



Hipertensión Arterial en Pediatría

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Introducción

- **¿por qué un pediatra debe saber sobre HTA?**
 - Porque la HTA secundaria es más frecuente en pediatría (existe una causa potencialmente corregible).
 - Los casos de HTA primaria aumentan (adolescentes obesos, dieta, Hx. Familiar).
 - 3-5% de la población pediátrica
Diagnosing Hypertension in Children. Medscape. May 02, 2016
 - 19% EEUU, 17% Brasil, 15% Grecia
N Engl J Med 2014;370:2316-25

Objetivos

- Familiarizarnos con la forma correcta de medición de la presión arterial en niños
- Conocer la forma correcta de utilizar las tablas de P/A en niños.
- Revisar principios fisiopatológicos relevantes.
- Revisar los protocolos de tratamiento más comunes.



Caso 1



- 5 años de edad, 20 Kg, talla 106 cm
- Hace dos semanas tuvo faringoamigdalitis, ayer amaneció hinchado, la orina es color té o coca cola
- creatinina sérica 1 mg/dL
Orina: GR campos llenos, cilindros hemáticos
- Albúmina: 3.5 mg/dL,
colesterol 150: mg/dL
proteína/creatinina: 0.5

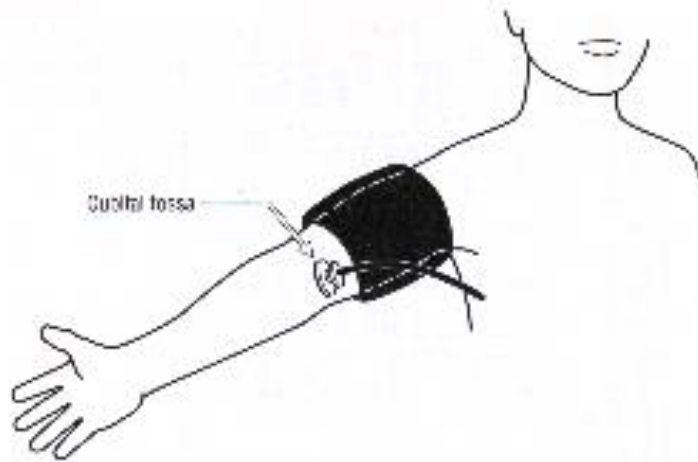
Caso 1



1. ¿está el paciente hipertenso?

Medición de la P/A

a. Tamaño del Brazaletes



- Task Force 1977: $2/3$ de la longitud del brazo
- Task Force 1987 : $3/4$ de la longirud del brazo
- Task Force 1997: el ancho del brazalete es el 50% de la circunferencia del brazo
- Longitud 80-100%

Medición de la P/A.

a. Tamaño del Brazaletes



Tamaños de Brazalete

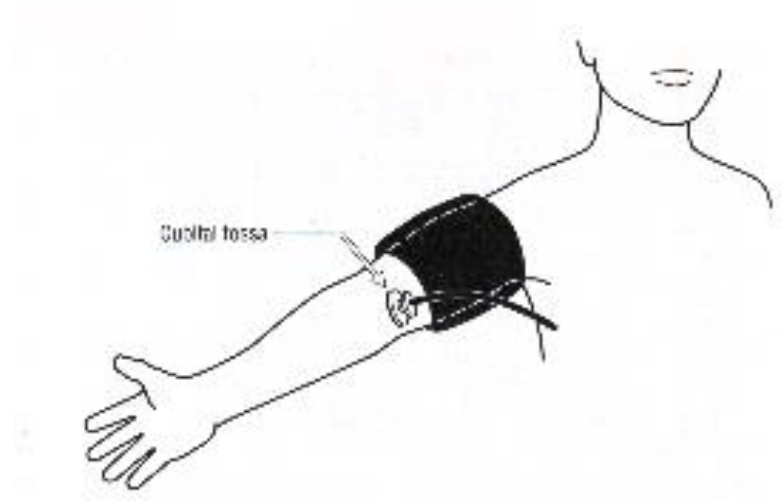
Table 1. Recommended Dimensions for Blood Pressure Cuff Bladders

Age Range	Width (cm)	Length (cm)	Max Arm Circumference (cm)
Newborn	4	8	10
Infant	6	12	15
Child	9	18	22
Small adult	10	24	26
Adult	13	30	34

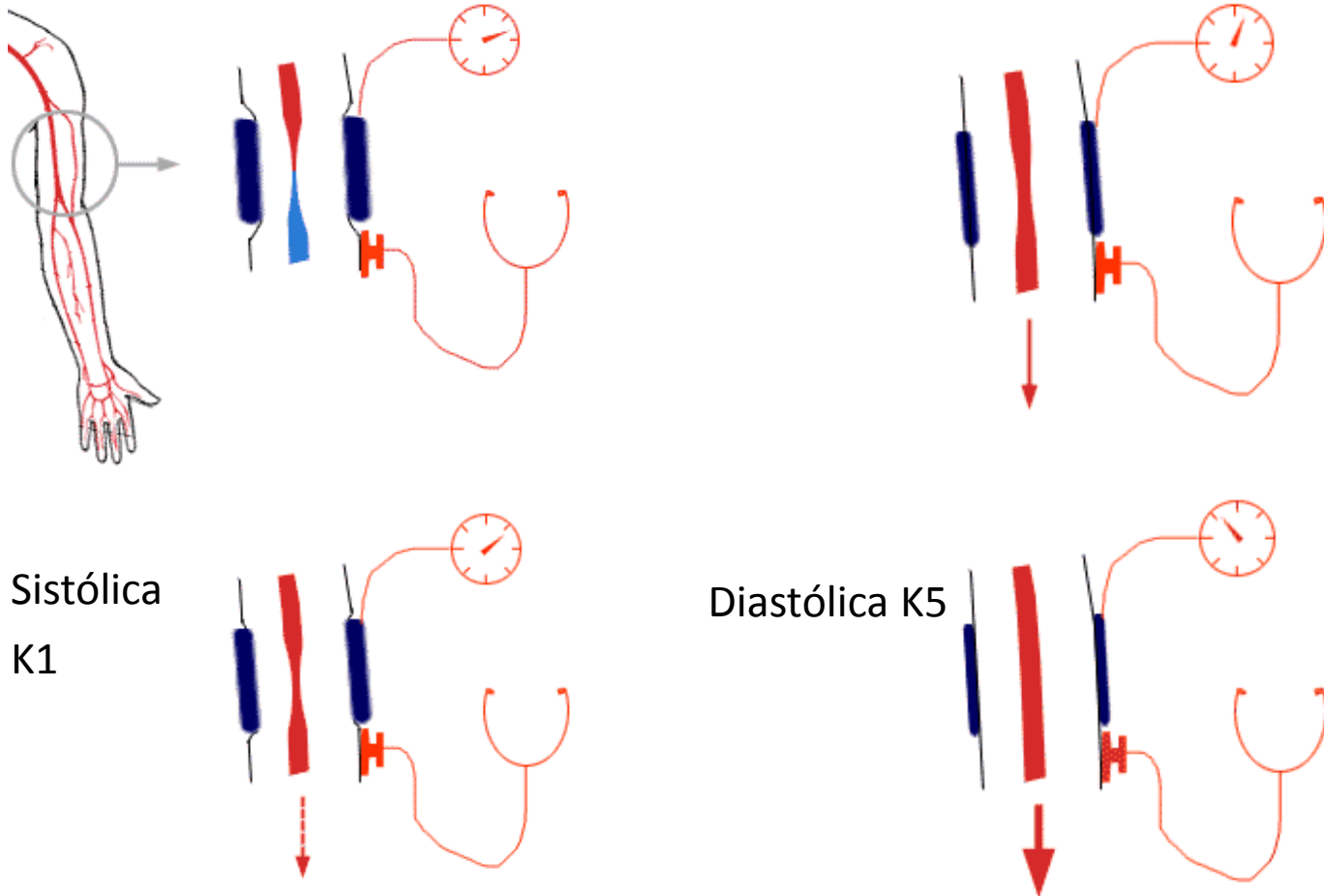
Medición de la P/A

b. Posición del paciente

- Paciente sentado (mayores de dos años, excepto los de UCI)
- Brazo derecho
- Brazo a la altura del corazón y relajado



Medición de la P/A c. Sonidos de Korotkoff





Caso 1

1. ¿está el paciente hipertenso?

