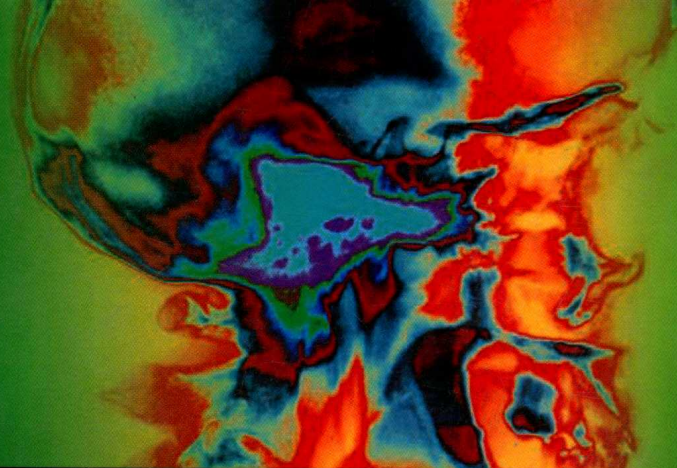


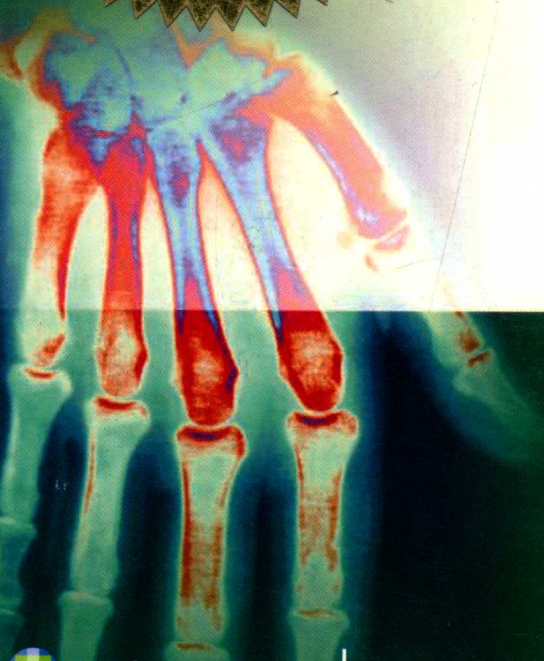


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WOLFGANG DÄHNERT

RADIOLOGY REVIEW MANUAL

7TH
EDITION



 Wolters Kluwer | Lippincott
Health Williams & Wilkins



Radiology Review Manual

Seventh Edition

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Radiology Review Manual

SEVENTH EDITION

“If a little knowledge is dangerous, where is the man who has so much to be out of danger!”

T.H. Huxley, 1825–1895
from *Elementary Instruction in Physiology* published in 1877

“It is the tragedy of the world that no one knows what he doesn’t know — and the less a man knows, the more sure he is that he knows everything”

Jouce Cary, British author 1888–1957

“Nothing in the world can take the place of persistence.
Talent will not; nothing is more common than unsuccessful men with talent. Genius will not; unrewarded genius is almost a proverb. Education will not; the world is full of educated derelicts.
Persistence and determination alone are omnipotent.”

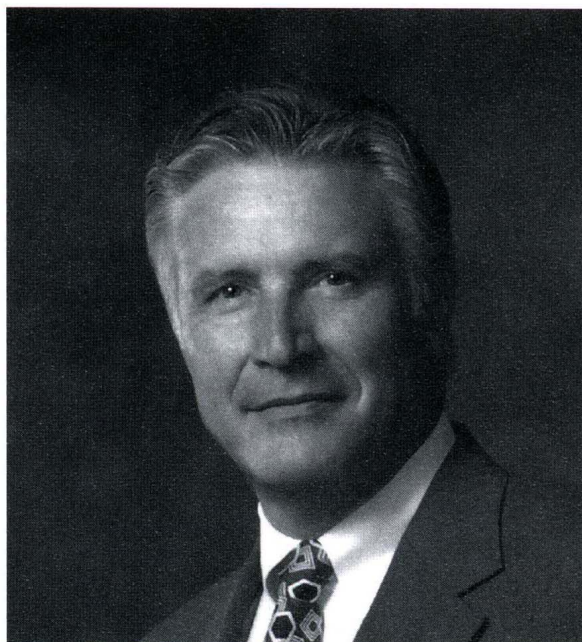
Calvin Coolidge 1872–1933
Vice President 1921–1923
President 1923–1929

*This edition is dedicated to the memory of my father **Fritz Karl Dähnert** (6 January 1920 – 8 June 2010), my mother **Margot Otilie Dähnert, née Kersten** (1 January 1922 – 20 May 1957) and my vice-mother **Barbara Dähnert, née Koch** (14 April 1931 – 11 February 2009).*

✕

To my wife Sue Ann and my children Mathias and Patrick
Thank you for your love and support.

About the Author



Wolfgang Dähnert, M.D.

