Dosis de radiación en TC: Conceptos básicos, definiciones y registros

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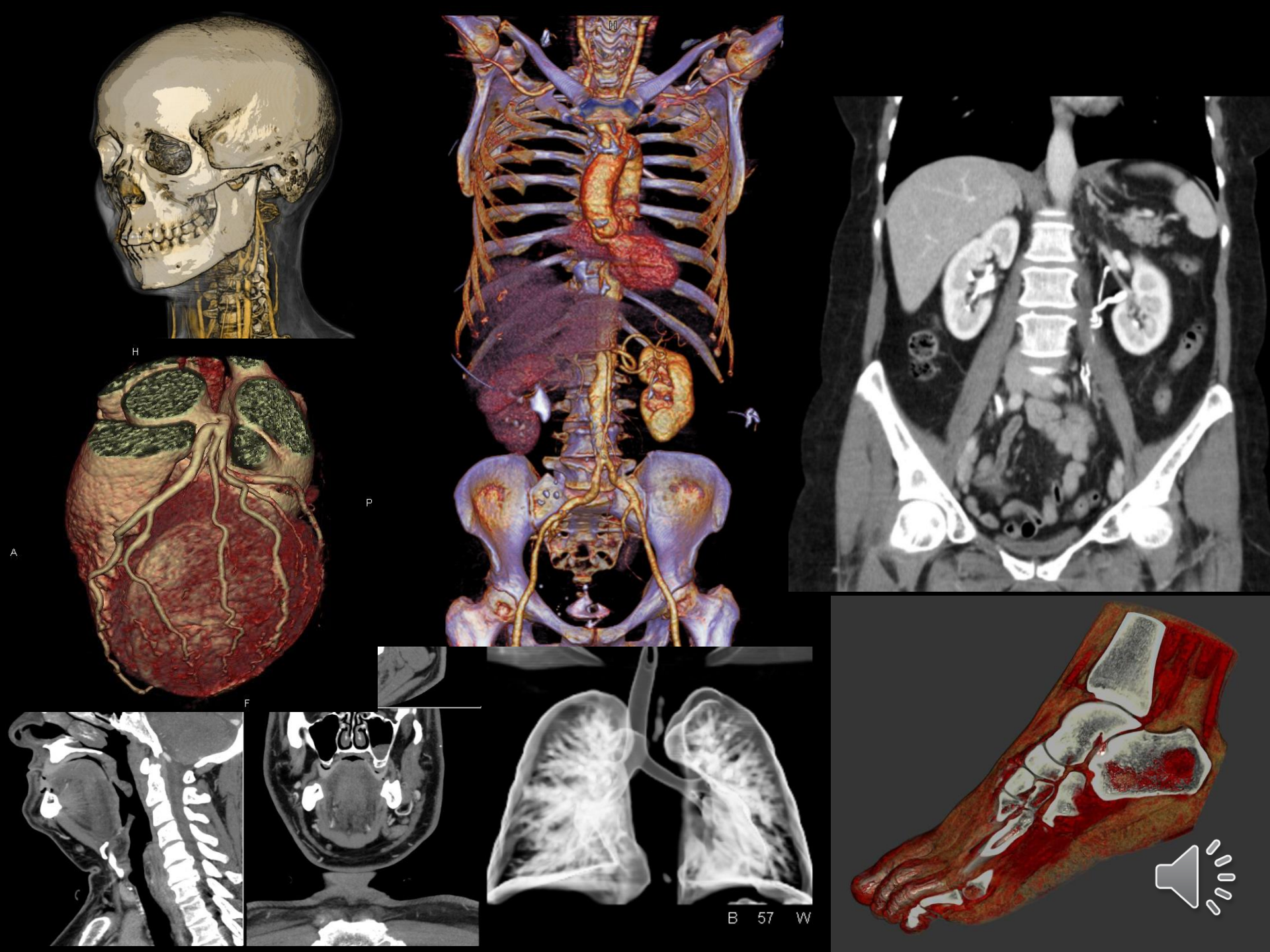
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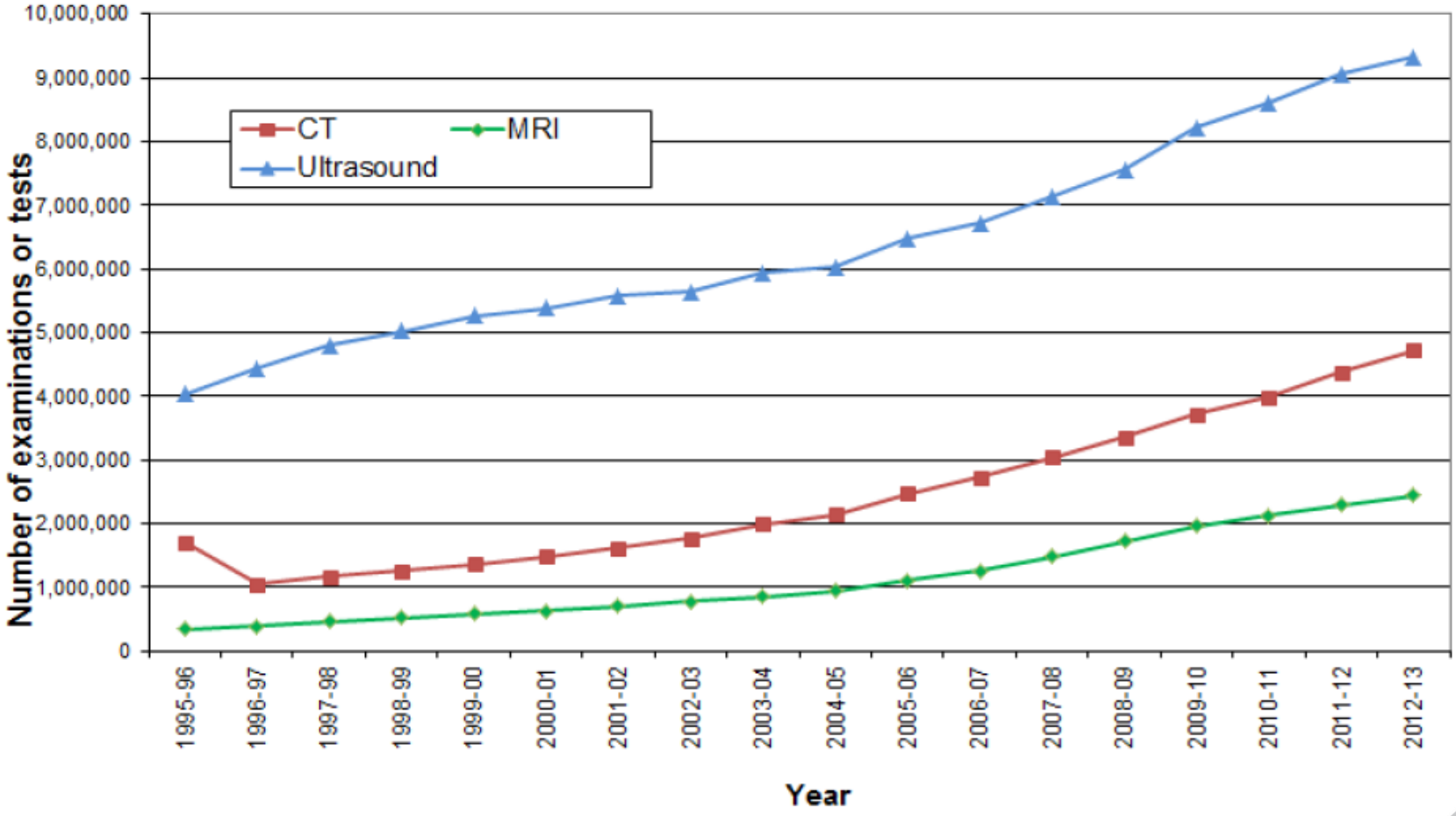
El problema

- La TC es hoy la principal fuente de radiación ionizante no natural recibida por la población (aprox. 60%)
- La TC crece ininterrumpidamente desde el año 2000
- Estudios multifásicos (hígado, páncreas, riñones)
- Más estudios en niños, jóvenes y patologías benignas

Graph 2: Growth in number of Ultrasound, CT and MRI imaging and radiodiagnostic examinations or tests, England, 1995-96 to 2012-13



Efectos biológicos de las radiaciones ionizantes

- Efectos **determinísticos**
- Efectos **estocásticos**
- Dosis habituales de la TC: 5-25 mSv
- Umbral para riesgo estadísticamente significativo de exceso de cáncer: 50-200mSv

Modelo lineal sin umbral (LNT): "Cualquier dosis, no importa que tan pequeña, puede generar efectos estocásticos"

1Gy=R100
0,01 Gy=R/100
0,00001 Gy=R/100000

Definiciones

- Dosis absorbida:

  Energía absorbida x unidad de masa (J Kg^{-1}): **Gy**

- Dosis equivalente:

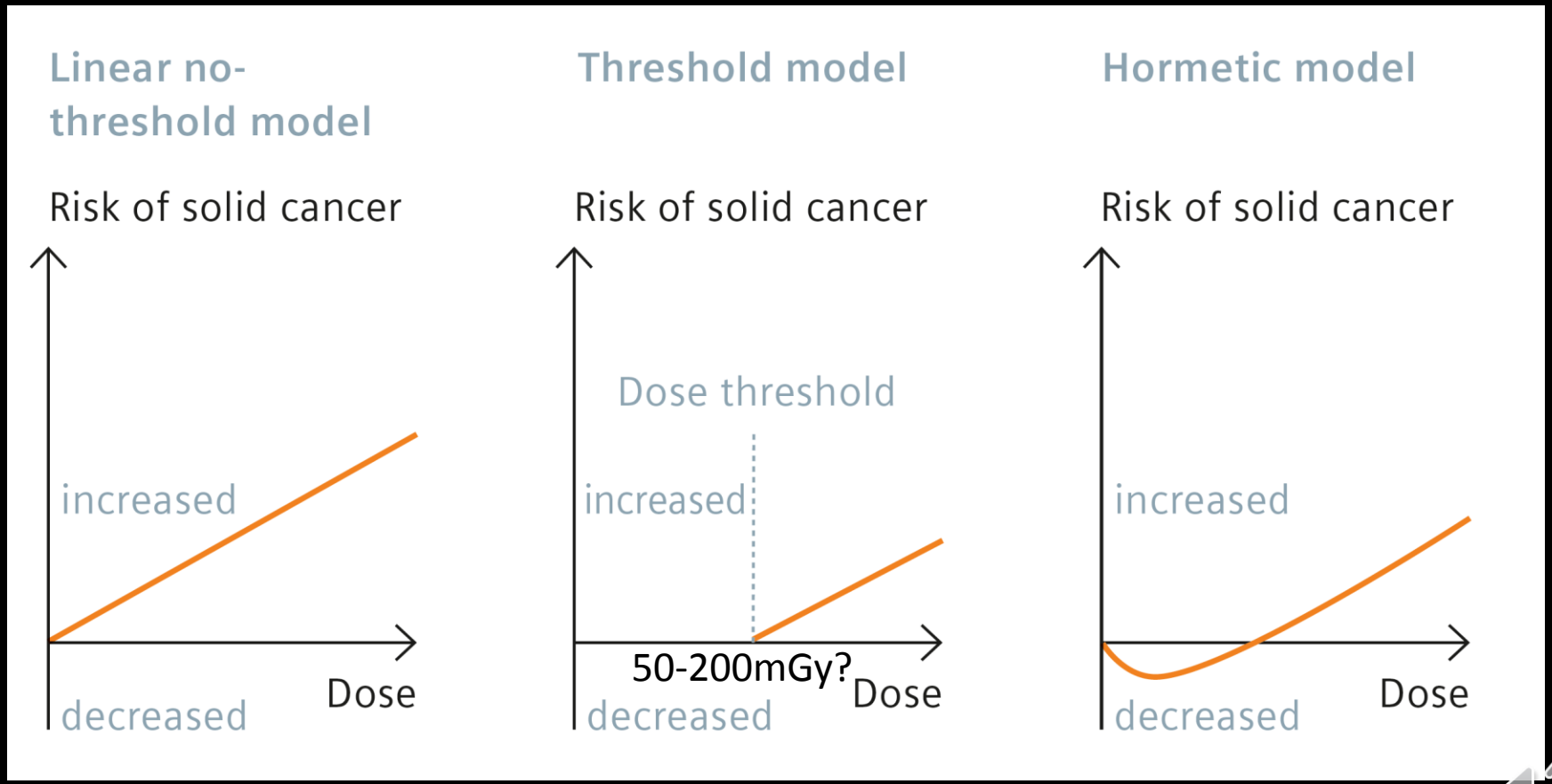
  Dosis corregida por tipo de radiación (Rayos X=1) **Sv**