115/75

¡veo las tablas!

IPHA (International Pediatric Hypertension Association)



Males

Age (yrs)	Height %tile (NHANES 2000)	Systolic BP (mmHg)						Diastolic BP (mmHg)							
		5th		10th		25th		50th		75th		90th		95th	
		Height (in) ---		Height (in) ---		Height (cm) ---		Height (cm) ---		Height (cm) ---		Height (cm) ---		Height (cm) ---	
2	Inches	31.9	32.4	33.3	34.2	35.1	36.0	36.5	31.9	32.4	33.3	34.2	35.1	36.0	36.5
	centimeters	81.1	82.4	84.5	86.9	89.2	91.4	92.6	81.1	82.4	84.5	86.9	89.2	91.4	92.6
	Stage 2 Hypertensive	114	115	116	118	120	122	122	71	72	73	74	75	76	76
	Stage 1 Hypertensive	101	102	104	106	108	109	110	59	59	60	61	62	63	63
	PreHypertensive	97	99	100	102	104	105	106	54	55	56	57	58	58	59
Normotensive	84	85	87	88	90	92	92	39	40	41	42	43	44	44	
3	Inches	35.1	35.6	36.5	37.5	38.6	39.5	40.1	35.1	35.6	36.5	37.5	38.6	39.5	40.1
	centimeters	89.2	90.5	92.7	95.3	97.9	100.4	101.9	89.2	90.5	92.7	95.3	97.9	100.4	101.9
	Stage 2 Hypertensive	116	117	119	121	123	124	125	76	76	77	78	79	80	80
	Stage 1 Hypertensive	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	PreHypertensive	100	101	103	105	107	108	109	59	59	60	61	62	63	63
Normotensive	86	87	89	91	93	94	95	44	44	45	46	47	48	48	
4	Inches	37.6	38.2	39.2	40.4	41.5	42.5	43.1	37.6	38.2	38.8	39.8	40.8	41.8	42.5
	centimeters	95.6	97.1	99.7	102.5	105.4	108.0	109.5	95.6	97.1	99.7	102.5	105.4	108.0	109.5
	Stage 2 Hypertensive	118	119	121	123	125	126	127	79	80	81	82	83	83	84
	Stage 1 Hypertensive	106	107	109	111	112	114	115	66	67	68	69	70	71	71
	PreHypertensive	102	103	105	107	109	110	111	62	63	64	65	66	66	67
Normotensive	88	89	91	93	95	96	97	47	48	49	50	51	51	52	
5	Inches	39.9	40.6	41.7	43.0	44.2	45.3	46.0	39.9	40.6	41.7	43.0	44.2	45.3	46.0
	centimeters	101.5	103.2	106.0	109.2	112.3	115.1	116.8	101.5	103.2	106.0	109.2	112.3	115.1	116.8
	Stage 2 Hypertensive	120	121	123	125	126	128	128	82	83	84	85	86	86	87
	Stage 1 Hypertensive	108	109	110	112	114	115	116	69	70	71	72	73	74	74
	PreHypertensive	104	105	106	108	110	111	112	65	66	67	68	69	69	70
Normotensive	90	91	93	95	96	98	98	50	51	52	53	54	55	55	
6	Inches	42.2	43.0	44.2	45.5	46.9	48.1	48.8	42.2	43.0	44.2	45.5	46.9	48.1	48.8
	centimeters	107.3	109.2	112.2	115.7	119.1	122.1	123.9	107.3	109.2	112.2	115.7	119.1	122.1	123.9
	Stage 2 Hypertensive	121	122	124	126	128	129	130	85	85	86	87	88	89	89
	Stage 1 Hypertensive	109	110	112	114	115	117	117	72	72	73	74	75	76	76
	PreHypertensive	105	106	108	110	111	113	113	68	68	69	70	71	72	72
Normotensive	91	92	94	96	98	99	100	53	53	54	55	56	57	57	
7	Inches	44.6	45.3	46.6	48.0	49.5	50.8	51.6	44.6	45.3	46.6	48.0	49.5	50.8	51.6
	centimeters	113.2	115.1	118.4	122.0	125.7	129.0	131.0	113.2	115.1	118.4	122.0	125.7	129.0	131.0
	Stage 2 Hypertensive	122	123	125	127	129	130	131	87	87	88	89	90	91	91
	Stage 1 Hypertensive	110	111	113	115	117	118	119	74	74	75	76	77	78	78
	PreHypertensive	106	107	109	111	113	114	115	70	70	71	72	73	74	74
Normotensive	92	94	95	97	99	100	101	55	55	56	57	58	59	59	
8	Inches	46.8	47.6	48.9	50.4	52.0	53.4	54.3	46.8	47.6	48.9	50.4	52.0	53.4	54.3
	centimeters	118.8	120.8	124.3	128.1	132.1	135.7	137.8	118.8	120.8	124.3	128.1	132.1	135.7	137.8
	Stage 2 Hypertensive	124	125	127	128	130	132	132	88	89	90	91	92	92	93
	Stage 1 Hypertensive	111	112	114	116	118	119	120	75	76	77	78	79	79	80
	PreHypertensive	107	109	110	112	114	115	116	71	72	72	73	74	75	76
Normotensive	94	95	97	99	100	102	102	56	57	58	59	60	60	61	
9	Inches	48.7	49.6	51.0	52.7	54.3	55.8	56.7	48.7	49.6	51.0	52.7	54.3	55.8	56.7
	centimeters	123.8	126.0	129.6	133.7	137.9	141.8	144.1	123.8	126.0	129.6	133.7	137.9	141.8	144.1
	Stage 2 Hypertensive	125	126	128	131	132	133	134	89	90	91	92	93	93	94
	Stage 1 Hypertensive	113	114	116	118	119	121	121	76	77	78	79	80	81	81
	PreHypertensive	109	110	112	114	115	117	118	72	73	74	75	76	76	77
Normotensive	95	96	98	100	102	103	104	57	58	59	60	61	61	62	

Legend: Normotensive = 50th%tile, Pre-Hypertensive = 90th%tile up to 120mmHg, Stage 1 HT = 95th%tile, Stage 2 HT = 99th%tile + 5 mmHg

Provided courtesy of the International Pediatric Hypertension Association (2006) www.pediatrichypertension.org



4	Stage 2 Hypertensive	118	119	121	123	125	126	127	4	79	80	81	82	83	83	84
	Stage 1 Hypertensive	106	107	109	111	112	114	115		66	67	68	69	70	71	71
	PreHypertensive	102	103	105	107	109	110	111		62	63	64	65	66	66	67
	Normotensive	88	89	91	93	95	96	97		47	48	49	50	51	51	52
5	Inches	39.9	40.6	41.7	43.0	44.2	45.3	46.0	5	39.9	40.6	41.7	43.0	44.2	45.3	46.0
	centimeters	101.5	103.2	106.0	109.2	112.3	115.1	116.8		101.5	103.2	106.0	109.2	112.3	115.1	116.8
	Stage 2 Hypertensive	120	121	123	125	126	128	128		82	83	84	85	86	86	87
	Stage 1 Hypertensive	108	109	110	112	114	115	116		69	70	71	72	73	74	74
PreHypertensive	104	105	106	108	110	111	112	65	66	67	68	69	69	70		
Normotensive	90	91	93	95	96	98	98	50	51	52	53	54	55	55		
Inches	42.2	43.0	44.2	45.5	46.9	48.1	48.8	42.2	43.0	44.2	45.5	46.9	48.1	48.8		
	centimeters	107.3	109.2	112.2	115.7	119.1	122.1		123.9	107.3	109.2	112.2	115.7	119.1	122.1	123.9