Wolfgang Dähnert was born in Hamburg, Germany. After graduating from the Wilhelm-Gymnasium High School in Braunschweig, Lower Saxony, in 1966 he enlisted into the German Air Force for four years. After his discharge from the armed services he studied medicine at the Heinrich-Heine Universität in Düsseldorf, North Rhine-Westphalia, for his preclinical years and at the Johannes-Gutenberg Universität in Mainz, Rhineland-Palatinate, for his clinical years. He graduated from medical school in 1975 and received his doctor of medicine degree shortly thereafter based on his dissertation "Pulse Flow Photocytometry of Prostate Punch Biopsies". A one-year rotating internship in urology, internal medicine and sports medicine at the Johannes-Gutenberg Universität and at the municipal Dr. Horst Schmidt Klinik in Wiesbaden was followed by a one-year residency in general surgery at the Deutsches Rotes Kreuz Krankenhaus in Mainz. In 1978 he switched to begin a residency in radiology at the municipal and teaching hospital in Darmstadt, Hesse, under the directorship of Prof. H.K. Deininger. He continued his education in diagnostic and therapeutic radiology at the Johannes-Gutenberg Universität in Mainz under the directorship of Prof. Manfred Thelen and Prof. Rolf W. Günther receiving his German certification for radiology in 1982. Dr. Dähnert started a 2-year fellowship in ultrasound and computed tomography at the Johns Hopkins Hospital in Baltimore in 1984 under the leadership of Roger Sanders / Ulrike Hamper and Stanley

Siegelman / Elliot Fishman and was appointed Clinical Instructor in 1986. In 1985 he sat for the federal licensing exam, and in 1987 took his oral exam in diagnostic radiology in Louisville, Kentucky. The American Board of Radiology had approved a 2-year fellowship program for him in lieu of a residency in radiology. The foundation of ***Radiology Review Manual*** was laid during the three years at Hopkins while preparing for the ABR exam. Between 1987 and 1989 he worked as Assistant Professor of Radiology in ultrasound at Thomas Jefferson Hospital in Philadelphia under Barry Goldberg. During this period in Philadelphia ***Radiology Review Manual*** was taken to fruition culminating in the publication of its first edition in 1991. Dr. Dähnert joined Clinical Diagnostic Radiology & Nuclear Medicine in Phoenix, AZ, in 1989 as director of ultrasound. This group practice of approximately 25 mostly fellowship-trained radiologists served three center city hospitals and their affiliated residency program in radiology, the latter at St. Joseph's Hospital and Medical Center, before it ceased operations in 2006 brought about by a fiscally unsustainable management style and culture. In September of 2004 Dr. Dähnert relocated to Green Bay, Wisconsin, joining a group of eight radiologists as part of a multispecialty group practice at Aurora BayCare Medical Center, the northern hub of Aurora Health Care, one of Wisconsin's largest private-sector employers.

PREFACE

The practice of radiology continues to evolve in a direction not anticipated when the first edition of ***Radiology Review Manual*** was published. Most radiology residents add an additional year of subspecialty training and then will join a radiology group with enough members to be able to practice their subspecialty. In recognizing the shifting practice pattern the American Board of Radiology is about to respond with a change in its traditional examination and will test competency in up to three subspecialty fields of the candidate's choice. Nevertheless general radiology is here to stay. On average at least 10% to 20% of a specialist's work consists of general radiology and the preliminary ABR and recertification examinations will continue to cover the whole of radiology. Lifelong learning will remain a necessity with a global perspective and broad experience in all of imaging. Many practicing radiologists are not keen on reducing their spectrum of capabilities afraid to diminish their marketability in an uncertain future for the US health care system. The depth of medical knowledge and scope of image interpretation expected from a general radiologist continues to increase exponentially. Many practicing radiologists find themselves occasionally in need of a quick review of imaging findings, information on diseases and their pathological correlate or differential diagnoses before issuing a report.

Radiology Review Manual has become my carry-on memory jogger, in an attempt to put into a single reference much of the information that is or could be relevant to my practice. I use it like a dictionary, always available at my workstation. The popularity of the "green giant" or the "green bible", as it has been dubbed by residents, and the continued impressive number of sales confirms the usefulness of this type of publication. The outline style chosen for the sake of conserving space provides only an extract of information and may, at times, jeopardize the intended meaning of statements without any prior background knowledge of the subject. Accordingly, this book is not intended for the novice.

How to use this book:

I have selected one of many possible ways of how to organize a book of this daunting scope. The primary goal was to present the material anatomically from head to heel. In order to avoid repetition, pediatric entities are not separated. All imaging findings are presented with the entity. However, nuclear medicine is treated in a separate section when emphasis is on technique and functional aspects not covered elsewhere. Brief chapters on statistics and contrast media are added at the end. The inside of the cover pages are used to provide immediate access to accepted therapies for contrast reactions. The organization within the individual chapters follows the practical approach of reading films. The initial step of film interpretation is the description of radiologic patterns that serves to identify categories in which they belong. Therefore, radiologic patterns for differential diagnoses are found in the first portion of a chapter. Once the diagnostic possibilities have been reviewed in brief outline, one can look up detailed information about a disease entity in the last segment of a chapter. The disease entities are presented in alphabetical order. Both these segments are separated by a few pages of functional, anatomic, or embryologic aspects. Occasionally, important clinical signs and their differential diagnoses, relevant to the practice of radiology, are included in the first portion of a chapter. Choices had to be made where to present systemic diseases within the topographical scheme. Mnemonics (which I personally abhor) have been liberally added by request. A table of contents and abbreviations used throughout the book are found in front. Newly added to the front matter are page references to drawings and tables.