- Dosis efectiva*:

  Suma ponderada de las dosis equivalentes a todos los tejidos y órganos **Sv**

*Estimación del riesgo de cáncer

Radiación ionizante a dosis bajas: Tres modelos



Chadwick y Leernout

Cohen

Brenner D, *NEJM* 2007

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

CURRENT CONCEPTS

Computed Tomography — An Increasing Source of Radiation Exposure

David J. Brenner, Ph.D., D.Sc., and Eric J. Hall, D.Phil., D.Sc.

Estudio sobrevivientes de la bomba A que recibieron 5-150 mSv
Encontró mayor incidencia de cáncer en ese grupo
Concluye que 1,5% de los cánceres en USA son atribuibles al CT

Dr. David Brenner
Professor of Radiation Biophysics
Director of the Center for Radiological Research
Columbia University Medical Center, New York.

Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study

Mark S Pearce, Jane A Salotti, Mark P Little, Kieran McHugh, Choonsik Lee, Kwang Pyo Kim, Nicola L Howe, Cecile M Ronckers, Preetha Rajaraman, Sir Alan W Craft, Louise Parker, Amy Berrington de González

Marc S. Pearce
Professor of Epidemiology
Newcastle University
RU

Pearce MS et al. *Lancet* 2012

- Primer estudio de cohorte retrospectivo en niños < 22 años (1985-2002)
- 180.000 pacientes/280.000 TC
- Se obtuvo datos de incidencia de leucemia & tumores cerebrales entre 1985-2008
- Hubo leve mayor incidencia de cáncer

- En niños <10 años, el riesgo sería 1/10.000 a 10 años plazo

	Leukaemia		Brain tumours	
	ERR per mGy	p value	ERR per mGy	p value
Sex				
Male*	0·031	0·6300	0·016	0·0850
Female	0·042		0·028	
Years since first exposure				
0–<5	0·048	0·8061	0†	0·6468
5–<10	0·033		0·025	
≥10	0·026		0·021	
Years since last exposure				
0–<5	0·052	0·3004	0†	0·1976
5–<10	0·015		0·026	
≥10	0·014		0·016	
Number of CT scans				
1	0·013	0·8013	0·007	0·1213
2–4	0·028		0·021	
≥5	0·035		0·018	
Age at exposure (years)‡				
0–<5	0·030	0·5381	0·005	0·0003
5–<10	0·072		0·028	
10–<15	−0·002		0·037	
≥15	0·049		0·041	
Years since exposure‡				
2–<5	0·055	0·5357	..	0·2399
5–<10	0·021		0·026	
10–<15	0·005		0·023	
≥15	0·026		0·005	

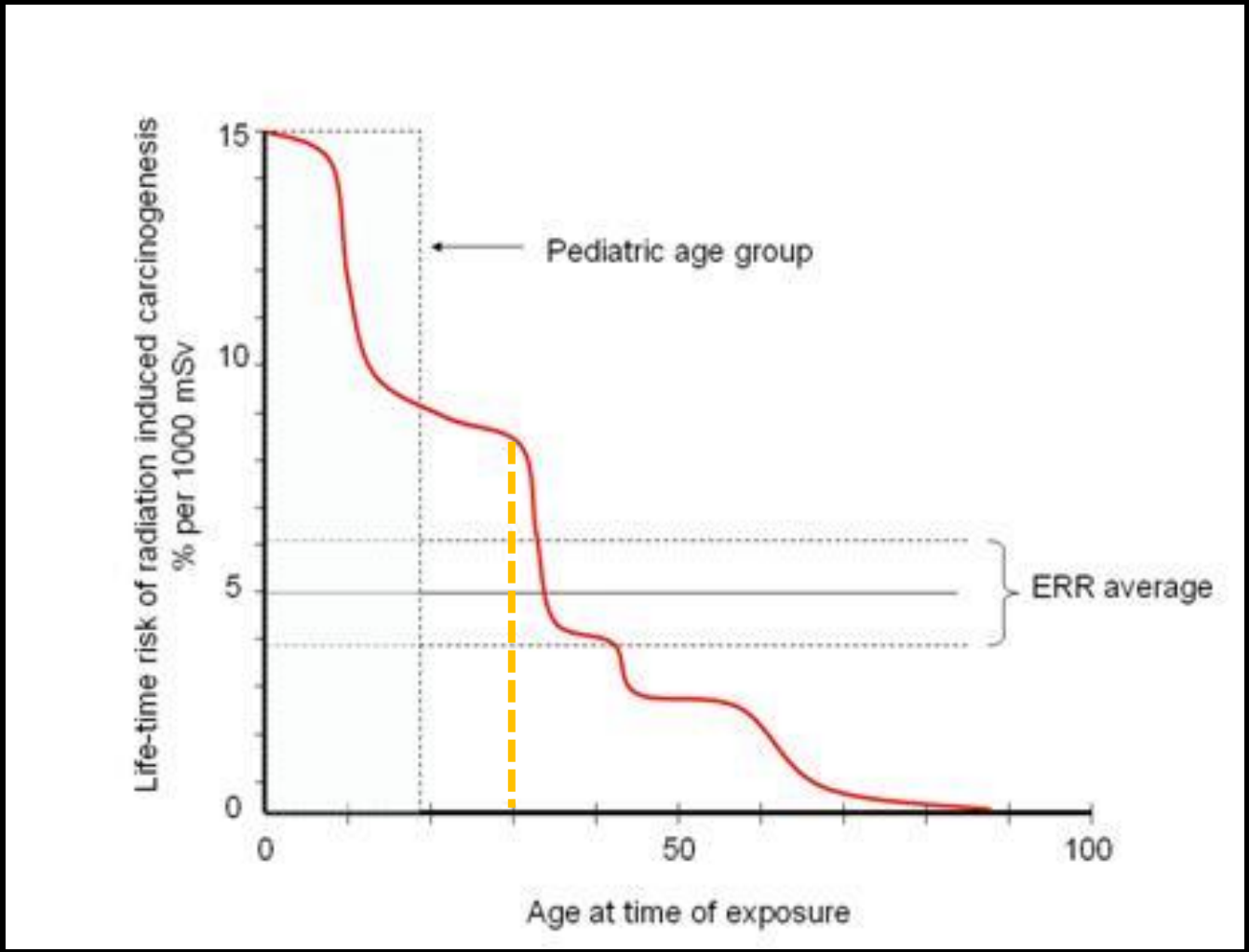
ERR=excess relative risk. ..=not applicable (follow-up started at 5 years).
*Includes individual of unknown sex. †Aliased parameter, set to zero.
‡Time-dependent variable.

Table 4: **Excess relative risk per mGy for leukaemia and brain tumours, by various personal characteristics**

*Observación: Dosis 28mGy

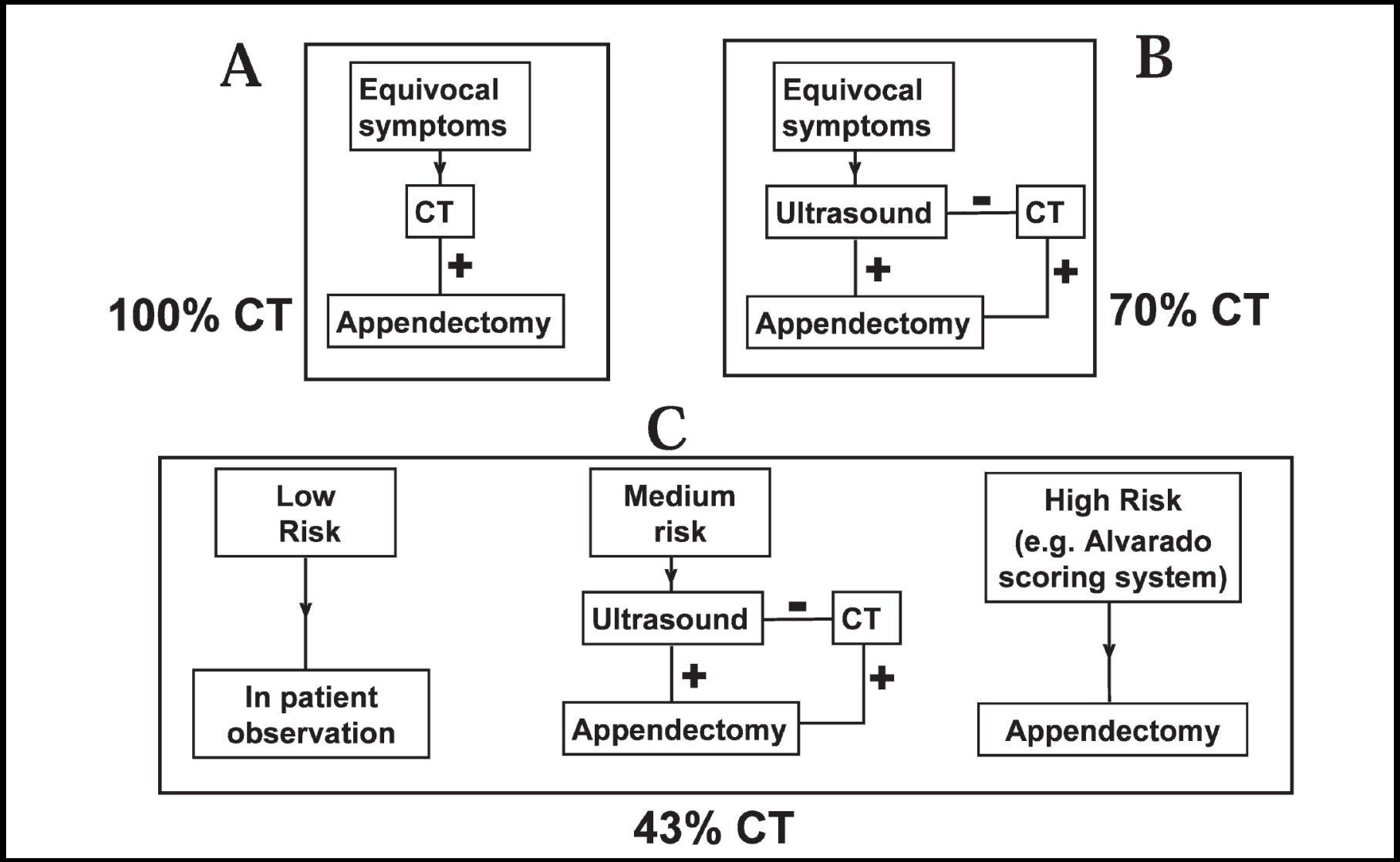
Pearce MS et al. *Lancet* 2012

Debemos proteger a la población joven (<30ª)