5	PreHypertensive	102	103	105	107	109	110	111
	Normotensive	88	89	91	93	95	96	97
	Inches	39.9	40.6	41.7	43.0	44.2	45.3	46.0
	centimeters	101.5	103.2	106.0	109.2	112.3	115.1	116.8
5	Stage 2 Hypertensive	120	121	123	125	126	128	128
	Stage 1 Hypertensive	108	109	110	112	114	115	116
	PreHypertensive	104	105	106	108	110	111	112
	Normotensive	90	91	93	95	96	98	98
Inches	42.2	43.0	44.2	45.5	46.9	48.1	48.8	
	centimeters	107.3	109.2	112.2	115.7	119.1	122.1	123.9

4	79	80	81	82	83	83	84
	66	67	68	69	70	71	71
	62	63	64	65	66	66	67
	47	48	49	50	51	51	52
5	39.9	40.6	41.7	43.0	44.2	45.3	46.0
	101.5	103.2	106.0	109.2	112.3	115.1	116.8
	82	83	84	85	86	86	87
	69	70	71	72	73	74	74
5	65	66	67	68	69	69	70
	50	51	52	53	54	55	55
	42.2	43.0	44.2	45.5	46.9	48.1	48.8
	107.3	109.2	112.2	115.7	119.1	122.1	123.9

Definiciones



- Normotensión:
 - 50 – 90 percentilo
- Pre hipertensión:
 - 90 – 95 S percentilo
 - > 120/80
- Hipertensión:
 - > 95
 - Estadio 1: 95 – 99+5
 - Estadio 2: >99 + 5



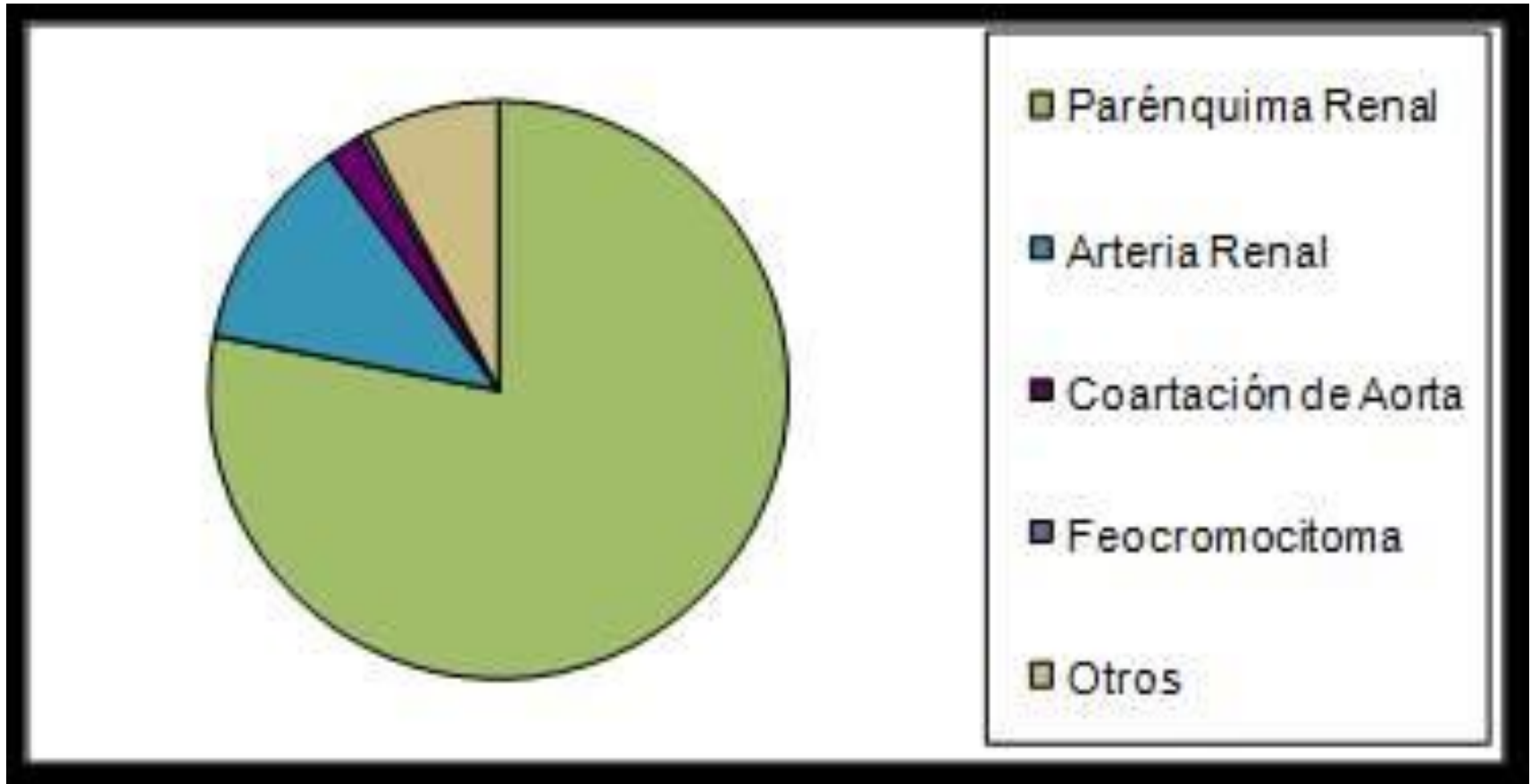
Caso 1

1. ¿está el paciente hipertenso? Sí, HTA estadio 1

2. ¿por qué está hipertenso?

- HTA primaria (adolescentes, obesos, historia familiar)
- HTA secundaria
 - Causa renal
 - Causa cardíaca
 - Causa endocrinológica