The index, which selectively refers to those pages with significant information, concludes the manual and is usually the starting point for many. The index also includes so-called "buzz words" that are miraculously attached to diseases.

The backbone of the book are disease entities, radiologic symptoms, as well as lists of differential diagnosis. Disease entities are headed by their most commonly used name with other designations listed below. As a radiologic diagnosis should be entertained in context with its probability to be correct, percentages in regard to frequency of signs and symptoms are included liberally, often giving the lowest and the highest number found in the literature. The truth may be somewhere in between for a nonselected patient population, and occasionally a third number is provided between the high and low number as the most frequently cited. Arbitrary choices have been made in situations when different or contradictory results are found in the literature — unfortunately, an occurrence not at all infrequent.

Lists of differential diagnoses can be presented in many fashions. There is no right or wrong way, but there certainly is a chaotic versus an organized approach. An orderly thought process portrays familiarity with a problem. Examinees have always felt that "nailing" the diagnosis is secondary, but including it in one's consideration is paramount to a successful exam. Accordingly, an attempt is made to categorize differential diagnostic considerations or etiologies of certain diseases in a manner digestible for recapitulation. It is a common experience that this is not always possible, logically satisfactory, or complete.

Acknowledgement:

The information contained herein has been gathered over several years and stems from various sources. Numerous individuals have contributed in major or minor ways. They have been named in prior editions. The most significant resources are the journals dedicated to imaging with brilliant review articles, in particular the practice-oriented publication of Radiographics, ACR syllabi, handouts from various CME courses, hand-written notes taken during lectures, as well as feed-back from candidates having taken the board exam. Information from major textbooks, too numerous to list, is contained in these pages. Anecdotal contributions can no longer be traced. Accordingly, none of the material in this book is based on my own research or of my own writing as is true for most textbooks of radiology. Instead it is a compilation and extraction of other's work presented from my perspective of relevance and perhaps with omissions of my ignorance. Our radiologic ancestors, mentors, teachers and scientists alike, throughout the world deserve our admiration and gratitude for the collective knowledge passed on to us for the benefit of our profession and our patients. I realize, in retrospect, that the omission of references may present a problem when certain statements appear unlikely and their verification has to be left to the user. For my defense, I can say that I have tried to extract all data as diligently as possible.

I sincerely hope that ***Radiology Review Manual*** will serve you in your preparation for the board exam, in teaching situations, and particularly in your daily work assignments — the way it continues to help me.