Tres formas de reducir la dosis colectiva de la TC

Reducción de la dosis de cada TC	Reemplazo de la TC por US o RM	Reducción de los TC innecesarios
• Protocolo ajustado a las dimensiones del paciente • Control automático exposición • Kv Bajo • Rec. iterativas	• Preferir RM en encéfalo, columna, jóvenes • US en niños , dolor abdominal	• Guías clínicas • Clinical Decision Support



Slowing the increase in the population dose resulting from CT scans
Brenner D. *Radiation Research* 2010

El principio de justificación: ALARA
As Low As Reasonably Achievable

Contents lists available at ScienceDirect

European Journal of Radiology

journal homepage: www.elsevier.com/locate/ejrad

Clinical application of 'Justification' and 'Optimization' principle of ALARA in pediatric CT imaging: "How many children can be protected from unnecessary radiation?"

Kushaljit S. Sodhi [a,*], Satheesh Krishna [a], Akshay K. Saxena [a], Anindita Sinha [a], Niranjan Khandelwal [a], Edward Y. Lee [b]

Se evitó el 8% de los estudios por no estar justificado

Sodhi, *European Journal of Radiology* 2015

¿Sabemos que dosis estamos entregando a nuestros pacientes?

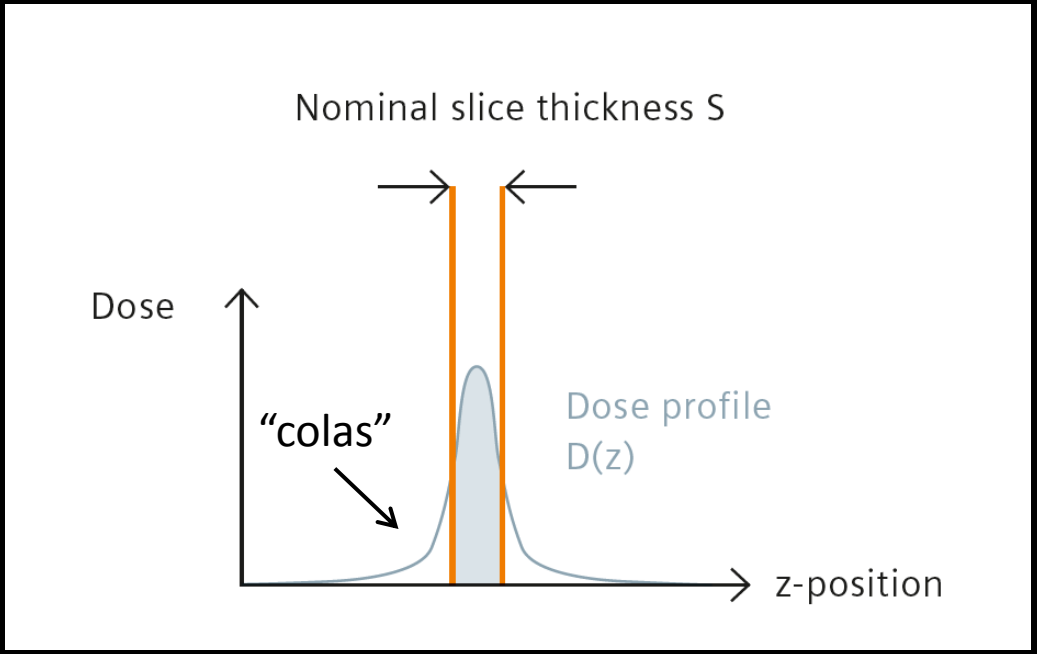
CTDI

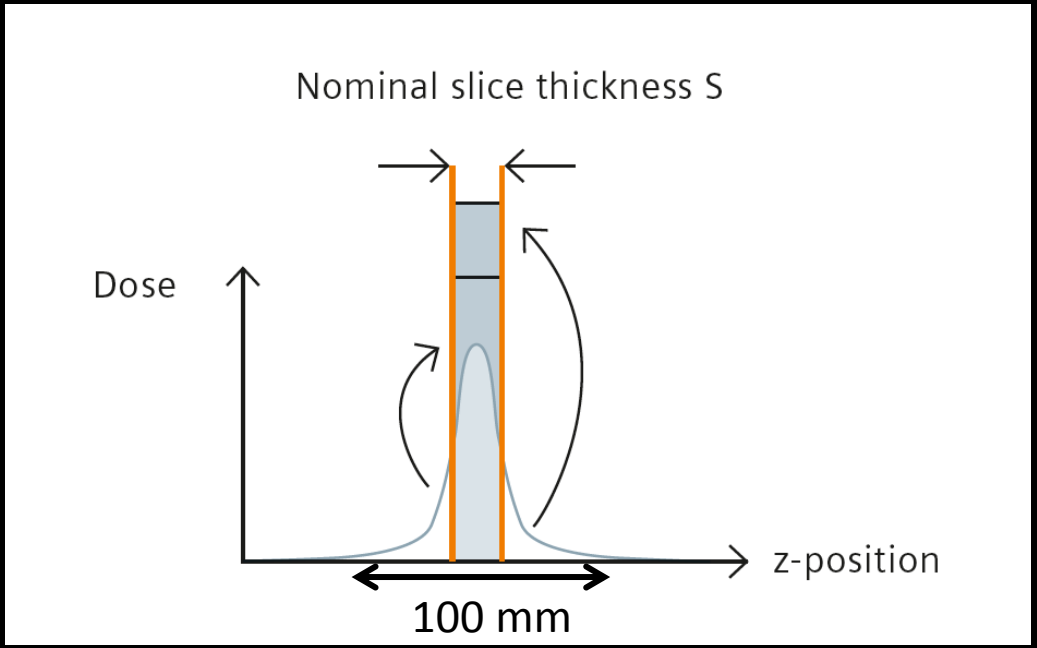
Computed tomography dose index

- El perfil de la dosis de un corte tiene “colas” en el eje z
- El CTDI es la integral de la dosis absorbida en el eje z dividida por el espesor nominal

- Se mide en mGy
- Los límites de la integral son 50 mm a cada lado del corte:

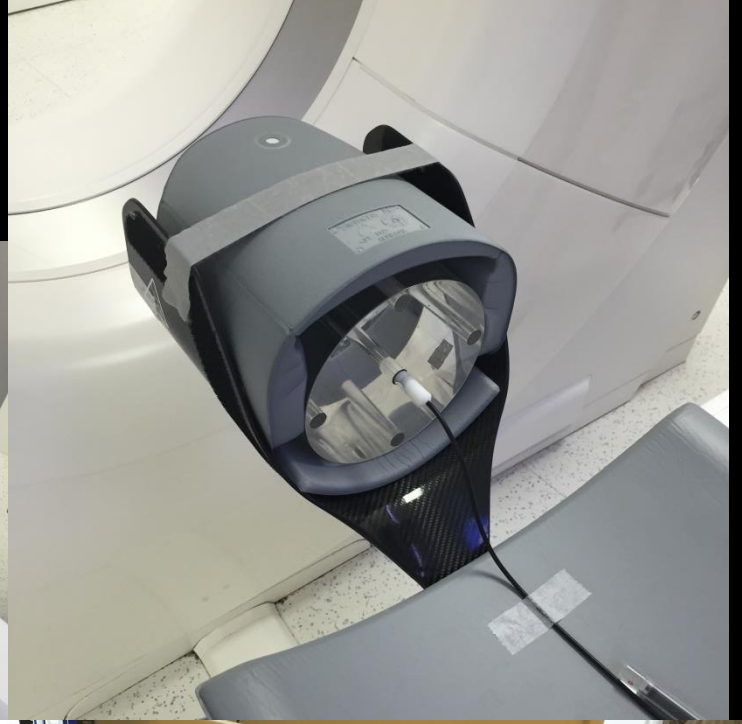
  $CTDI_{100}$



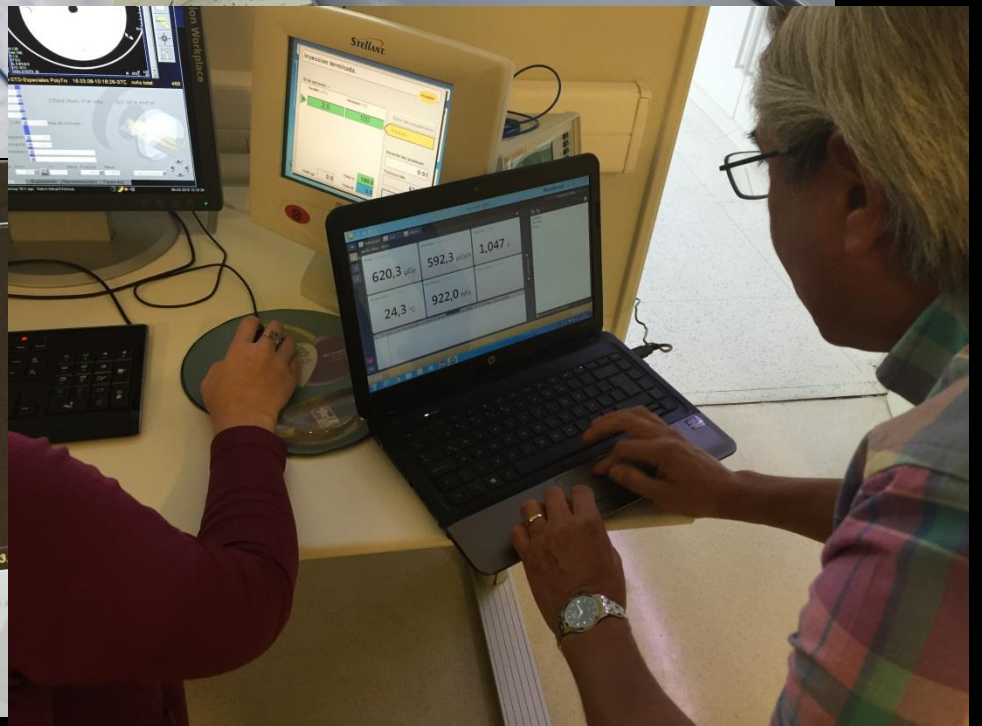


El $CTDI_{100}$ se mide con los fantomas de PMMA de la American Asociation of Physics in Medicine