Causas de HTA *en Niños*



*Diagnosing Hypertension in
Children. Medscape. May 02, 2016*



Caso 1

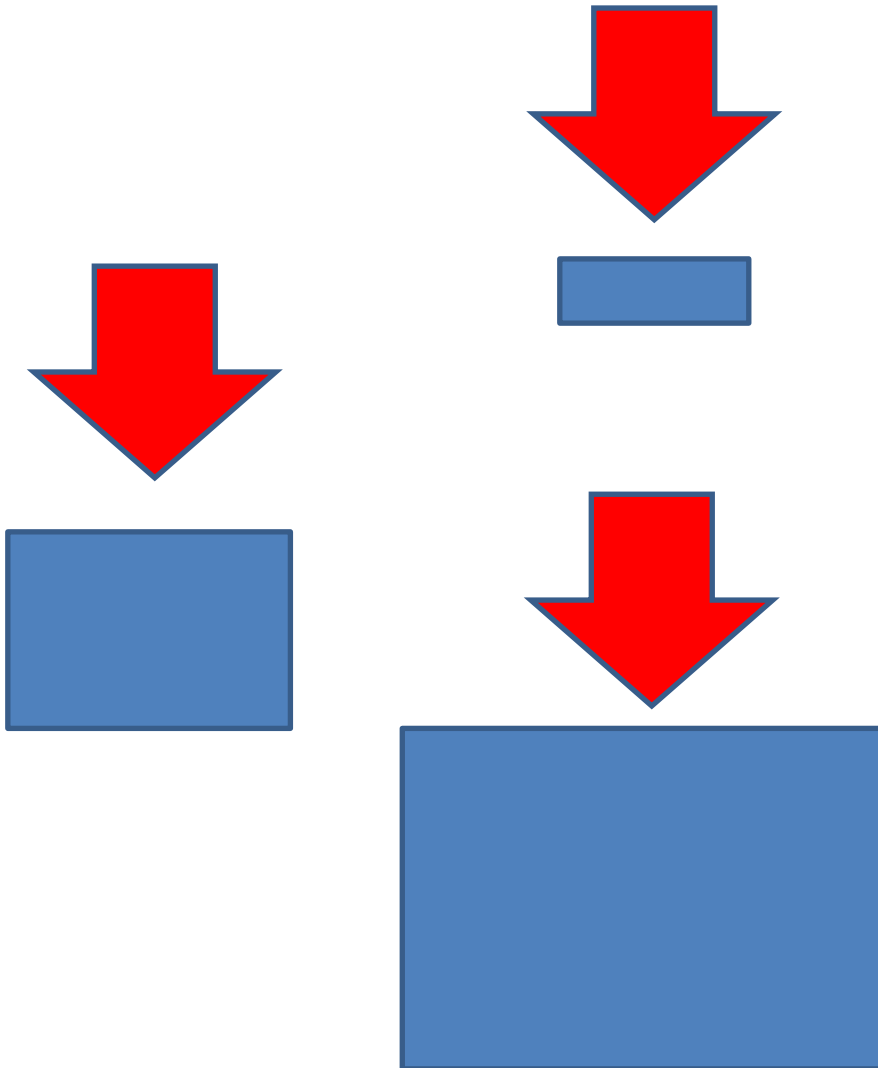
1. ¿está el paciente hipertenso? Sí, HTA estadio 1

2. ¿por qué está hipertenso?

- HTA secundaria
 - Causa renal
 - GN aguda (Sx Nefrítico)

3. **¿Cómo lo trato?**

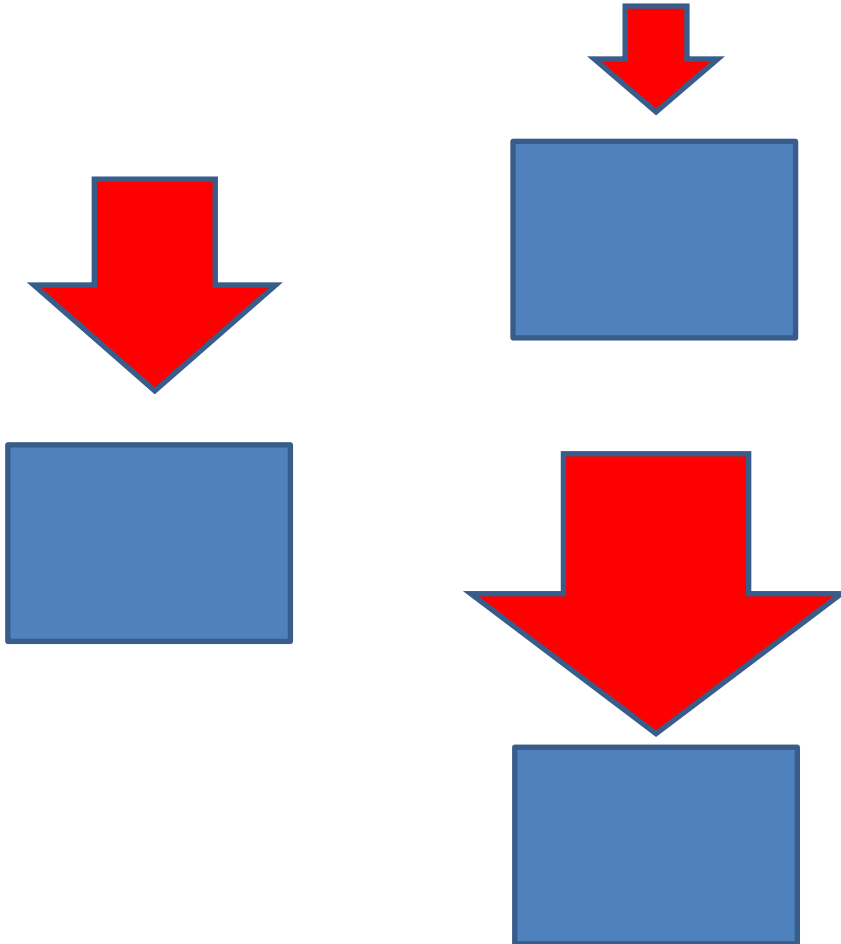
Fisiología de la P/A



Si la fuerza permanece igual y cambia el área, descubro que:

La presión es inversamente proporcional al área.

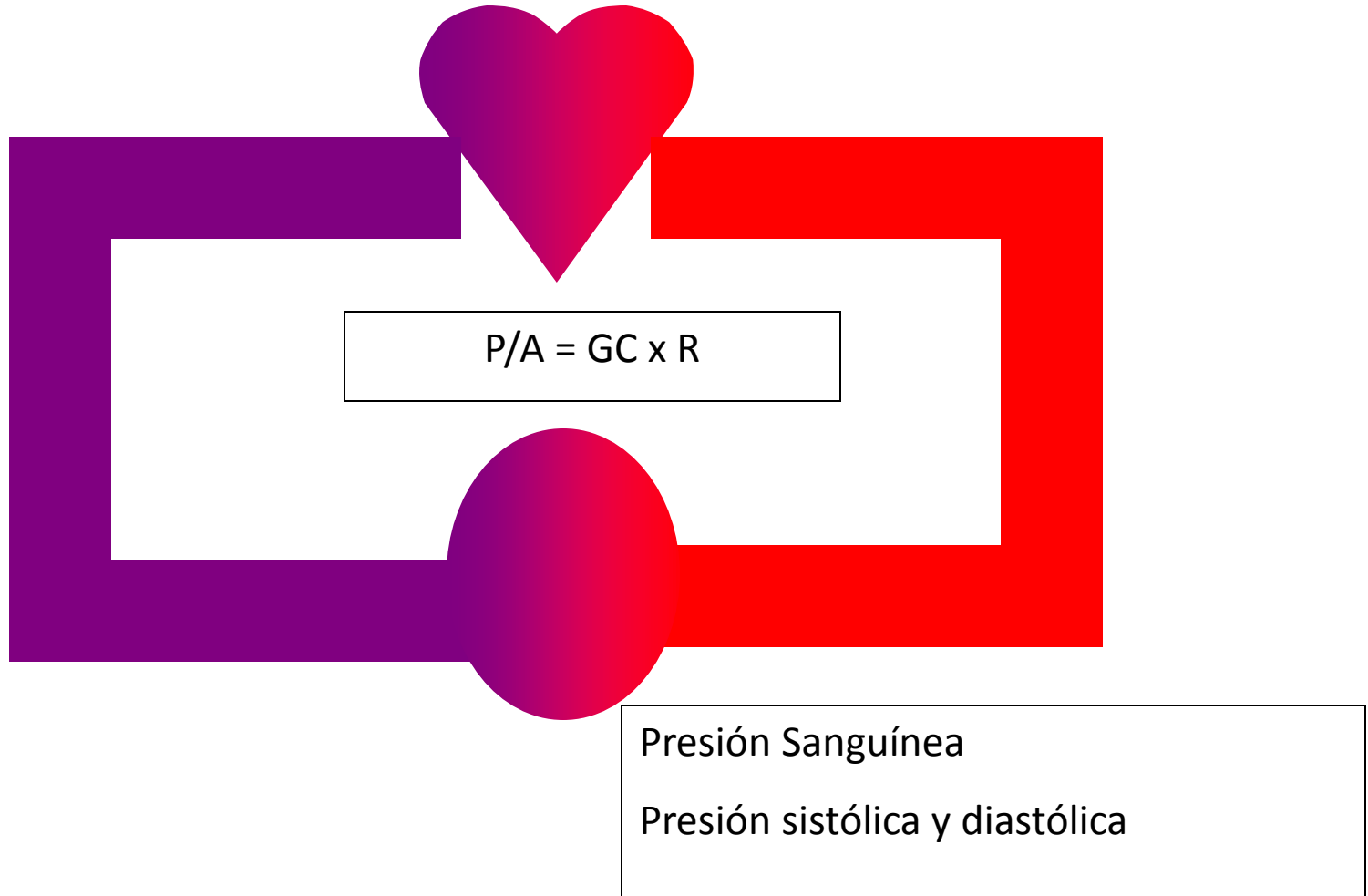
Fisiología de la P/A



Si el área permanece igual
y cambia la fuerza,
descubro que:

*La presión es
directamente proporcional
a la fuerza.*

Fisiología de la P/A



Fisiología de la P/A



- Causas dependientes de volumen
 - IRA
 - IRC
 - mineralocorticoides
- Causas dependientes de vasoconstricción
 - Renina (cicatrices, isquemia)
 - Catecolaminas
 - medicamentos



Caso 1

1. ¿está el paciente hipertenso? Sí, HTA estadio 1
2. ¿por qué está hipertenso?
 - HTA secundaria
 - Causa renal
 - GN aguda (Sx Nefrítico)
3. ¿Cómo lo trato?
 - Disminuyendo volemia
 - Diurético (furosemida)
 - Restringiendo sal

Caso 2



- 4 años de edad, 20 Kg, talla 101 cm
- Historia de ITU febril a repetición. Hace 24 horas inicia con fiebre, dolor lumbar.
- creatinina sérica 0.6 mg/dL
Orina: leucocitos campos llenos, cilindros leucocitarios
- Hematología con leucocitosis y neutrofilia

Ultrasonido



Riñón normal
(comparativo)



Cistograma



Fase miccional

Caso 2



- 1. ¿está la paciente hipertensa?**

Medición de la P/A.

a. Tamaño del Brazaletes



Caso 2



- 1. ¿está la paciente hipertensa?**

120/80

Females



Age (yrs)	Height %tile (NHANES 2000)	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
2	Inches	31.4	31.9	32.7	33.6	34.5	35.4	35.9	31.4	31.9	32.7	33.6	34.5	35.4	35.9
	centimeters	79.6	80.9	83.0	85.4	87.7	89.9	91.1	79.6	80.9	83.0	85.4	87.7	89.9	91.1
	Stage 2 Hypertensive	114	115	116	117	119	120	121	74	74	75	75	76	77	77
	Stage 1 Hypertensive	102	103	104	105	107	108	109	61	62	62	63	64	65	65
	Pre-Hypertensive	98	99	100	101	103	104	105	57	58	58	59	60	61	61
	Normotensive	85	85	87	88	89	91	91	43	44	44	45	46	46	47
3	Inches	34.6	35.1	36.0	37.1	38.1	39.1	39.7	34.6	35.1	36.0	37.1	38.1	39.1	39.7
	centimeters	87.8	89.2	91.6	94.2	96.9	99.3	100.8	87.8	89.2	91.6	94.2	96.9	99.3	100.8
	Stage 2 Hypertensive	116	116	118	119	120	121	122	78	78	79	79	80	81	81
	Stage 1 Hypertensive	104	104	105	107	108	109	110	65	66	66	67	68	68	69
	Pre-Hypertensive	100	100	102	103	104	106	106	61	62	62	63	64	64	65
	Normotensive	86	87	88	89	91	92	93	47	48	48	49	50	50	51
4	Inches	37.0	37.6	38.6	39.8	41.0	42.0	42.7	37.0	37.6	37.7	39.6	41.6	43.3	44.4
	centimeters	94.0	95.6	98.1	101.0	104.0	106.8	108.4	94.0	95.6	98.1	101.0	104.0	106.8	108.4
	Stage 2 Hypertensive	117	118	119	120	122	123	124	81	81	81	82	83	84	84
	Stage 1 Hypertensive	105	106	107	108	110	111	112	68	68	69	70	71	71	72
	Pre-Hypertensive	101	102	103	104	106	107	108	64	64	65	66	67	67	68
	Normotensive	88	88	90	91	92	94	94	50	50	51	52	52	53	54
5	Inches	39.5	40.2	41.3	42.5	43.8	45.0	45.7	39.5	40.2	41.3	42.5	43.8	45.0	45.7
	centimeters	100.4	102.0	104.8	108.0	111.2	114.3	116.1	100.4	102.0	104.8	108.0	111.2	114.3	116.1
	Stage 2 Hypertensive	119	119	121	122	123	125	125	83	83	84	84	85	86	86
	Stage 1 Hypertensive	107	107	108	110	111	112	113	70	71	71	72	73	73	74
	Pre-Hypertensive	103	103	105	106	107	109	109	66	67	67	68	69	69	70
	Normotensive	89	90	91	93	94	96	96	52	53	53	54	55	55	56
6	Inches	42.1	42.8	43.9	45.3	46.7	48.0	48.8	42.1	42.8	43.9	45.3	46.7	48.0	48.8
	centimeters	106.9	108.6	111.6	115.0	118.6	121.9	123.9	106.9	108.6	111.6	115.0	118.6	121.9	123.9
	Stage 2 Hypertensive	120	121	122	124	125	126	127	85	85	85	86	87	88	88
	Stage 1 Hypertensive	108	109	110	111	113	114	115	72	72	73	74	74	75	76
	Pre-Hypertensive	104	105	106	108	109	110	111	68	68	69	70	70	71	72
	Normotensive	91	92	93	94	96	97	98	54	54	55	56	56	57	58
7	Inches	44.5	45.2	46.5	47.9	49.4	50.8	51.7	44.5	45.2	46.5	47.9	49.4	50.8	51.7
	centimeters	113.1	114.9	118.1	121.8	125.6	129.1	131.3	113.1	114.9	118.1	121.8	125.6	129.1	131.3
	Stage 2 Hypertensive	122	123	124	125	127	128	129	86	86	87	87	88	89	89
	Stage 1 Hypertensive	110	111	112	113	115	116	116	73	74	74	75	76	76	77
	Pre-Hypertensive	106	107	108	109	111	112	113	69	70	70	71	72	72	73
	Normotensive	93	93	95	96	97	99	99	55	56	56	57	58	58	59
8	Inches	46.7	47.5	48.8	50.3	51.9	53.4	54.3	46.7	47.5	48.8	50.3	51.9	53.4	54.3
	centimeters	118.5	120.5	123.9	127.8	131.9	135.6	137.9	118.5	120.5	123.9	127.8	131.9	135.6	137.9
	Stage 2 Hypertensive	124	125	126	127	128	130	130	87	87	88	88	89	90	91
	Stage 1 Hypertensive	112	112	114	115	116	118	118	75	75	75	76	77	78	78
	Pre-Hypertensive	108	109	110	111	113	114	114	71	71	71	72	73	74	74
	Normotensive	95	95	96	98	99	100	101	57	57	57	58	59	60	60
9	Inches	48.5	49.3	50.8	52.4	54.1	55.7	56.6	48.5	49.3	50.8	52.4	54.1	55.7	56.6
	centimeters	123.2	125.3	129.0	133.1	137.4	141.4	143.8	123.2	125.3	129.0	133.1	137.4	141.4	143.8
	Stage 2 Hypertensive	126	126	128	129	130	132	132	88	88	89	89	90	91	92
	Stage 1 Hypertensive	114	114	115	117	118	119	120	76	76	76	77	78	79	79
	Pre-Hypertensive	110	110	112	113	114	116	116	72	72	72	73	74	75	75
	Normotensive	96	97	98	100	101	102	103	58	58	58	59	60	61	61