Green Bay, May 2010

ABBREVIATIONS

√	radiologic sign	ANCA	antineutrophil cytoplasmic autoantibodies	Bx	biopsy
•	clinical sign, symptom	Angio	angiography	Ca	calcium
=	equals, is	ANT	anterior	Ca ²⁺	calcium ion
@	at anatomic location of	Ao	aorta	c-ANCA	cytoplasmic pattern of antineutrophil cytoplasmic autoantibodies
/	or, per	AP	anteroposterior; arterial phase; alkaline phosphatase	CA-125	cancer antigen 125
+	and, plus, with	APA	aldosterone producing adenoma	CABG	coronary artery bypass grafting
±	with or without	approx.	approximately	CAD	coronary artery disease
<	less than	APUD	amine precursor uptake and decarboxylation	CADASIL	cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy
>	more than, over	APUDomas	endocrine cells tumors	CAM	cystic adenomatoid malformation
»	method	APVR	anomalous pulmonary venous return	CBD	common bile duct
◇	important comment	APW	absolute percentage washout	CBF	cerebral blood flow
→	leads to	ARA-C	arabinside C	cBPD	corrected biparietal diameter
↑	increased	ARDS	acute respiratory distress syndrome	CBV	cerebral blood volume
↑↑	much increased	ARF	acute renal failure	CC	craniocaudad
↓	decreased	AS	aortic stenosis	CCA	common carotid artery
↓↓	much decreased	ASA	acetylsalicylic acid	CCK	cholecystokinin
≈	mildly, corresponding to	ASD	atrial septal defect	CCMC	common carpometacarpal joint
2-D	two-dimensional	ASH	asymmetric septal hypertrophy	CCNU	1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea
3-D	three-dimensional	AST	aspartate aminotransferase	CD4	specialized lymphocyte responsible for cell-mediated immunity
5-HIAA	5-hydroxyindole acetic acid	ATN	acute tubular necrosis	CDC	Center for Disease Control
AAA	abdominal aortic aneurysm	ATP	adenosine triphosphate	CEA	carcinoembryonic antigen
AAAs	abdominal aortic aneurysms	AV	arteriovenous; atrioventricular	CECT	contrast-enhanced computed tomography
ABC	aneurysmal bone cyst	AVF	arteriovenous fistula	CEMR	contrast-enhanced MR
ABER	abduction + external rotation	AVM	arteriovenous malformation	CF	cystic fibrosis
ABO	blood group	AVMs	arteriovenous malformations	CFI	color flow imaging
ABR	American Board of Radiology	AVN	avascular necrosis	CFTR	cystic fibrosis transmembrane regulator gene
AC	abdominal circumference	AVNA	atrioventricular node artery	cGy	centigray = rad
ACA	anterior cerebral artery	Ba	barium	CHAOS	Congenital high airway obstruction syndrome
ACE	angiotensin I-converting enzyme	BAH	bilateral adrenal hyperplasia	CHD	common hepatic duct; congenital heart defect
ACEI	angiotensin-converting enzyme inhibitor	BAL	bronchoalveolar lavage	CHF	congestive heart failure
ACL	anterior cruciate ligament	BCG	bacille Calmette-Guérin	CLL	chronic lymphatic leukemia
aCom	anterior communicating artery	BCNU	bis-chloronitrosourea	cm	centimeter
ACR	American College of Radiology	BDI	basion-dens interval	cm ²	square centimeter
ACTH	adrenocorticotrophic hormone	BE	barium enema	cm ³	cubic centimeters
ADC	apparent diffusion coefficient	BF	blood flow	CMC	carpometacarpal
ADH	antidiuretic hormone; atypical ductal hyperplasia	BIDA	butyl iminodiacetic acid	CME	continuing medical education
ADPKD	adult polycystic kidney disease	BI-RADS	Breast Imaging Reporting and Data System	CML	chronic myelogenous leukemia
AF-AFP	amniotic fluid alpha-fetoprotein	BIH	benign intracranial hypertension	CMV	Cytomegalovirus
AFI	amniotic fluid index	BKG	background	CN	cranial nerve
AFP	alpha-fetoprotein	BKGcounts	background counts	CNS	central nervous system
AICA	anterior inferior cerebellar artery	BLC	biceps-labral complex	CO	carbon monoxide
AIDS	acquired immune deficiency syndrome	BMD	bone marrow density	CoA	coarctation of aorta
AIP	acute interstitial pneumonia	BOOP	bronchiolitis obliterans organizing pneumonia	COPD	chronic obstructive pulmonary disease
AJCC	American Joint Committee on Cancer	BP	blood pressure	CP	cerebellopontine
AlkaPhos	alkaline phosphatase	BPD	biparietal diameter	CPA	cerebellopontine angle
ALL	acute lymphoblastic leukemia	BPH	benign prostatic hyperplasia	CPAP	continuous positive airway pressure
ALPSA	anterior labroligamentous periosteal sleeve avulsion	bpm	beats per minute	CPD	cardiopulmonary disease
ALSA	aberrant left subclavian artery	BPP	biophysical profile		
ALT	alanine aminotransferase	Bq	Becquerel (1 Bq = one nucleus decays per sec)		
AMA	antimitochondrial antibody	BRCA	breast cancer suppressor gene		
AML	acute myeloblastic leukemia; angiomyolipoma	BSA	body surface area		
aML	anterior mitral valve leaflet	BSO	bilateral salpingo-oophorectomy		
AMLs	angiomyolipomas				
ANA	antinuclear antibodies				