Dos medidas estándar:
100 x 16 cm (S)
100 x 32 cm (L)




Paciente Aplicaciones Editar Insertar Ver Configurar Imagen Opciones Sistema Ayuda
Topograma
Topograma
Cerebro

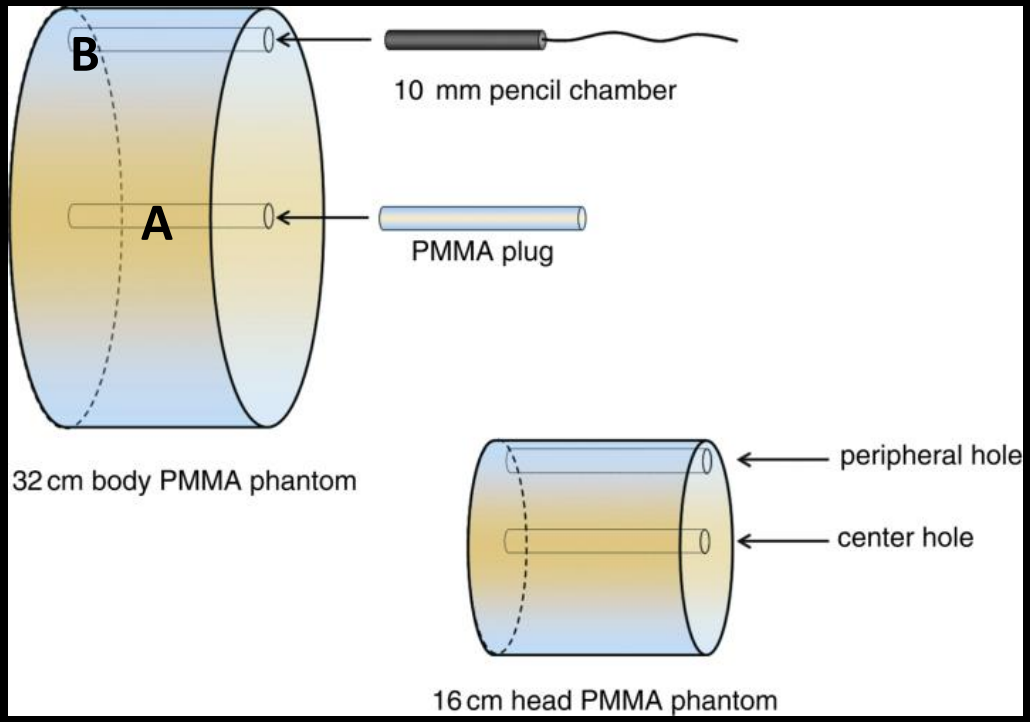

620,3
592,3
1,047
24,3
922,0

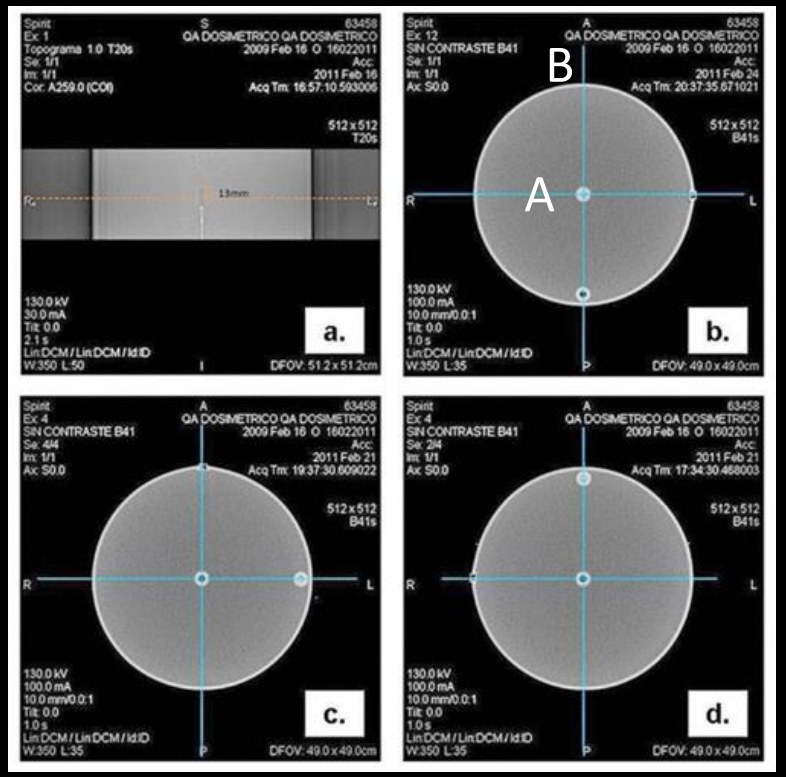
Definiciones

CTDI 100-CTDI w

$CTDI_w$ (weighted):

- $1/3\ CTDI^{A}_{100} + 2/3\ CTDI^{B}_{100}$

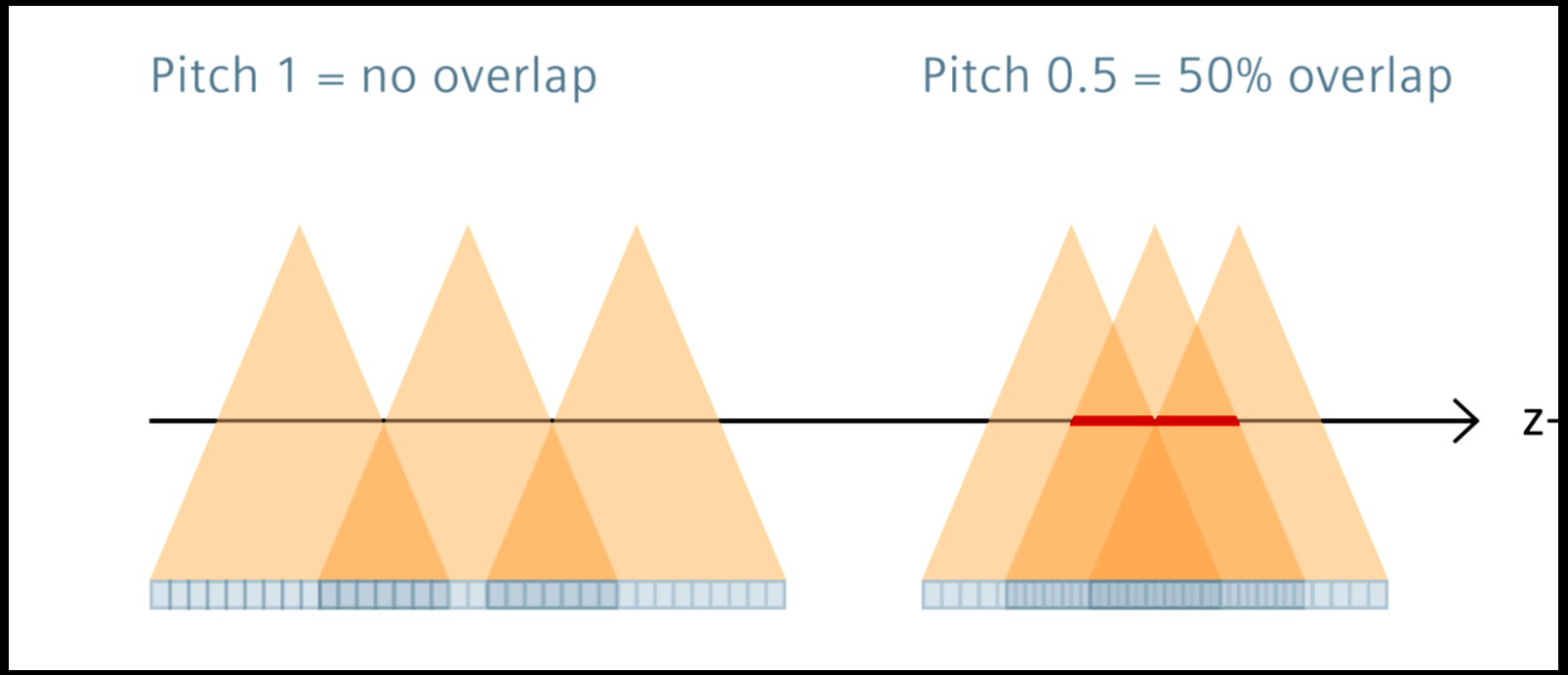




Definiciones

$CTDI_w$ -$CTDI_{vol}$

$CTDI_{vol}$ (volume)= $CTDI_w$ x 1/pitch

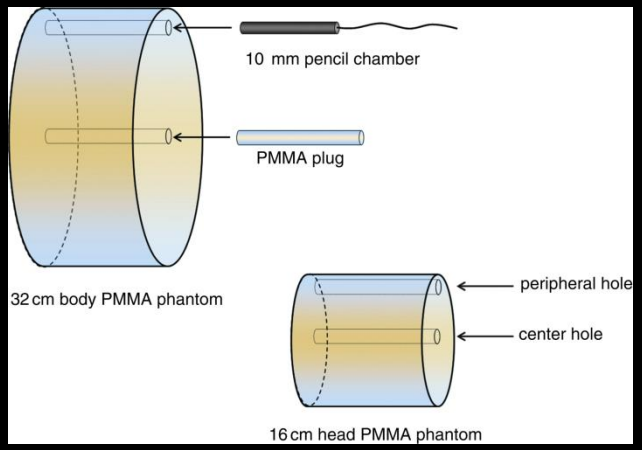


Definiciones

Computed Tomography Dose Index vs Dose Length Product

CTDIvol:

- Representa la dosis en un corte de 100 mm, ajustado al pitch
- Estandarizado con fantomas de PMMA
- 16 cm (S) y 32 cm (L)
- Se mide en mGy



DLP:

- CTDIvol x longitud del barrido
- Se mide en mGy*cm

Image –Based Dose Sheet
(Hoja de dosis basada en imagen)

mAs total 7520 DLP total 2384 mGycm

	Scan	kV	mAs / ref.	CTDIvol* mGy	DLP mGycm	TI s	cSL mm
Posición del paciente H-SP							
Topograma	1	120	36 mA	0.14 L	7	5.1	0.6
Sin-Cte	2	140	93 / 120	9.64 L	314	0.5	0.6
PreControl	3	140	50	4.46 L	4	1.0	10.0
Contraste							
Control	4	140	80	78.44 L	78	1.0	10.0
Body-Angio	15	140	401 / 500	41.33 L	1376	1.0	0.6
Venoso	16	140	179 / 230	18.45 L	605	0.5	0.6

