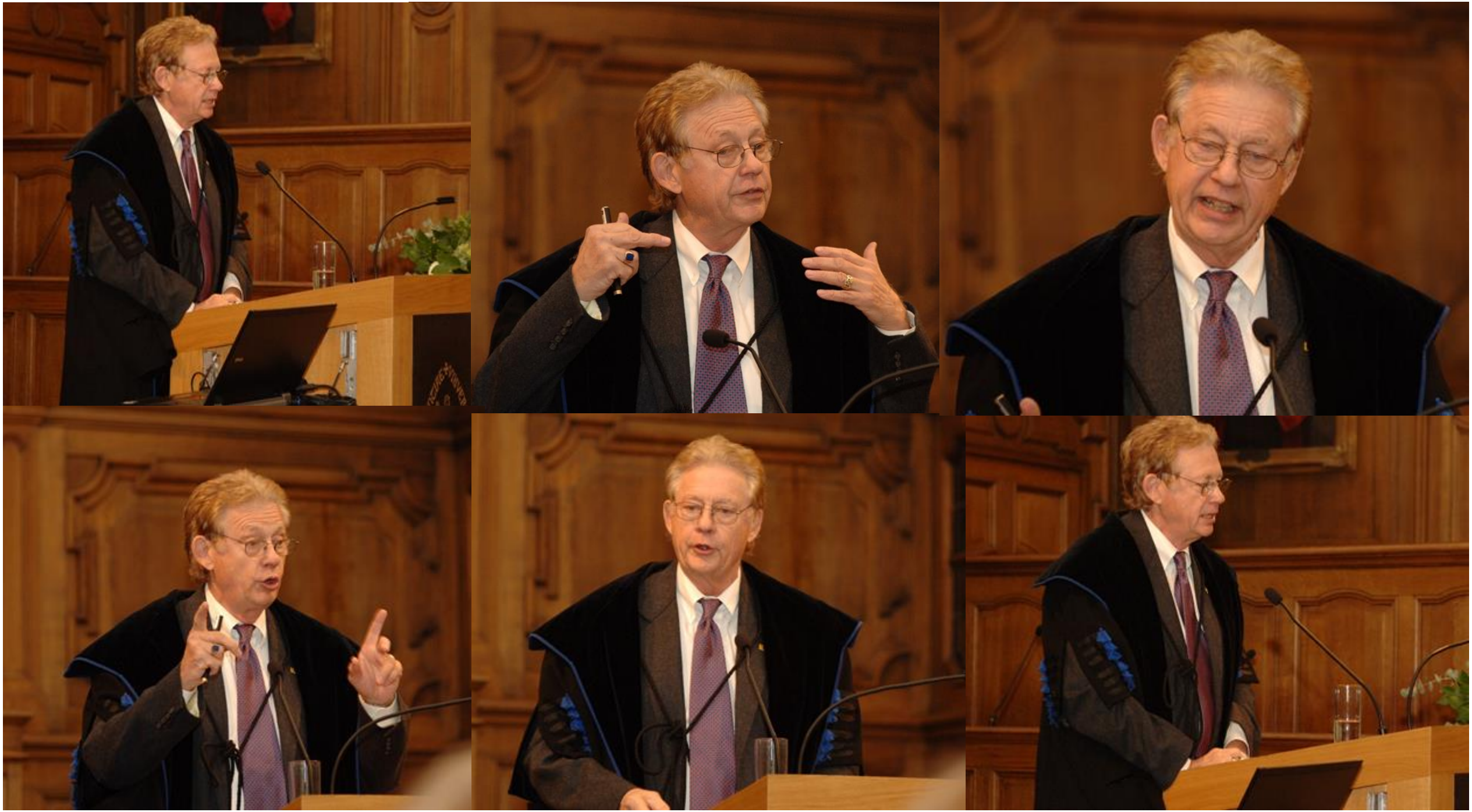

ELEVENTH WORKSHOP ON VITAMIN D

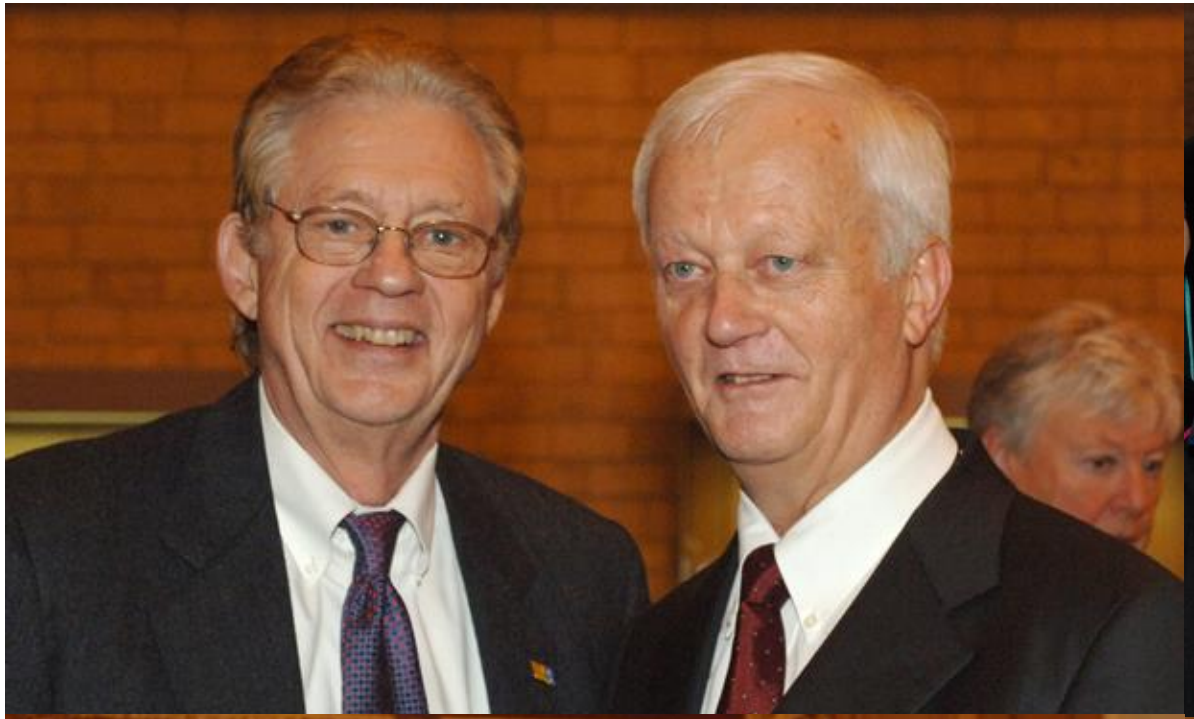

Wiesbaden, West Germany 1977
Asilomar, California, USA 1979
Berlin, West Germany 1982
Williamsburg, Virginia, USA 1985
Merano, Italy 1988
Rancho Mirage, California, USA 1991
Paris, France 1994
Orlando, Florida, USA 1997
15TH WORKSHOP ON VITAMIN D
HOUSTON, TEXAS JUNE 20-22, 2012


Vitamin D and bone health
Conclusions (I)
15TH WORKSHOP ON VITAMIN D
HOUSTON, TEXAS
JUNE 20-22, 2012