CPDN	cystic partially differentiated nephroblastoma	ECG	electrocardiogram	FSH	follicle stimulating hormone
cpm	counts per min	ECHO	echocardiogram:	FVC	forced vital capacity
CPPD	calcium pyrophosphate dihydrate		enteric cytopathic human orphan (virus)	FWHM	full-width at half-maximum
CPR	cardiopulmonary resuscitation	EDD	enddiastolic diameter	Fx	fracture
cps	counts per sec	EDTA	ethylenediaminetetraacetic acid	GA	gestational age
cRCC	conventional renal cell cancer	EDV	enddiastolic volume	GB	gallbladder
	cystic renal cell cancer	EEG	electroencephalogram	GBM	glioblastoma multiforme
CRF	chronic renal failure	EF	ejection fraction	GCT	giant cell tumor;
CRL	crown rump length	EFW	estimated fetal weight		granulosa cell tumor
CRT	cathode ray tube	EG	eosinophilic granuloma	GCTs	giant cell tumors
CSF	cerebrospinal fluid	eg	exempli gratia	Gd	gadolinium
CSI	chemical shift imaging	EGA	estimated gestational age	GDA	gastroduodenal artery
CST	contraction stress test	EHDP	ethylene hydroxydiphosphonate	GE	gastroesophageal
C/T	cardiothoracic ratio	EKG	electrocardiogram	GER	gastroesophageal reflux
CT	computed tomography	ELISA	enzyme-linked immunosorbent assay	GERD	gastroesophageal reflux disease
CTA	angio CT			GFR	glomerular filtration rate
CVA	cerebrovascular accident	EMA	epithelial membrane antigen	GH	growth hormone
CVJ	craniovertebral junction	ENT	ear, nose and throat	GHA	glucoheptonate
CVS	chorionic villus sampling	ErbB	epidermal growth factor receptor gene	GI	gastrointestinal
CWP	coal worker's pneumoconiosis			GIST	gastrointestinal stromal tumor
Cx	complication	ERC	endoscopic retrograde cholangiography	GMP	guanosine monophosphate
CXR	chest x-ray			GMRH	germinal matrix-related hemorrhage
CXR _s	chest x-rays	ERCP	endoscopic retrograde cholangiopancreatography	GN	glomerulonephritis
d	day(s)	ERPF	effective renal plasma flow	GNRH	gonadotropin releasing hormone
D5W	solution of 5% dextrose in water	ERV	expiratory reserve volume	GRASS	gradient recalled acquisition in steady state
DCBE	double-contrast barium enema	ESD	endsystolic diameter	GRE	gradient refocused echo
DCIS	ductal carcinoma in situ	esp.	especially	GS	gestational sac
DDH	developmental dysplasia of hip	ESR	erythrocyte sedimentation rate	GSV	great saphenous vein
DDx	differential diagnosis	EtOH	ethanol	GnRH	gonadotropin releasing hormone
DES	diethylstilbestrol	ESV	end-systolic volume	GU	genitourinary
DEXA	dual energy X-ray absorptiometry	F	female	Gy	1 gray = absorption of 1 joule of ionizing radiation by 1 kilogram of matter = $1 \text{ J} \cdot \text{kg}^{-1}$ = $1 \text{ m}^2 \cdot \text{sec}^{-2}$
DIC	disseminated intravascular coagulation	Fab	fragment antigen binding	γ GT	gamma-glutamyltransferase
DIDA	diethyl iminodiacetic acid	FAI	femoroacetabular impingement	HAART	highly active antiretroviral therapy
DIP	desquamative interstitial pneumonia;	FAP	familial adenomatous polyposis	HAGL	humeral avulsion of the glenohumeral ligament
	distal interphalangeal	FDA	Federal Drug Administration	Hb	hemoglobin
DISH	diffuse idiopathic skeletal hyperostosis	FDG	fluorodeoxyglucose	HBME-1	mouse monoclonal antibody to mesothelioma
DISIDA	diisopropyl iminodiacetic acid	Fe ²⁺	ferrous ion	HBP	high blood pressure
dist	distal	Fe ³⁺	ferric state	HBV	hepatitis B virus
DIT	diiodotyrosine	FEV	forced expiratory volume	HC	head circumference
DLCL	diffuse large cell lymphoma	FEV ₁	FEV at 1 sec	HCC	hepatocellular carcinoma
D _L CO	diffusion capacity of lung for carbon monoxide	FEV ₃	FEV at 3 sec	HCCs	hepatocellular carcinomas
DMSA	dimercaptosuccinic acid	FHM	fetal heart motion	hCG	human chorionic gonadotropin
DORV	double outlet right ventricle	FIGO	Fédération Internationale de Gynécologie et d'Obstétrique	HCl	hydrochloric acid
DPLD	diffuse parenchymal lung disease	FISH	fluorescence in situ hybridization	Hct	hematocrit
DSA	digital subtraction angiography	FK-506	code number for tacrolimus	HD	Hodgkin disease
DTPA	diethylenetriamine pentaacetic acid	FL	femur length	HELLP	hemolysis, elevated liver enzymes, low platelets
DVT	deep vein thrombosis	FLAIR	fluid-attenuated inversion recovery sequence	Hg	mercury
DWI	diffusion weighted images	FLASH	fast low-angle shot	HHV8	human herpes virus type 8
Dx	diagnosis	FN	false negative	HIAA	hydroxyindole acetic acid
EAC	external auditory canal	FNAB	fine needle aspiration biopsy	HIDA	hepatic 2,6-dimethyl iminodiacetic acid
EBV	Epstein-Barr virus	FNH	follicular nodular hyperplasia	Histo	histology
EC-cells	enterochromaffin cells	FP	false positive	HIV	human immunodeficiency virus
ECA	external carotid artery	Fr	French = unit of linear measure of circumference ($1 \text{ F} = 1/3 \text{ mm} \approx 1 \text{ mm}$ in diameter)		
ECD	endocardial cushion defect;	FRC	functional residual capacity		
	ethyl cysteine dimer	FS	fractional shortening		
ECF	extracellular fluid	FSE	fast spin echo		