Todos los fabricantes la tienen en diferentes formatos

Todas entregan Kv, CTDIvol y DLP

CLINICA ALEMANA
02-06-2014

Protocolo de paciente
Angiotac Renal

*: L = 32cm, S = 16cm

Reportes de dosis de TC

0Z3Y
Mar 20, 2015, 15:14:17
Total DLP: 3273.4 mGy*cm

Dose

#	Description	Scan Mode	mAs	kV	CTDIvol [mGy]	DLP [mGy*cm]
1		Surview	1	120	0.08	4.5
2	SIN CONTRASTE	Helical	398	120	25.75	1052.0
3	CON CONTRASTE	Helical	399	120	25.80	1114.3
6	TARDIOS	Helical	433	120	28.01	1102.6

Siemens

053Y
F
1.Abdomen Rutina

No.	Protocol	#of scan(s)	kVp	CTDIvol (mGy)	DLP (mGy.cm)
1	DualScano	1	120		
2	DualScano	1	120		
3	Helical	1	80	7.70 (Body)	206.40 (Body)
4	Helical	1	80	7.70 (Body)	206.40 (Body)
5	Helical	1	80	7.30 (Body)	486.70 (Body)

Toshiba

Total DLP: 3176.7 mGy*cm

Dose

#	Description	Scan Mode	mAs	kV	CTDIvol [mGy]	DLP [mGy*cm]
1		Surview	1	120	0.05	5.0
3		Surview	1	120	0.05	7.6
3		Surview	1	120	0.05	7.6
4	SIN CONTRASTE	Helical	200	120	12.94	552.6
6	locator	Stationary	N/A	120	2.63	2.6
7	tracker	Stationary	N/A	120	13.15	13.2
8		Helical	249	120	16.12	697.2
10	Venografia	Helical	200	120	12.94	1891.0

Philips

Patient ID:
LightSpeed VCT
Exam Description: CT Liver,Spleen,Panc

Dose Report

Series	Type	Scan Range (mm)	CTDIvol (mGy)	DLP (mGy-cm)	Phantom cm
1	Scout	-	-	-	-
2	Helical	I35.750-I310.750	6.17	198.28	Body 32
200	Axial	I100.000-I100.000	3.54	1.78	Body 32
3	Helical	I35.750-I310.750	6.86	220.21	Body 32
3	Helical	I35.750-I538.250	7.17	393.57	Body 32
3	Helical	I35.750-I310.750	6.85	220.05	Body 32

Total Exam DLP: 1033.89

General Electric

¿Nota alguna diferencia (calidad)?

39 a, diverticulitis, control 48 hrs

mAs total 7997 DLP total 1107 mGycm

	Scan	kV	mAs / ref.	CTDIvol* mGy	DLP mGycm
Posición del paciente H-SP					
Topograma	1	120	36 mA	0.14 L	9
Abdomen	2	100	283 / 268	11.14 L	423
Abd + C	3	100	285 / 248	11.22 L	675

1.Abdomen Rutina

No.	Protocol	#of scan(s)	kVp	CTDIvol (mGy)	DLP (mGy.cm)
1	DualScano	1	120		
2	DualScano	1	120		
3	GG-Hel	1	100	6.50 (Body)	343.60 (Body)

SURE Exposure

Conversión del DLP a dosis efectiva
k-factor

Table 3. Normalized effective dose per dose-length product (DLP) for adults (standard physique) and pediatric patients of various ages over various body regions. Conversion factor for adult head and neck and pediatric patients assume use of the head CT dose phantom (16 cm). All other conversion factors assume use of the 32-cm diameter CT body phantom[78,79]

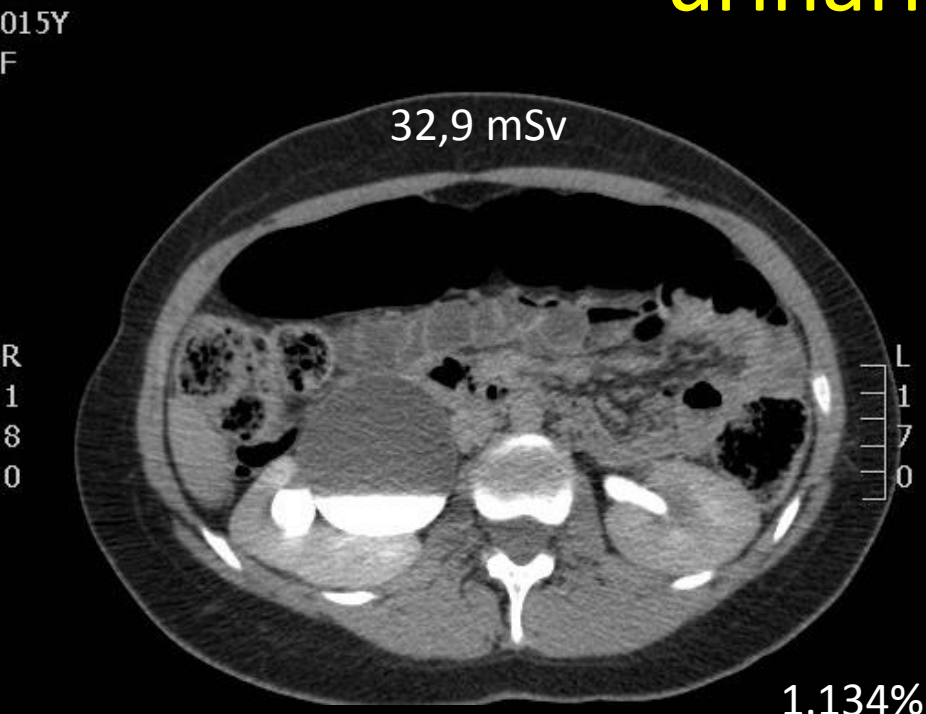
Region of Body	*k (mSv mGy^{-1} cm^{-1})*				
	0 year old	*1 year old*	*5 year old*	*10 year old*	*Adult*
Head and neck	0.013	0.0085	0.0057	0.0042	0.0031
Head	0.011	0.0067	0.0040	0.0032	0.0021
Neck	0.017	0.012	0.011	0.0079	0.0059
Chest	0.039	0.026	0.018	0.013	0.014
Abdomen & pelvis	0.049	0.030	0.020	0.015	0.015
Trunk	0.044	0.028	0.019	0.014	0.015

kVp	CTDIvol (mGy)	DLP (mGy.cm)
120		
120		
100	6.50 (Body)	343.60 (Body)

343,6 x 0,015= 5,15 mSv

Huda W. Converting Dose-Length Product to Effective Dose at CT. *Radiology* 2008

15 y 17 a, obs. Malformación de la vía urinaria: UroTC



32,9 mSv

2,9 mSv

1.134% más dosis

92% reducción

etal DLP: 2198.0 mGy*cm
Estimated Dose Savings: 31%

Dose

#	Description	Scan Mode	mAs	kV	CTDIvol [mGy]	DLP [mGy*cm]	Phantom Type[cm]
1		Surview	1	120	0.08	4.2	BODY 32
2		Helical	215	120	13.89	732.2	BODY 32
3	locator	Stationary	N/A	120	2.63	2.6	BODY 32
4	tracker	Stationary	N/A	120	23.67	23.7	BODY 32
5	Fase Arterial	Helical	126	120	8.15	298.1	BODY 32
6	Fase Portal	Helical	177	120	11.44	601.6	BODY 32
7	Eliminación	Helical	155	120	10.02	535.6	BODY 32

No.	Protocol	#of scan(s)	kVp	CTDIvol (mGy)	DLP (mGy.cm)
1	DualScano	1	120		
2	DualScano	1	120		
3	GG-Hel	1	100	4.00 (Body)	195.70 (Body)

SURE Exposure

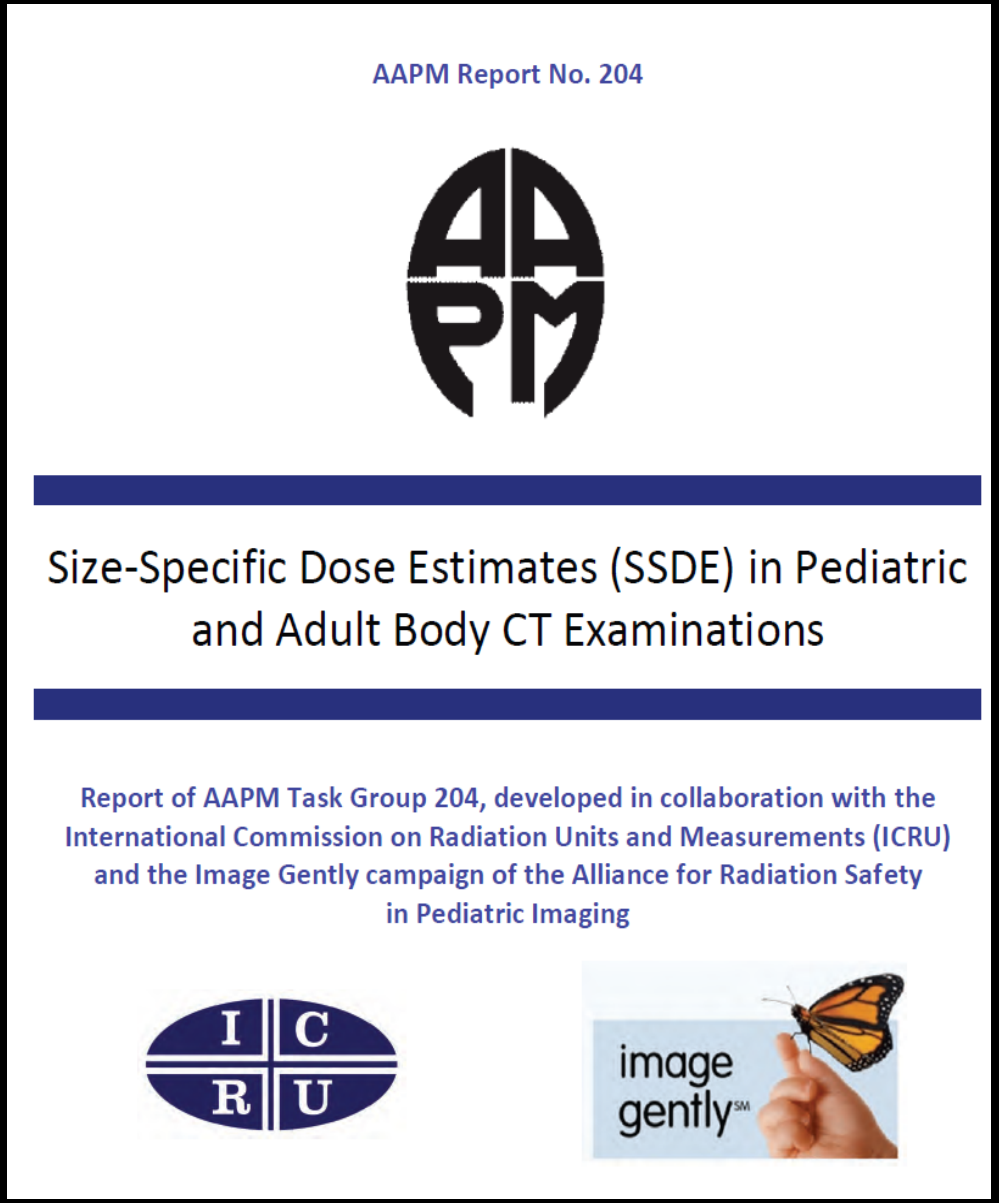
No.	Name	SD	SURE IQ	Image Thickness	Recon FC	Dose Reduction	XY
3	Estandar	10.00	Cuerpo:Std. A...	5.0	FC18	AIDR3D STD	3D