Abbott Laboratories
hugai Pharmaceutical Co., Ltd.
LEO-Pharma


EXIT
VITAMIN D
WORKSHOP
VITAMIN D WORKSHOP
40 YEARS AND COUNTING

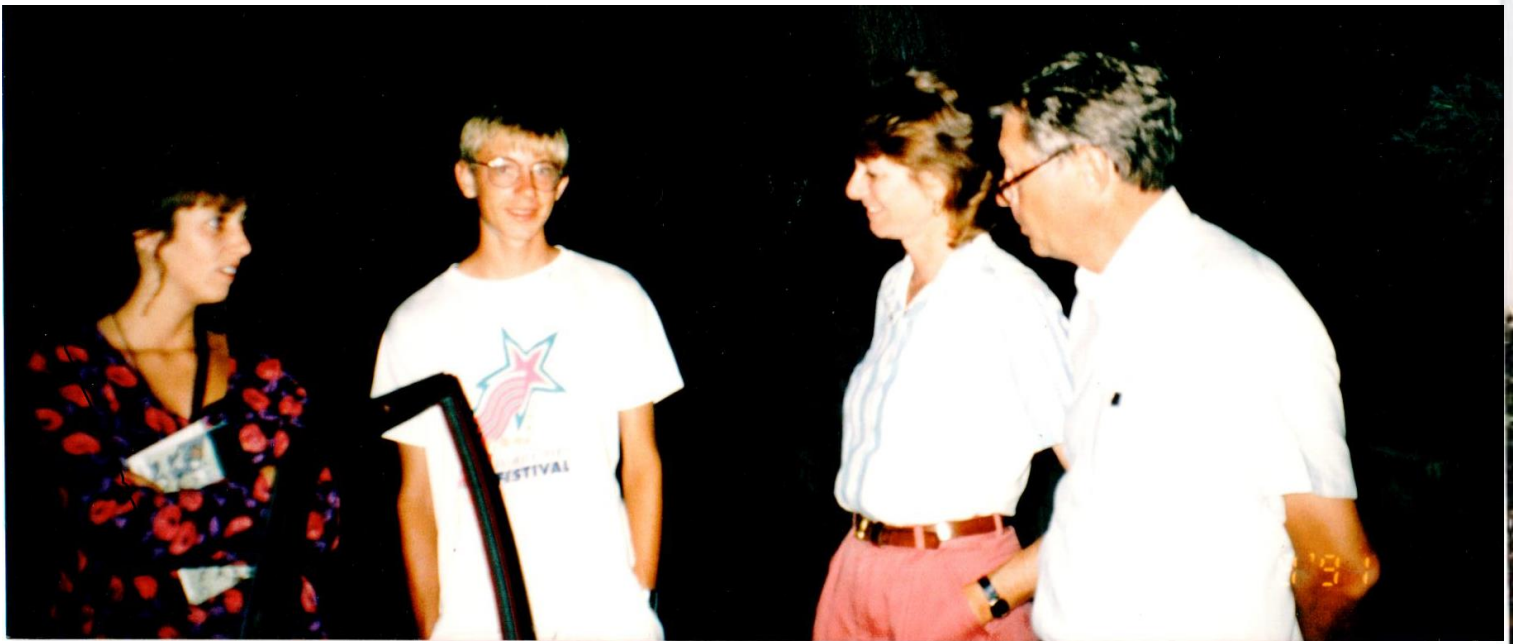





29 8'91


29 '8'91


VITAMN D
CT200h
I ♥ OBAMACARE



pictures taken after the Vitamin D workshop Strasbourg 1997

Anthony W Norman, PhD

Biochemist, Mentor, Distinguished Professor and Principal Steward of Vitamin D Science (1938–2019)

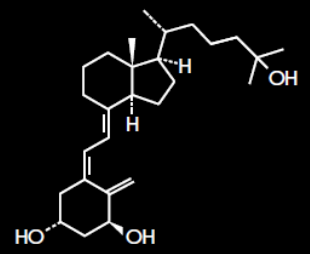
Message from the VDW

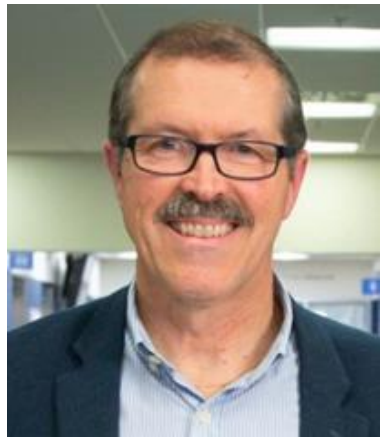
The Vitamin D Workshop and the vitamin D community commemorate

Anthony W Norman, PhD, (1938-2019)

Biochemist, Mentor, Distinguished Professor

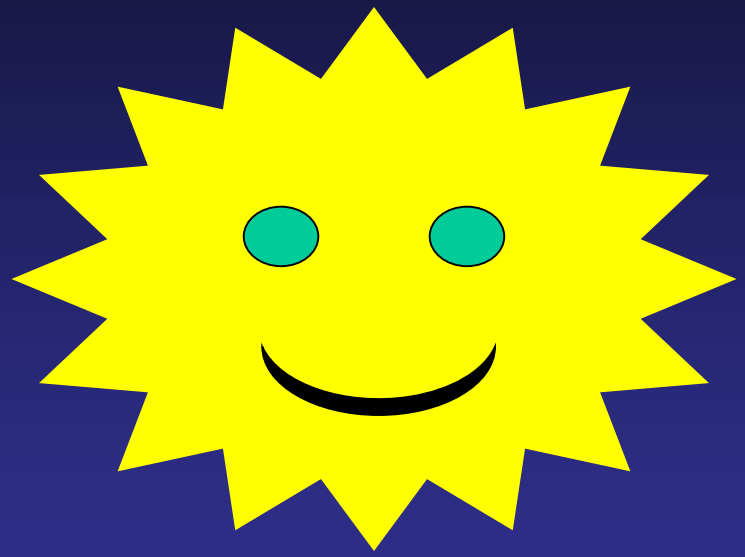
for his major contributions in vitamin D research and for organizing the premier scientific meeting in the discipline of vitamin D





(co) Chairpersons of Houston to Gold coast VDWs 2012-2020

Bright sunny future for vitamin D



Thank you Tony for making this possible!!!