HL	Hodgkin lymphoma	IQ	intelligence quotient	LLL	left lower lobe
HLA	human leukocyte antigen	IR	inversion recovery	LLQ	left lower quadrant
HMB-45	monoclonal antibody against human melanoma black	IRP	international reference preparation	LM	left main coronary artery; lateromedial
HMPAO	hexamethylpropyleneamine oxime = exametazime	IRU	inferior radioulnar joint	LMP	last menstrual period
HNP	herniated nucleus pulposus	IRV	inspiratory reserve volume	Lnn	lymph nodes
HOCM	hypertrophic obstructive cardiomyopathy; high-osmolar contrast media	IS	iliosacral; international standard	LOCM	low-osmolar contrast media
HPF	high power field (400 x magnification)	IU	international unit = amount of a substance, based on measured biological activity or effect	LPA	left pulmonary artery
HPO	hypertrophic pulmonary osteoarthropathy	IUD	intrauterine device	LPD	lymphoproliferative disease
HPS	hypertrophic pyloric stenosis	IUGR	intrauterine growth retardation	LPO	left posterior oblique
HPT	hyperparathyroidism	IUP	intrauterine pregnancy	LPV	left portal vein
HPV	human papilloma virus	IV	intravenous	LSA	left subclavian artery
hr	hour	IVC	inferior vena cava	LSD	lysergic acid diethylamide
HRCT	high-resolution CT	IVDA	intravenous drug abuse	LUL	left upper lobe
HRT	hormone replacement therapy	IVH	intraventricular hemorrhage	LUQ	left upper quadrant
HSA	human serum albumin	IVP	intravenous pyelogram	LV	left ventricle
HSG	hysterosalpingography	IVS	intraventricular septum	LVEF	left ventricular ejection fraction
HSV	herpes simplex virus	IVU	intravenous urogram	LVET	left ventricular ejection time
HTN	hypertension			LVFT1	left ventricular fast filling time
HU	Hounsfield unit	JAA	juxtaposition of atrial appendages	LVOT	left ventricular outflow tract
HV	hepatic vein			LVPW	left ventricular posterior wall
HypoPT	hypoparathyroidism	KCC	Kulchitsky cell carcinoma	M	male
Hx	history	kDa	atomic weight in terms of kilodaltons	m	meter
		keV	1 kiloelectron volt = $1.60217646 \times 10^{-16}$ joules	m.	muscle
IAC	internal auditory canal	kV	kilovolt	MA	menstrual age
ICA	internal carotid artery	kVp	kilovolt peak	MAA	macroaggregated albumin
ICBT	intercostal bronchial trunk a.	KUB	kidney + ureter + bladder on one film	MAG	mercaptoacetyl triglycine
ICP	intracranial pressure			MAI	Mycobacterium avium intracellulare
IDA	iminodiacetic acid	L	left	MALT	mucosa-associated lymphoid tissue
IDC	invasive ductal carcinoma	L-DOPA	3-(3,4-dihydroxyphenyl)-levo-alanine	Mammo	mammography
IDDM	insulin-dependent diabetes mellitus	LA	left atrium	max.	maximum
IDM	infant of diabetic mother	LAD	left anterior descending	MBC	maximum breathing capacity
ie	id est	LAO	left anterior oblique	MBq	mega Becquerel = 106 Bq
IgA	Immunoglobulin A	LAT	lateral	MCA	middle cerebral artery
IgE	Immunoglobulin E	LATS	long-acting thyroid stimulating pounds (<i>Libra pondo</i> , Latin)	MCDK	multicystic dysplastic kidney
IgG	Immunoglobulin G	lbs	pounds (<i>Libra pondo</i> , Latin)	mCi	millicurie (1 mCi = 3.7×10^7 disintegrations per sec)
IGL	inferior glenohumeral ligament	LCA	left coronary artery	MCP	metacarpophalangeal
IGHLC	inferior glenohumeral labroligamentous complex	LCH	Langerhans cell histiocytosis	MCL	medial collateral ligament
IGL	inferior glenohumeral ligament	LCIS	lobular carcinoma in situ	MDMA	3,4-methylenedioxymethamphetamine
IgM	immunoglobulin M	LCL	lateral collateral ligament	MDP	methylene diphosphonate
IHSS	idiopathic hypertrophic subaortic stenosis	LCx	left circumflex coronary artery	MEA	multiple endocrine adenomas
IIP	idiopathic interstitial pneumonia	LDH	lactate dehydrogenase	MED	medial
ILC	invasive lobular carcinoma	LE	lupus erythematosus	MELAS	Mitochondrial myopathy, Encephalopathy, Lactic acidosis, And Strokelike episodes
IM	intramuscular	LES	lower esophageal sphincter	MEN	multiple endocrine neoplasms
IMA	inferior mesenteric artery	LFTs	liver function tests	mEq	milliequivalent
IMH	intramural hematoma	LGA	large for gestational age	mets	metastases
IMV	inferior mesenteric vein	LH	luteinizing hormone	MFH	malignant fibrous histiocytoma
In	indium	LHBB	long head of biceps brachii	MGL	middle glenohumeral ligament
inf	inferior	LHRH	luteinizing hormone releasing hormone	mGy	absorbed energy of ionizing radiation (1 Gy = $1 \text{ J} \cdot \text{kg}^{-1} = 1 \text{ m}^2 \cdot \text{sec}^{-2}$)
intermed	intermediate	lig.	ligament	MHA	microhemagglutination assay
IPF	idiopathic pulmonary fibrosis	ligg.	ligaments	MIBG	metaiodobenzylguanidine
IPH	idiopathic pulmonary hemosiderosis	LIP	lymphocytic interstitial pneumonitis	MIBI	methoxyisobutylisonitril
	intraparenchymal hemorrhage	LL	lower lobes	min.	minimum
IPMT	intraductal papillary mucinous tumor			min	minute(s)