$CTDI_{vol}$ y DLP no expresan dosis al paciente

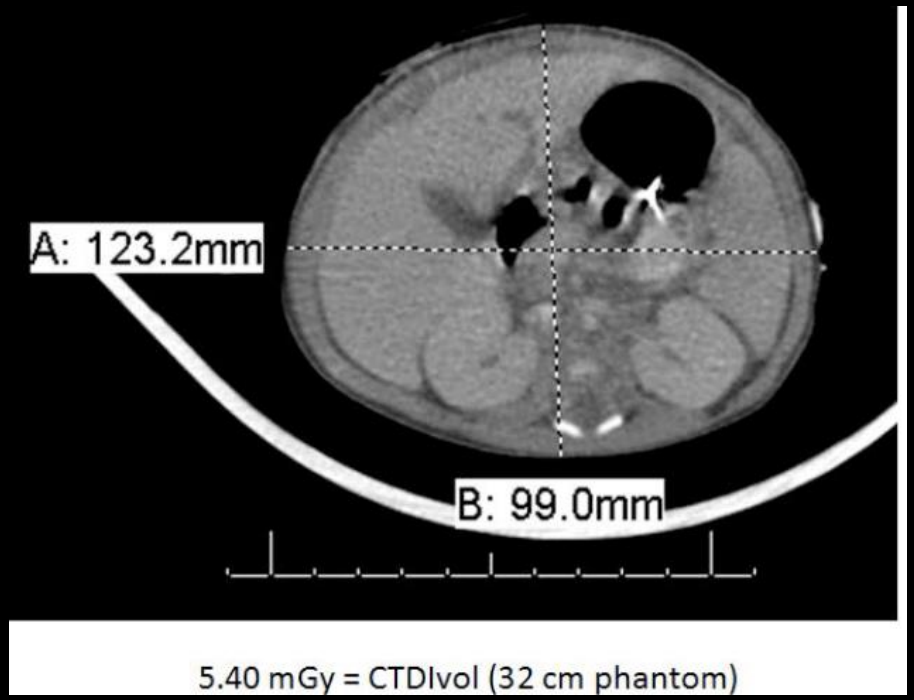
- La Dosis Efectiva es poblacional, no individual
- El factor de conversión *K* está calculado a partir de un fantoma antropométrico idealizado
- $CTDI_{vol}$ y DLP expresan radiación *emitida*, sin diferenciar el tamaño del paciente

Size Specific Dose Estimates (SSDE)

- Estimación de dosis al paciente considerando el tamaño, medido en base a los diámetros AP y L



Cómo se calcula el SSDE



12,32 +9,9 cm=
22 cm

SSDE: 5,4 mGy x 2,5= 13 mGy

El SSDE no debe usarse para calcular el DLP ni la dosis efectiva

Table 1A

Lat+AP Dim (cm)	Effective Dia (cm)	Conversion Factor
16	7.7	2.79
18	8.7	2.69
20	9.7	2.59
22	10.7	2.50
24	11.7	2.41
26	12.7	2.32
28	13.7	2.24
30	14.7	2.16
32	15.7	2.08
34	16.7	2.01
36	17.6	1.94
38	18.6	1.87
40	19.6	1.80
42	20.6	1.74
44	21.6	1.67
46	22.6	1.62
48	23.6	1.56
50	24.6	1.50
52	25.6	1.45
54	26.6	1.40
56	27.6	1.35
58	28.6	1.30
60	29.6	1.25
62	30.5	1.21
64	31.5	1.16
66	32.5	1.12
68	33.5	1.08

Table 1B

Lateral Dim (cm)	Effective Dia (cm)	Conversion Factor
8	9.2	2.65
9	9.7	2.60
10	10.2	2.55
11	10.7	2.50
12	11.3	2.45
13	11.8	2.40
14	12.4	2.35
15	13.1	2.29
16	13.7	2.24
17	14.3	2.19
18	15.0	2.13
19	15.7	2.08
20	16.4	2.03
21	17.2	1.97
22	17.9	1.92
23	18.7	1.86
24	19.5	1.81
25	20.3	1.76
26	21.1	1.70
27	22.0	1.65
28	22.9	1.60
29	23.8	1.55
30	24.7	1.50
31	25.6	1.45
32	26.6	1.40
33	27.6	1.35
34	28.6	1.30

Table 1C

AP Dim (cm)	Effective Dia (cm)	Conversion Factor
8	8.8	2.68
9	10.2	2.55
10	11.6	2.42
11	13.0	2.30
12	14.4	2.18
13	15.7	2.08
14	17.0	1.98
15	18.3	1.89
16	19.6	1.81
17	20.8	1.73
18	22.0	1.65
19	23.2	1.58
20	24.3	1.52
21	25.5	1.45
22	26.6	1.40
23	27.6	1.34
24	28.7	1.29
25	29.7	1.25
26	30.7	1.20
27	31.6	1.16
28	32.6	1.12
29	33.5	1.08
30	34.4	1.05
31	35.2	1.02
32	36.0	0.99
33	36.8	0.96
34	37.6	0.93

Que dice la industria

- *Currently, there is no accepted nor easily achievable method to calculate actual absorbed radiation dose to an individual patient's organs.*

- *Although significant progress has been made and there are solutions on the market that will currently calculate SSDE, timelines for implementation on CT systems will depend on accepted scientific consensus and standardization.*

2014 Annual Report, European Coordination Committee of the Radiological, Electromedical and Healthcare Industry

CT Manufacturers Voluntary Commitment Regarding CT Dose

General Electric-Siemens-Toshiba-Philips

¿Cómo registrar y procesar la información de dosis?

Modality Performed Procedure Steps (MPPS)

Radimetrics solution Bayer

Radiance free software Optical character recognition (OCR)

Total DLP: 2198.0 mGy*cm
Estimated Dose Savings: 31%

Dose

#	Description	Scan Mode	mAs	kV	CTDIvol [mGy]	DLP [mGy*cm]	Phantom Type[cm]
1		Surview	1	120	0.08	4.2	BODY 32 CM
2		Helical	215	120	13.89	732.2	BODY 32 CM
3	locator	Stationary	N/A	120	2.63	2.6	BODY 32 CM
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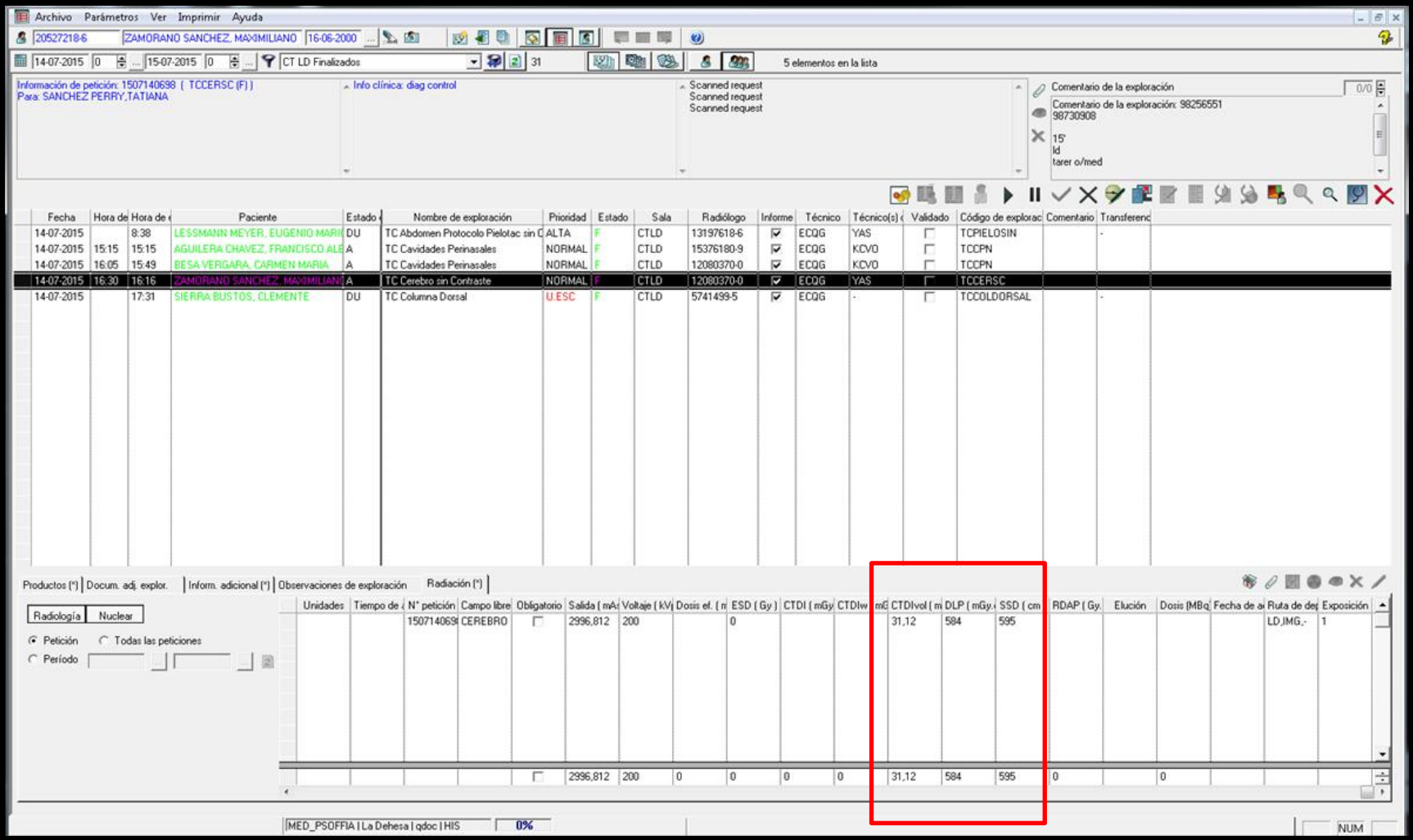
5	Fase Arterial	Helical	126	120	8.15	298.1	BODY 32 CM
6	Fase Portal	Helical	177	120	11.44	601.6	BODY 32 CM
7	Eliminación	Helical	155	120	10.02	535.6	BODY 32 CM