Legend: Normotensive = 50th%tile, Pre-Hypertensive = 90th%tile up to 120mmHg, Stage 1 HT = 95th%tile + 5 mmHg, Stage 2 HT = 99th%tile + 5 mmHg



	86	87	88	89	91	92	93		47	48	48	49	50	50	51
Normotensiva															
Inches	37.0	37.6	38.6	39.8	41.0	42.0	42.7	4	37.0	37.6	37.7	39.6	41.6	43.3	44.4
centimeters	94.0	95.6	98.1	101.0	104.0	106.8	108.4		94.0	95.6	98.1	101.0	104.0	106.8	108.4
Stage 2 Hypertensiva	117	118	119	120	122	123	124		81	81	81	82	83	84	84
Stage 1 Hypertensiva	105	106	107	108	110	111	112		68	68	69	70	71	71	72
Pre-Hypertensiva	101	102	103	104	106	107	108		64	64	65	66	67	67	68
Normotensiva	88	88	90	91	92	94	94		50	50	51	52	52	53	54
Inches	39.5	40.2	41.3	42.5	43.8	45.0	45.7		39.5	40.2	41.3	42.5	43.8	45.0	45.7
centimeters	100.4	102.0	104.8	108.0	111.2	114.3	116.1		100.4	102.0	104.8	108.0	111.2	114.3	116.1

	86	87	88	89	91	92	93
Normotensiva							
Inches	37.0	37.6	38.6	39.8	41.0	42.0	42.7
centimeters	94.0	95.6	98.1	101.0	104.0	106.8	108.4
Stage 2 Hypertensiva	117	118	119	120	122	123	124
Stage 1 Hypertensiva	105	106	107	108	110	111	112
Pre-Hypertensiva	101	102	103	104	106	107	108
Normotensiva	88	88	90	91	92	94	94
Inches	39.5	40.2	41.3	42.5	43.8	45.0	45.7
centimeters	100.4	102.0	104.8	108.0	111.2	114.3	116.1

	47	48	48	49	50	50	51
	37.0	37.6	37.7	39.6	41.6	43.3	44.4
	94.0	95.6	98.1	101.0	104.0	106.8	108.4
	81	81	81	82	83	84	84
	68	68	69	70	71	71	72
	64	64	65	66	67	67	68
	50	50	51	52	52	53	54
	39.5	40.2	41.3	42.5	43.8	45.0	45.7
	100.4	102.0	104.8	108.0	111.2	114.3	116.1



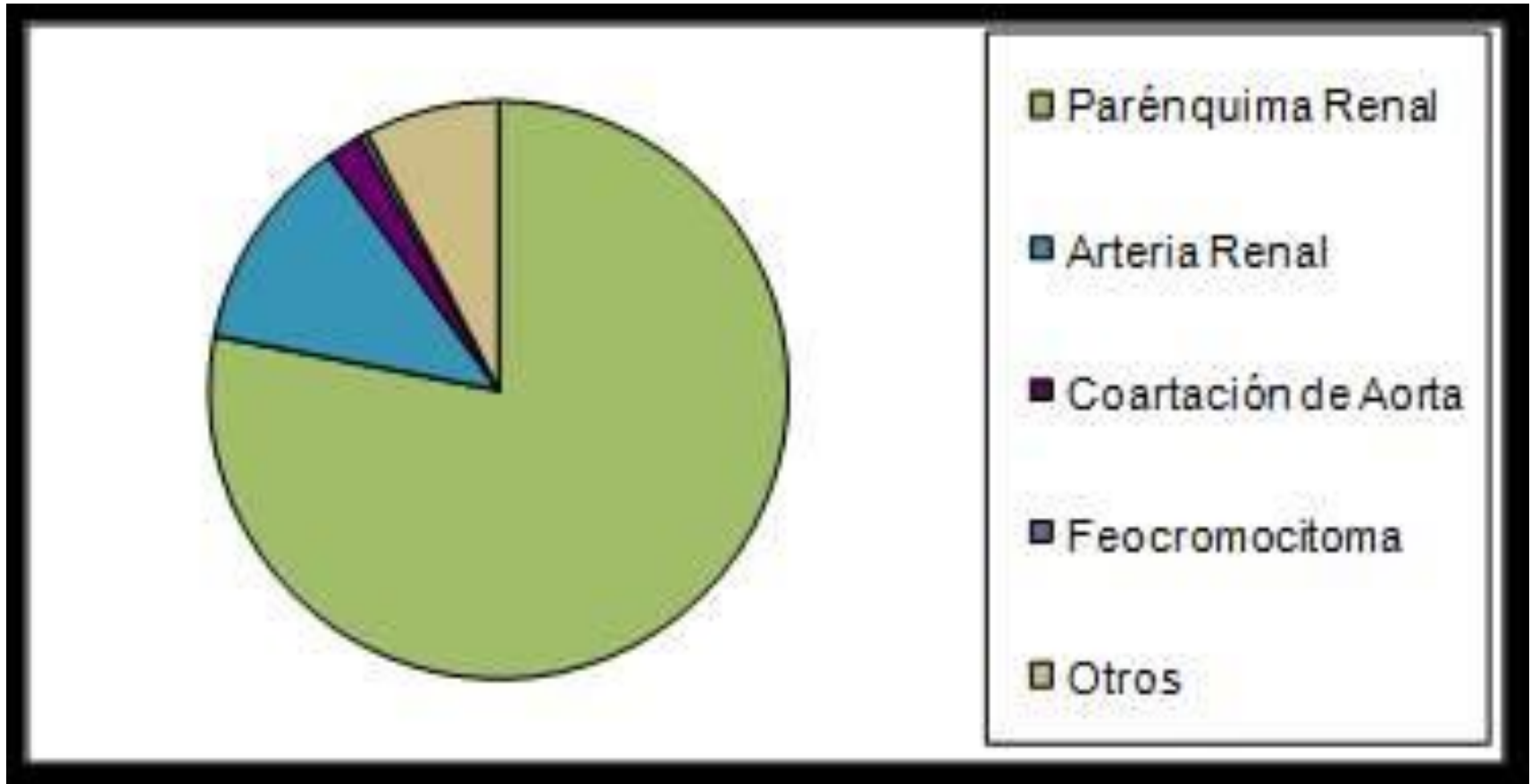
Caso 2

1. ¿está la paciente hipertensa? Sí, HTA estadio 2

2. ¿por qué está hipertensa?