MIP	maximum intensity projection	P	phosphorus	PPD	purified protein derivative
MIT	moniodotyrosine	p-ANCA	perinuclear antineutrophil cytoplasmic autoantibodies	PPG	photoplethysmography
mIU	1 • 10 ⁻⁶ IU	PA	posteroanterior;	PPHypoPT	pseudopseudohypoparathyroidism
ML	middle lobe		pulmonary artery	ppm	parts per million
MLCN	multilocular cystic nephroma	PACs	premature atrial contractions	PPROM	preterm premature rupture of membranes
MLO	mediolateral oblique	PAH	paraaminohippurate; precapillary pulmonary arterial hypertension	PPV	positive predictive value; positive-pressure ventilation
MMAA	mini-microaggregated albumin colloid			pRCC	papillary renal cell cancer
MMFR	maximal midexpiratory flow rate	PALM	premature with accelerated lung maturity	preval	prevalence
mo	month(s)	PAP	primary atypical pneumonia; pulmonary alveolar proteinosis	PS	pulmonary stenosis
MoM	multiple of mean	PAPVR	partial anomalous pulmonary venous return	PSA	prostate-specific antigen
MPA	main pulmonary artery	PAS	periodic acid Schiff	PSS	progressive systemic sclerosis
MPS	mucopolysaccharidosis	PASH	pseudoangiomatous stromal hyperplasia	PSV	peak systolic velocity
MPV	main portal vein	Path	pathology	PTA	percutaneous transluminal angioplasty
MR	magnetic resonance	PAVM	pulmonary arteriovenous malformation	PTC	percutaneous transhepatic cholangiography
MRA	magnetic resonance angiography	PAWP	pulmonary artery wedge pressure	PTH	parathyroid hormone
MRCP	magnetic resonance cholangiopancreatography	PBF	pulmonary blood flow	pTL	posterior tricuspid valve leaflet
MRV	magnetic resonance venography	PCA	posterior cerebral artery	PTU	propylthiouracil
MS-AFP	maternal serum -fetoprotein	PCKD	polycystic kidney disease	PV	portal vein
mSv	millisievert (1 Sv = 1 J/kg)	PCL	posterior cruciate ligament	PVC	polyvinyl chloride
MT	metatarsal	pCom	posterior communicating artery	PVCs	premature ventricular contractions
MTP	metatarsophalangeal	PCP	Pneumocystis carinii pneumonia	PVH	pulmonary venous hypertension
MTT	mean transit time	PCWP	pulmonary capillary wedge pressure	PVL	periventricular leukomalacia
MUGA	multiple gated acquisition	PD	posterior descending artery	PVNS	pigmented villonodular synovitis
MV	mitral valve	PDA	patent ductus arteriosus	PVP	portal venous phase
MVA	motor vehicle accident	PE	pulmonary embolism	PVR	pulse volume recording; postvoid residual
MVC	motor vehicle collision	PEEP	positive end expiratory pressure	PYP	pyrophosphate
Myelo	myelography	PEP	preejection period		
		PET	positron emission tomography	QPS	quantitative perfusion SPECT
NASCET	North American symptomatic endarterectomy trial	pHPT	primary hyperparathyroidism		
N.B.	nota bene	PHPV	persistent hyperplastic primary vitreous	R	right
NCCT	noncontrast CT	PHypoPT	pseudohypoparathyroidism	RA	rheumatoid arthritis; right atrium
NECT	nonenhanced computed tomography	PICA	posterior inferior cerebellar artery	RAA	right aortic arch; right atrial appendage
NF	neurofibromatosis	PID	pelvic inflammatory disease	rad	radiation absorbed dose, in 1975 replaced by gray (Gy)
NG	nasogastric	PIE	pulmonary infiltrate with eosinophilia; pulmonary interstitial emphysema	RAIU	radioactive iodine uptake
NHL	non-Hodgkin lymphoma	PIOPED	prospective investigation of pulmonary embolus detection	RAO	right anterior oblique
NIDDM	non-insulin dependent diabetes mellitus	PIP	proximal interphalangeal	Rb	Rubidium
nn.	nerves	PIPIDA	para-isopropyl iminodiacetic acid	RB-ILD	respiratory bronchiolitis-associated interstitial lung disease
NPO	nulla per os	PLCH	pulmonary Langerhans cell histiocytosis	RBC	red blood cell
NPV	negative predictive value	PLSA	posterolateral segment artery	RBCs	red blood cells
NRC	Nuclear Regulatory Commission	pML	posterior mitral valve leaflet	RCA	right coronary artery
NSAID	nonsteroidal antiinflammatory drug	PMMA	polymethylmethacrylate	RCC	renal cell carcinoma
NSAIDs	nonsteroidal antiinflammatory drugs	PMN	polymorphonuclear	RCCs	renal cell carcinomas
NSIP	nonspecific interstitial pneumonia	PMNs	polymorphonuclears	RDS	respiratory distress syndrome
NST	nonstress test	PMT	photomultiplier tube	rel.	relative
NTD	neural tube defect	PNET	primitive neuroectodermal tumor	RES	reticuloendothelial system
NTDs	neural tube defects	PNST	peripheral nerve sheath tumor	RHV	right hepatic vein
NUC	nuclear medicine	PO	per oral	RI	resistive index
		pO ₂	oxygen pressure	RIBA	recombinant immunoblot assay
OB	obstetrical	POST	posterior	RIND	reversible ischemic neurologic deficit
OB-US	obstetrical ultrasound			RISA	radioiodine serum albumin
OBL	oblique			RLAT	right lateral
OFD	occipitofrontal diameter				
OHSS	ovarian hyperstimulation syndrome				
OI	osteogenesis imperfecta				
OIH	orthoiodohippurate				
OKC	odontogenic keratocyst				