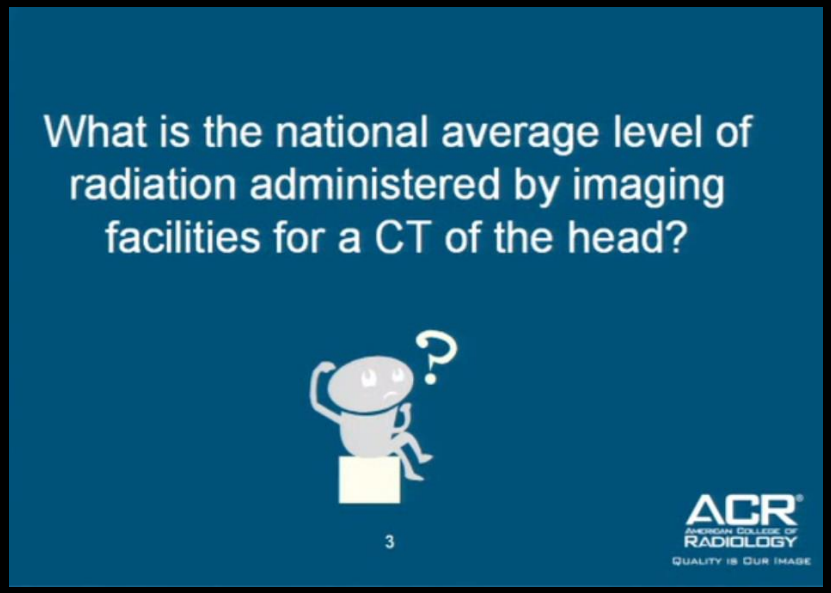
Registro de dosis en el RIS a través de un servicio DICOM (*MPPS-Modality Performed Procedure Step*)

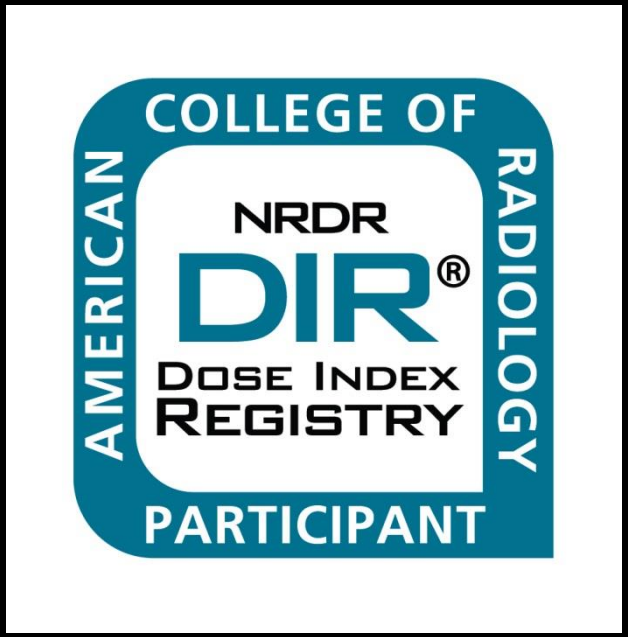
CT → MPPS DICOM RDSR → **RIS**



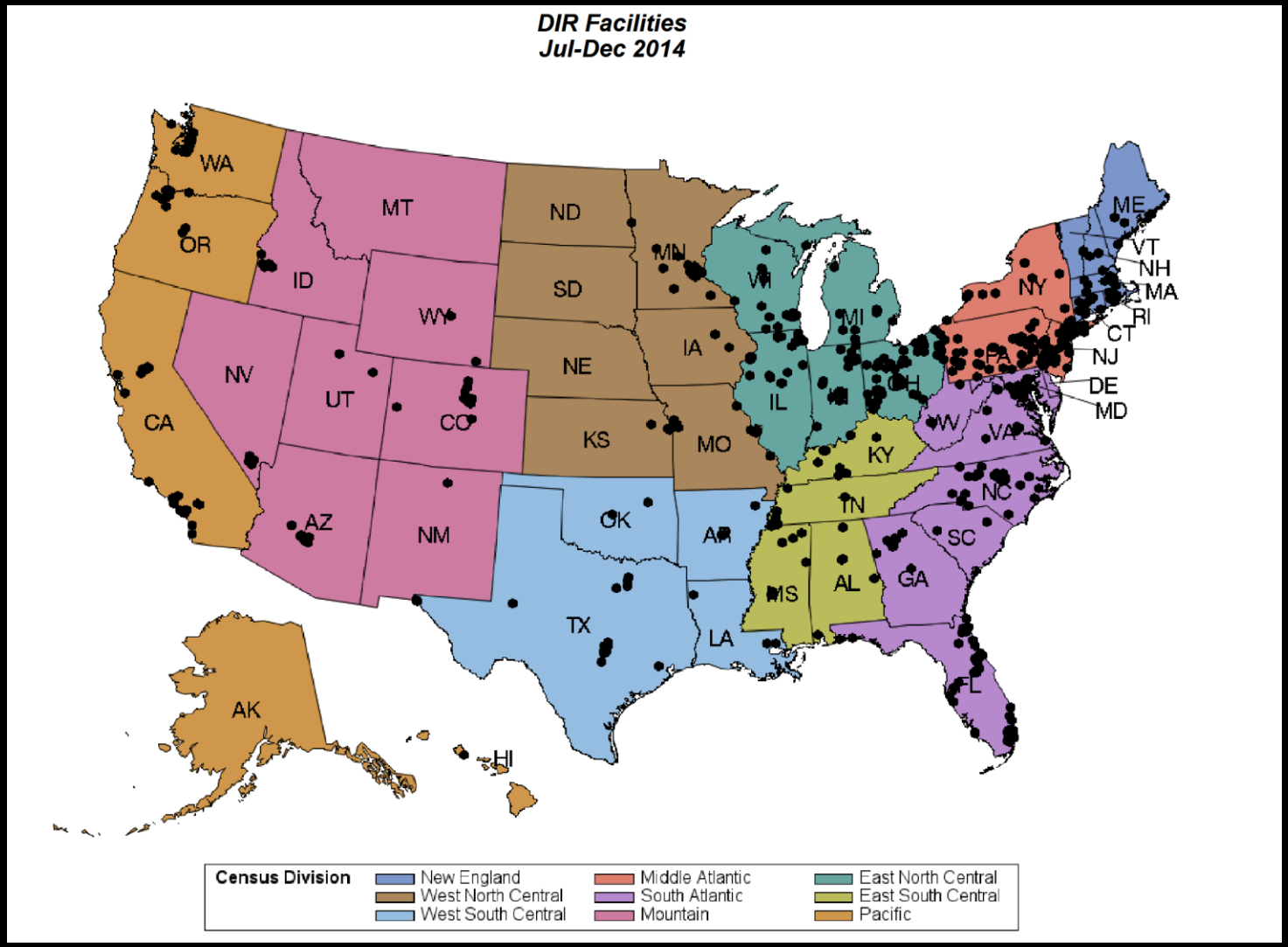
Registros internacionales de dosis

- Dose Index Registry- American College of Radiology





En Diciembre de 2013 se habían recolectado 5,5 millones de exámenes



*Executive Summary DLP Per Scan (mGy*cm): Facility 999999*

	1: Site 999999		2: All DIR sites		3: Sites in location Metropolitan		4: Sites in division South Atlantic		5: Sites of type Freestanding center	
RPID Shortname	**N**	**(25th-Med-75th)**	**N**	**(25th-Med-75th)**	**N**	**(25th-Med-75th)**	**N**	**(25th-Med-75th)**	**N**	**(25th-Med-75th)**
CT ABDOMEN	1	(161/161/161)	15034	(472/706/1048)	7583	(402/630/962)	6094	(555/783/1098)	650	(296/467/672)
CT ABDOMEN PELVIS			26850	(397/592/860)	19024	(391/604/877)	572	(722/980/1403)	2548	(440/626/872)
CT ABDOMEN PELVIS KIDNEY WO IVCON	37	(477/545/844)	38692	(367/582/880)	21724	(329/551/858)	10757	(433/645/907)	2735	(332/501/692)
CT ABDOMEN PELVIS UROGRAPHY WO THEN W IVCON	97	(571/747/961)	10602	(446/657/935)	5465	(403/618/945)	1268	(463/672/927)	4037	(406/590/818)
CT ABDOMEN PELVIS W IVCON	1070	(512/599/725)	376708	(408/624/945)	217191	(417/627/948)	79694	(434/650/957)	29495	(423/610/868)
CT ABDOMEN PELVIS WO IVCON	384	(480/599/866)	158934	(431/651/973)	78633	(445/659/985)	34213	(445/685/1023)	9950	(380/572/821)
CT ABDOMEN PELVIS WO THEN W IVCON	145	(467/600/745)	23990	(459/697/990)	12294	(488/735/1007)	4554	(483/759/1106)	5772	(374/559/793)
CT ABDOMEN W IVCON	219	(352/468/701)	16638	(293/491/716)	8903	(279/469/724)	2944	(286/470/726)	2244	(242/386/586)
CT ABDOMEN WO IVCON	52	(305/422/620)	10555	(330/544/801)	6575	(336/541/776)	1617	(301/519/788)	1400	(258/426/659)
CT C SPINE W IVCON	72	(326/414/539)	13242	(247/372/509)	8859	(241/390/516)	769	(382/485/642)	408	(273/373/568)
CT C SPINE WO IVCON	107	(188/264/340)	96565	(327/473/709)	48228	(347/528/758)	19728	(349/502/755)	3954	(284/418/565)
CT CHEST	2	(238/243/247)	26112	(208/330/526)	20035	(199/314/516)	4482	(239/356/518)	5705	(157/228/363)
CT CHEST ABDOMEN PELVIS W IVCON	212	(433/584/770)	75533	(466/711/1069)	56359	(468/713/1077)	12338	(560/917/1320)	5283	(453/654/920)
CT CHEST ABDOMEN W IVCON	8	(327/438/650)	10081	(411/623/940)	8800	(424/638/954)	1024	(378/624/901)	1135	(413/649/1042)
CT CHEST ANGIO W IVCON	64	(310/353/517)	40794	(316/485/713)	18888	(326/510/736)	13813	(323/464/685)	2178	(293/456/658)

Dose efetiva(E)
E = DLP x Fator de Conve

Esp. Soluções Clínicas CT – Siemens Healt

TOSHIBA

ueves 23.7.2015

0.15 horas.

esentacion de In

edio de contraste

owsens.

.Giorgio Alagna.

mpresa Tecnoimag

NIVELES DIAGNOSTICOS DE REFERENCIA (DRL)
American College of Radiology-Dose Index Registry Diciembre 2014

Dose-Length –Product (DLP) mGy*cm

Organo	Percentil 25	Mediana	Percentil 75
Encéfalo s/c	723	877	1028
Cuello c/c	321	447	602
Tórax s/c	208	330	526
Abdomen y pelvis sc	397	592	860
Abdomen y pelvis s/c y c/c	459	697	990
Columna lumbar s/c	471	721	1038
Cavidades paranasales s/c	178	305	505
Angio-TC art pulmonares	248	386	567

12.1.4 Reconstruction functions

The reconstruction function can be selected from among those shown below.