- HTA primaria (adolescentes, obesos, historia familiar)
- HTA secundaria
 - Causa renal
 - Causa cardíaca
 - Causa endocrinológica

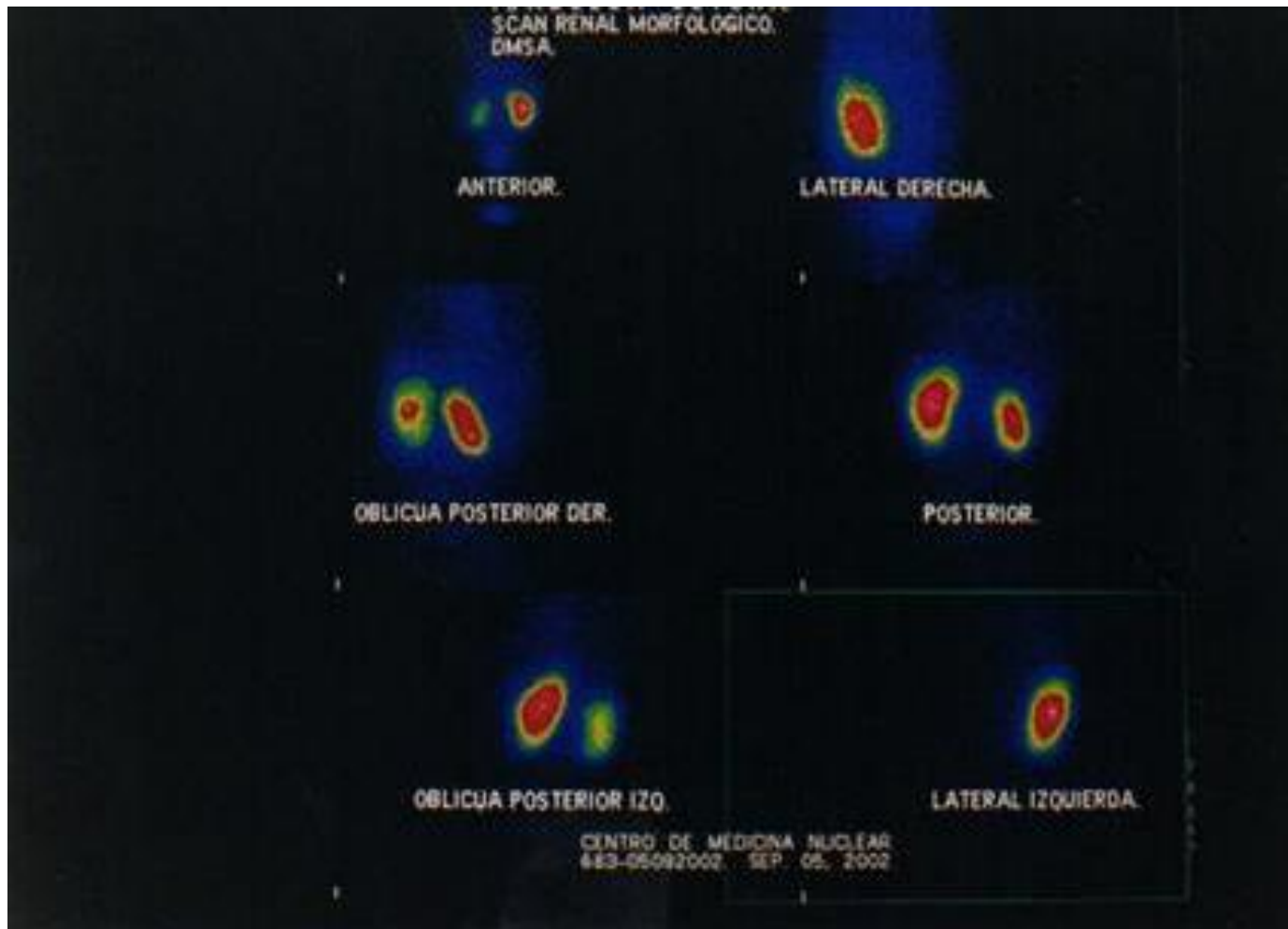
Causas de HTA *en Niños*



*Diagnosing Hypertension in
Children. Medscape. May 02, 2016*



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Fundación para el Niño Enfermo Renal





Caso 2

1. ¿está la paciente hipertensa? Sí, HTA estadio 2

2. ¿por qué está hipertenso?

- HTA secundaria
 - Causa renal
 - Cicatrices renales (Nefropatía por reflujo)

3. ¿Cómo lo trato?

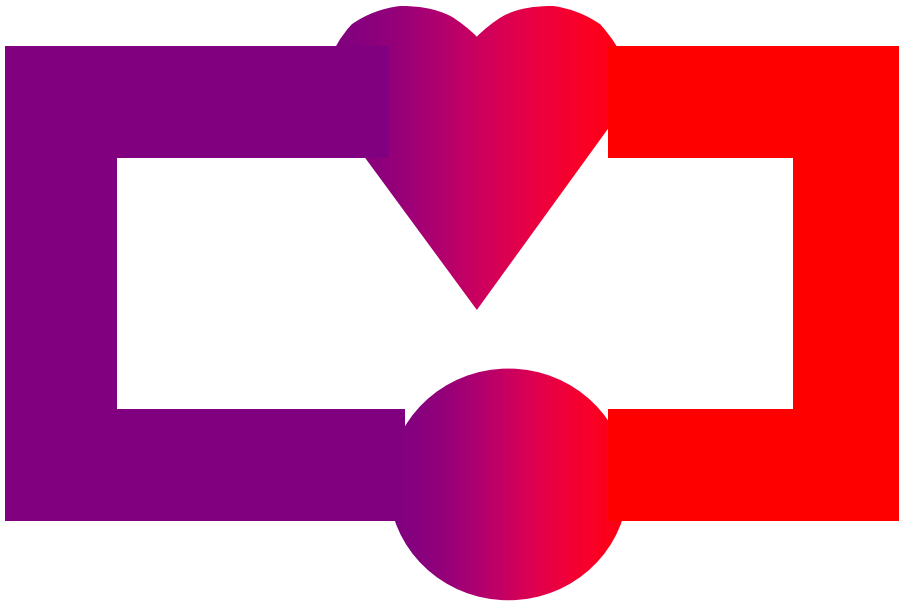
Fisiología de la P/A

- Causas dependientes de volumen

- IRA
- IRC
- mineralocorticoides

Causas dependientes de vasoconstricción

- Renina (cicatrices, isquemia)
- Catecolaminas
- medicamentos



Caso 2



1. ¿está la paciente hipertensa? Sí, HTA estadio 2
2. ¿por qué está hipertenso?
 - HTA secundaria
 - Causa renal
 - Cicatrices renales (Nefropatía por reflujo)
3. ¿Cómo lo trato?
 - Disminuyendo vasoconstricción
 - IECA (bloquea renina)
 - Enalapril 0.08-0.6 mg/Kg/d

Caso 3



- 10 años de edad, 60 Kg, talla 139 cm
- Lo llevan a su control de crecimiento y desarrollo.
- Historia familiar de hipertensión y diabetes.
- creatinina sérica 0.6 mg/dL Orina: normal,
- Albúmina: 4.5 mg/dL, colesterol 199: mg/dL proteína/creatinina: 0.10
- US renal normal

Caso 2

1. ¿está el paciente hipertenso?



BOTERO

Medición de la P/A.

a. Tamaño del Brazaletes



Caso 1

1. ¿está el paciente hipertenso?



125/85

¡veo las tablas!

IPHA (International Pediatric Hypertension Association)