RLL	right lower lobe	Surg	surgery	UPJ	ureteropelvic junction
RLQ	right lower quadrant	SUV	standardized uptake values	US	ultrasound;
RML	right middle lobe	SVC	superior vena cava		United States of America
RMS	root mean square	SVCs	superior venae cavae	USP	United States Pharmacopoeia
ROC	receiver operating characteristic			USP XX	United States Pharmacopoeia, 20th edition
ROI	region of interest	TIWI	T1-weighted image	UTI	urinary tract infection
ROIs	regions of interest	T2WI	T2-weighted image	UTIs	urinary tract infections
RPF	renal plasma flow	TAH	total abdominal hysterectomy	UVJ	ureterovesical junction
RPO	right posterior oblique	TAPVR	total anomalous pulmonary venous return	Uvol	urine volume
RPV	right portal vein				
RPW	relative percentage washout	TB	tuberculosis		
RSV	respiratory syncytial virus	TBG	thyroxin-binding globulin	VACTERL	vertebral, anorectal, cardiovascular, tracheo- esophageal fistula, renal, limb anomalies
RTA	renal tubular acidosis	Tc	Technetium	VC	vital capacity
RUL	right upper lobe	TCC	transitional cell carcinoma	VCUG	voiding cystourethrogram
RUQ	right upper quadrant	TDLU	terminal ductal lobular unit	VDRL	veneral disease research laboratory
RV	residual volume; right ventricle	TDLUs	terminal ductal lobular units	vHL	von Hippel-Lindau disease
RVOT	right ventricular outflow tract	TE	echo time	VIP	vasoactive intestinal peptides
RVT	renal vein thrombosis	TEF	tracheoesophageal fistula	VMA	vanillylmandelic acid
Rx	therapy	TGA	transposition of great arteries	VP	ventriculoperitoneal
		TGV	transposition of great vessels	V/Q	ventilation perfusion
SIQ3T3	prominent S wave in lead I + Q wave and inverted T wave in lead III	tHPT	tertiary hyperparathyroidism	VR	Virchow-Robin space
S/P	status post	TIA	transitory ischemic attack	VSD	ventricular septal defect
SAE	subcortical arteriosclerotic encephalopathy	TIAAs	transitory ischemic attacks	VSDs	ventricular septal defects
SAG	sagittal	TLC	total lung capacity	VUR	vesicoureteral reflux
SAH	subarachnoid hemorrhage	Tm	transport maximum across tubular cells	vv.	venae
SBE	subacute bacterial endocarditis	T _{max}	time to maximum peak		
SBFT	small bowel follow-through	TMB-IDA	2,4,6-trimethylbromo- acetanilide iminodiacetic acid	WAGR	Wilms tumor, aniridia, genital abnormalities, mental retardation
SBO	small bowel obstruction	TN	true negative	WBC	white blood cell
SCBE	single-contrast barium enema	TNF	tumor necrosis factor	WBCs	white blood cells
SD	standard deviation	TNM	tumor nodes metastasis	WDHA	watery diarrhea, hypokalemia, achlorhydria
SDS	summed difference score	TOA	tuboovarian abscess	WDHH	watery diarrhea, hypokalemia, hypochlorhydria
SE	spin echo	TOF	tetralogy of Fallot	WM	white matter
Sens	sensitivity	TORCH	toxoplasmosis, rubella, cytomegalovirus, herpes virus	wk	week(s)
SGA	small for gestational age	TP	true positive	w/o	without
SGL	superior glenohumeral ligament	TPN	total parenteral nutrition	WPW	Wolff-Parkinson-White
sHPT	secondary hyperparathyroidism	TPROM	term premature rupture of membranes	wt/vol	weight/volume percent = amount of solute in g per amount of solution in mL
SI	signal intensity	TR	repetition time	XGP	xanthogranulomatous pyelonephritis
SIJ	sacroiliac joint	TRH	thyrotropin-releasing hormone	YS	yolk sac
SIS	Second International Standard	TRV	transverse	yr	year(s)
SLAP	superior labral tear from anterior to posterior	TSC	tuberous sclerosis		
SLE	systemic lupus erythematosus	TSH	thyroid-stimulating hormone		
SMA	superior mesenteric artery	TURP	transurethral resection of prostate		
SMV	superior mesenteric vein	TV	tidal volume		
Sn	stannum	UA	umbilical artery		
SNHL	sensorineural hearing loss	UCL	ulnar collateral ligament		
SOB	shortness of breath	uE3	unconjugated estriol		
Specif	specificity	UGI	upper gastrointestinal series		
SPECT	single photon emission	UICC	Union Internationale Contre le Cancer		
SQ	subcutaneous	UIP	usual interstitial pneumonia		
SRS	summed rest score	UL	upper lobe		
SSS	summed stress score				
STH	somatotrophic hormone				
STIR	short tau inversion recovery				

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