(1) For scanoscopy
Smooth FL01 FL02 FL03 Sharp FL04

(2) For the abdomen (with BHC processing)*1
Smooth FC01 FC02 FC03 FC04 Sharp FC05

(3) For the abdomen (with BHC processi
Smooth FC07 FC08 Sharp FC09

The contours are mu enhanced in *2 and *1 *1 and *3.

(4) For the abdomen (without BHC processing)*3
Smooth FC11 FC12 FC13 FC14 Sharp FC15

(5) For the abdomen (without BHC processing)*4
Smooth FC17 FC18 Sharp FC19

(6) For the head (with BHC processing)*5
Smooth FC20 FC21 FC22 FC23 FC24 FC25 Sharp FC26*7

*7: Contrast enhancement

(7) For the head (with BHC processing)*6
Smooth FC62 FC63 FC64 FC65 FC66 FC67 Sharp FC68*7

The image quality of *6 is sharper than that of *5.

*7: Contrast enhancement

(8) For the head (without BHC processi
Smooth FC41 FC42 FC43 Sharp FC44

(9) For bone*8
Smooth FC30 Sharp FC31

(10) For bone*9
FC35

The image quality of *9 is sharper than that of *8.

(11) For the inner ear and bo
Smooth FC80 Sharp FC81

(12) For the pediatric head (without BHC processing)
Smooth FC46 FC47 FC48 Sharp FC49*7

*7: Contrast enhancement

(13) For the lung fields*10
Smooth FC50 FC51 FC52 Sharp FC53

(14) For the lung fields*11
Smooth FC55 Sharp FC56

The image quality of *11 is sharper than that of *10.

(15) For high resolution for the lung fields
Smooth FC83 FC84 FC85 Sharp FC86

(16) For Xe-Study
FC60

NOTE: BHC (Beam Hardening Correction) processing

This processing reduces artifacts such as cupping artifacts of the head and CT number reduction at the apex of the lung, caused by X-ray beam hardening due to bones.
It is recommended that BHC processing be used for reconstruction of data obtained by head scanning.

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VACACIONES A. [illegible]RGAS.

	AM		PM	
	TM	REEMPLAZO	TM	REEMPLAZO
LUNES				

DRL Europeos (límite superior)

Región	Año	Origen	CTDIvol	DLP
Encéfalo	2010	Alemania	60	950
	2010	Suiza	65	1000
	2011	RU	62	970
	2002	Suecia	75	1200
Tórax	2008	Suiza	15	450
	2010	Francia	15	475
	2011	RU	14	580
Abdomen	2002	Alemania	14,6	635
	2008	Francia	17	800
	2010	Bélgica	17,1	830
	2003	RU	15,3	534

Public Health England

Niveles de referencia de dosis (DRL):
Corresponden al percentil 75 de una encuesta nacional sobre la práctica clínica.

Doses from Computed Tomography (CT) Examinations in the UK – 2011 Review

www.gov.uk/government/publications/doses-from-computed-tomography-ct-examinations-in-the-uk

TABLE 12 Trends in national reference doses for common CT examinations on adults

Examination (clinical indication)	Region/ technique	National reference doses for the UK					
		$CTDI_{vol}$ per sequence (mGy)			DLP per exam (mGy cm)		
		1999[a]	2003[b]	2011[c]	1999[a]	2003[b]	2011[c]
Head[d] (acute stroke)	Post fossa	–	65/100	80	–	–	–
	Cerebrum	–	55/65	60	–	–	–
	Brain (whole)	–	–	60	–	–	–
	Whole exam	(60[e,f])	–	–	1050[f]	760/930	970
Chest[g] (lung cancer)	Lung	(30[e,f])	10/13	–	–	–	–
	Liver	(35[e,h])	11/14	–	–	–	–
	Whole exam	–	–	12	650[f]	430/580	610
Chest – high resolution[g] (interstitial lung disease)	Axial only	–	–	4	–	–	140
	Helical only	–	–	12	–	–	350
	Whole exam	(35[e,h])	3/7	–	280[h]	80/170	–
Abdomen[g] (liver metastases)	Whole exam	(35[e,h])	13/14	14	900[h]	460/470	910
Abdomen and pelvis[g] (abscess)	Whole exam	(35[e,f])	13/14	15	780[f]	510/560	745
Chest-abdomen-pelvis[g] (cancer)	Whole exam	–	12/14	–	–	760/940	1000

Definiciones de dosis en TC

- Dosis estándar: Es la dosis recomendada por el fabricante percentil *P75*
- Dosis optimizada: Es una dosis que no entrega una imagen “perfecta” pero es adecuada para diagnóstico-ALARA *P25-50*
- Dosis baja: Similar que una serie de radiografías, con mucho ruido, pero suficiente para diagnosticar *P10*

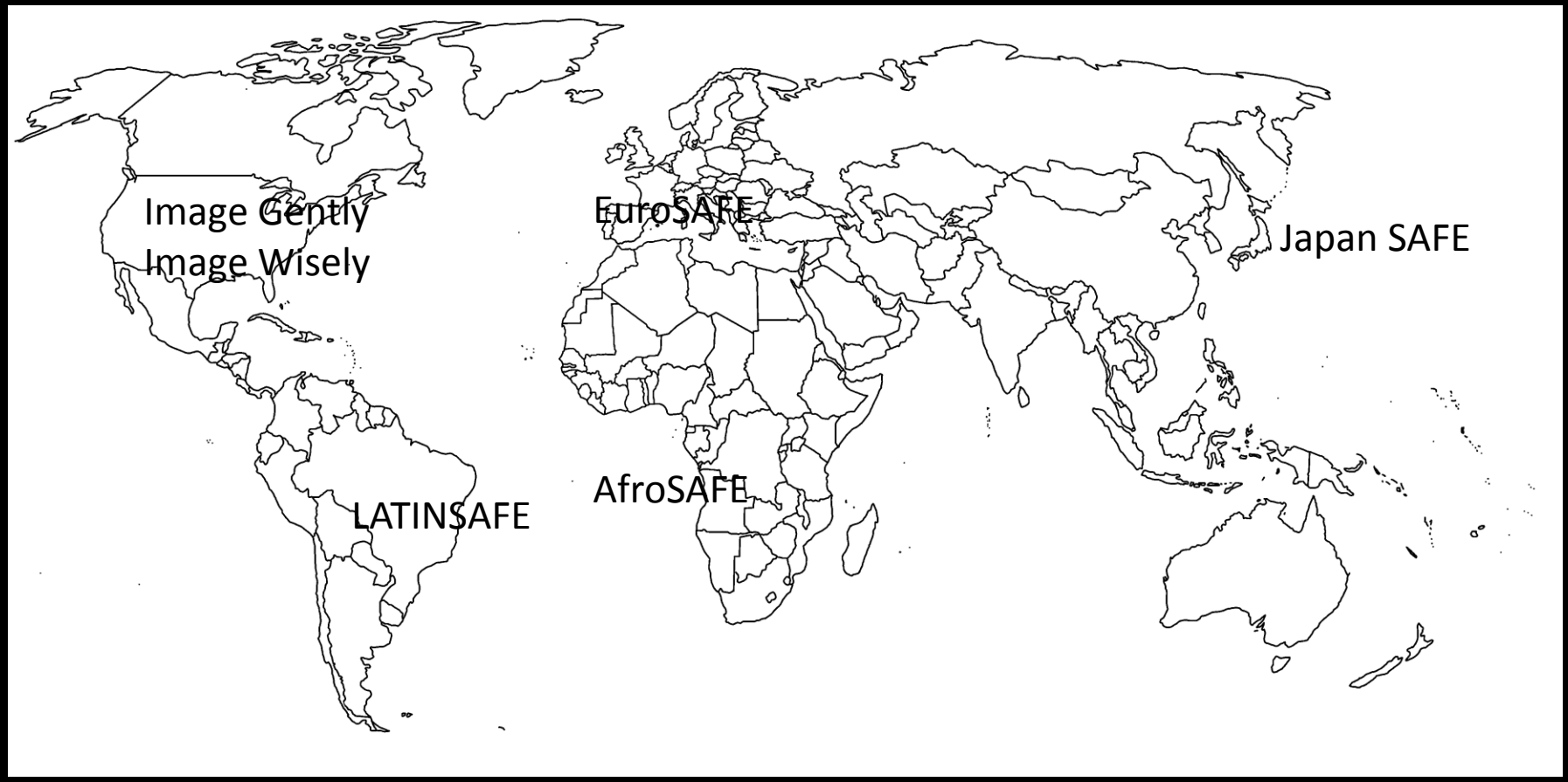
La ley de TC de California

- Ley aprobada por el senado el 2012
- Senadores Alex Padilla y Bonnie Lowenthal
- Exige:
- Registro de dosis (CTDIvol y DLP)
- Envio electrónico al PACS
- Registro en el informe
- Control de calidad anual por físico (dosis medida no > 20% dosis reportada)
- Acreditación del centro

La ley de CA exige enviar un informe al Dpto de Salud si:

- La dosis efectiva de una TC sobrepasa 50 mSv
- Si se irradia otra parte del cuerpo
- Si hay daño físico (eritema)
- Si se irradia la persona equivocada o el campo equivocado
- Si se irradia al feto con >50mSv

Campañas y alianzas de organizaciones de radiólogos



Cambio de paradigma: Radioprotección del trabajador-radioprotección del paciente

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ESR EUROSAFE IMAGING

ESR European Society of Radiology

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News

EuroSafe Imaging at World Health Assembly 2015

Posted May 27, 2015

The ESR was represented on the panel of a side-event entitled 'Imaging for Saving Kids – the Inside Story about Patient Safety in Paediatric Radiology' initiated and co-organised by the International Society of Radiology (ISR) at the WHO World Health Assembly in Geneva on May 26.

The mission of EuroSafe Imaging is to support and strengthen medical radiation protection across Europe following a holistic, inclusive approach.

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IAEA | Radiation Protection of Patients (RPOP)

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Launching of AFROSAFE

AFROSAFE is a campaign made by the Pan African Congress of Radiology and Imaging (PACORI) and other radiation health workers in Africa. The campaign was launched during the 8th Scientific Congress of the PACORI. The colourful ceremony was presided over by the Director of Medical Services, Ministry of Health, Kenya Dr. Nicholus Muraguri. The minister pledged the support of government towards the realization of AFROSAFE objectives. Present were other dignitaries and representatives from IAEA, WHO, ISR, ISRRT.

AFROSAFE's main objective is to unite with a common goal, to identify and address issues arising from radiation protection in medicine in Africa. The genesis of this campaign is the joint position statement by the IAEA and WHO known as the Bonn Call-for-Action which was released in 2013. The vision of AFROSAFE is: All radiation-based medical procedures in Africa appropriate and safely performed. AFROSAFE plans to achieve its goals through supporting adherence to policies, strategies and activities for the promotion of radiation safety.

More Information »

Resumen

- No podemos sustraernos a la preocupación mundial por reducir y/ optimizar las dosis de radiación en TC
- Requiere conocimiento de las dosis empleadas en la práctica local, un registro acucioso y su auditoría permanente
- Es indispensable conocer a fondo las herramientas tecnológicas que ofrece la industria e implementarlas activamente