Males

Age (yrs)	Height %tile (NHANES 2000)	Systolic BP (mmHg)						Diastolic BP (mmHg)							
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
10	Inches	50.5	51.4	52.9	54.7	56.4	58.0	59.0	50.5	51.4	52.9	54.7	56.4	58.0	59.0
	centimeters	128.2	130.5	134.4	138.8	143.3	147.4	149.9	128.2	130.5	134.4	138.8	143.3	147.4	149.9
	Stage 2 Hypertensive	127	128	130	132	133	135	135	90	91	91	93	93	94	95
	Stage 1 Hypertensive	115	116	117	119	121	122	123	77	78	79	80	81	81	82
	PreHypertensive	111	112	114	115	117	119	119	73	73	74	75	76	77	78
Normotensive	97	98	100	102	103	105	106	58	59	60	61	61	62	63	
11	Inches	52.1	53.1	54.7	56.6	58.5	60.2	61.2	52.1	53.1	54.7	56.6	58.5	60.2	61.2
	centimeters	132.4	134.9	139.0	143.7	148.5	152.9	155.5	132.4	134.9	139.0	143.7	148.5	152.9	155.5
	Stage 2 Hypertensive	129	130	132	134	135	137	137	91	91	92	93	94	95	96
	Stage 1 Hypertensive	117	118	119	121	123	124	125	78	78	79	80	81	82	82
	PreHypertensive	113	114	115	117	119	120	120	74	74	75	76	77	78	78
Normotensive	99	100	102	104	105	107	107	59	59	60	61	62	63	63	
12	Inches	54.1	55.1	56.8	58.8	60.8	62.6	63.7	54.1	55.1	56.8	58.8	60.8	62.6	63.7
	centimeters	137.3	139.9	144.3	149.3	154.4	159.0	161.9	137.3	139.9	144.3	149.3	154.4	159.0	161.9
	Stage 2 Hypertensive	131	132	134	136	138	139	140	91	92	93	94	95	95	96
	Stage 1 Hypertensive	119	120	122	123	125	127	127	78	79	80	81	82	82	83
	PreHypertensive	115	116	118	120	120	120	120	74	75	75	76	77	78	79
Normotensive	101	102	104	106	108	109	110	59	60	61	62	63	63	64	
13	Inches	56.5	57.6	59.5	61.6	63.7	65.6	66.7	56.5	57.6	59.5	61.6	63.7	65.6	66.7
	centimeters	143.6	146.4	151.1	156.4	161.7	166.6	169.5	143.6	146.4	151.1	156.4	161.7	166.6	169.5
	Stage 2 Hypertensive	133	135	136	138	140	141	142	92	92	93	94	95	96	96
	Stage 1 Hypertensive	121	122	124	126	128	129	130	79	79	80	81	82	83	83
	PreHypertensive	115	116	118	120	120	120	120	75	75	76	77	78	79	79
Normotensive	104	105	106	108	110	111	112	60	60	61	62	63	64	64	
14	Inches	59.3	60.5	62.5	64.6	66.7	68.6	69.7	59.3	60.5	62.5	64.6	66.7	68.6	69.7
	centimeters	150.5	153.6	158.7	164.1	169.5	174.2	177.0	150.5	153.6	158.7	164.1	169.5	174.2	177.0
	Stage 2 Hypertensive	136	137	139	141	143	144	145	92	93	94	95	96	97	97
	Stage 1 Hypertensive	124	125	127	128	130	132	132	80	80	81	82	83	84	84
	PreHypertensive	120	120	120	120	120	120	120	75	76	77	78	79	79	80
Normotensive	106	107	109	111	113	114	115	60	61	62	63	64	65	65	
15	Inches	61.7	62.9	64.9	67.0	69.0	70.8	71.8	61.7	62.9	64.9	67.0	69.0	70.8	71.8
	centimeters	156.7	159.8	164.8	170.1	175.3	179.8	182.4	156.7	159.8	164.8	170.1	175.3	179.8	182.4
	Stage 2 Hypertensive	139	140	141	143	145	147	147	93	94	95	96	97	98	98
	Stage 1 Hypertensive	126	127	129	131	133	134	135	81	81	82	83	84	85	85
	PreHypertensive	120	120	120	120	120	120	120	76	77	78	79	80	80	80
Normotensive	109	110	112	113	115	117	117	61	62	63	64	65	66	66	
16	Inches	63.3	64.5	66.3	68.4	70.3	72.0	73.0	63.3	64.5	66.3	68.4	70.3	72.0	73.0
	centimeters	160.8	163.7	168.5	173.6	178.6	182.9	185.5	160.8	163.7	168.5	173.6	178.6	182.9	185.5
	Stage 2 Hypertensive	141	142	144	146	148	149	150	95	95	96	97	98	99	99
	Stage 1 Hypertensive	129	130	132	134	135	137	137	82	83	83	84	85	86	87
	PreHypertensive	120	120	120	120	120	120	120	78	78	79	80	80	80	80
Normotensive	111	112	114	116	118	119	120	63	63	64	65	66	67	67	
17	Inches	64.2	65.3	67.1	69.0	70.9	72.6	73.6	64.2	65.3	67.1	69.0	70.9	72.6	73.6
	centimeters	163.1	165.8	170.4	175.3	180.2	184.5	187.0	163.1	165.8	170.4	175.3	180.2	184.5	187.0
	Stage 2 Hypertensive	144	145	146	148	150	151	152	97	98	98	99	100	101	102
	Stage 1 Hypertensive	131	132	134	136	138	139	140	84	85	86	87	87	88	89
	PreHypertensive	120	120	120	120	120	120	120	80	80	80	80	80	80	80
Normotensive	114	115	116	118	120	121	122	65	66	66	67	68	69	70	

Legend: Normotensive = 50th%tile, Pre-Hypertensive = 90th%tile up to 80mmHg, Stage 1 HT = 95th%tile, Stage 2 HT = 99th%tile + 5 mmHg

Provided courtesy of the International Pediatric Hypertension Association (2006) www.pediatrichypertension.org



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Age (yrs)		Height (in) --- Height (cm) ---							Height (in) --- Height (cm) ---							IPIA						
		Height %tile (NHANES 2000)								Height %tile (NHANES 2000)												
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
10	Inches	50.5	51.4	52.9	54.7	56.4	58.0	59.0	50.5	51.4	52.9	54.7	56.4	58.0	59.0	50.5	51.4	52.9	54.7	56.4	58.0	59.0
	centimeters	128.2	130.5	134.4	138.8	143.3	147.4	149.9	128.2	130.5	134.4	138.8	143.3	147.4	149.9	128.2	130.5	134.4	138.8	143.3	147.4	149.9
	Stage 2 Hypertensive	127	128	130	132	133	135	135	90	91	91	93	93	94	95	90	91	91	93	93	94	95
	Stage 1 Hypertensive	115	116	117	119	121	122	123	77	78	79	80	81	81	82	77	78	79	80	81	81	82
	PreHypertensive	111	112	114	115	117	119	119	73	73	74	75	76	77	78	73	73	74	75	76	77	78
Normotensive	97	98	100	102	103	105	106	58	59	60	61	61	62	63	58	59	60	61	61	62	63	
		52.1	53.1	54.7	56.6	58.5	60.2	61.2	52.1	53.1	54.7	56.6	58.5	60.2	61.2	52.1	53.1	54.7	56.6	58.5	60.2	61.2
		132.4	134.9	139.0	143.7	148.5	152.9	155.5	132.4	134.9	139.0	143.7	148.5	152.9	155.5	132.4	134.9	139.0	143.7	148.5	152.9	155.5

Age (yrs)		Height (in) --- Height (cm) ---						
		Height %tile (NHANES 2000)						
		5th	10th	25th	50th	75th	90th	95th
10	Inches	50.5	51.4	52.9	54.7	56.4	58.0	59.0
	centimeters	128.2	130.5	134.4	138.8	143.3	147.4	149.9
	Stage 2 Hypertensive	127	128	130	132	133	135	135
	Stage 1 Hypertensive	115	116	117	119	121	122	123
	PreHypertensive	111	112	114	115	117	119	119
Normotensive	97	98	100	102	103	105	106	
		52.1	53.1	54.7	56.6	58.5	60.2	61.2
		132.4	134.9	139.0	143.7	148.5	152.9	155.5

Age (yrs)		Height (in) --- Height (cm) ---							IPIA
		Height %tile (NHANES 2000)							
		5th	10th	25th	50th	75th	90th	95th	
10	Inches	50.5	51.4	52.9	54.7	56.4	58.0	59.0	10
	centimeters	128.2	130.5	134.4	138.8	143.3	147.4	149.9	
	Stage 2 Hypertensive	90	91	91	93	93	94	95	
	Stage 1 Hypertensive	77	78	79	80	81	81	82	
	PreHypertensive	73	73	74	75	76	77	78	
Normotensive	58	59	60	61	61	62	63		
		52.1	53.1	54.7	56.6	58.5	60.2	61.2	
		132.4	134.9	139.0	143.7	148.5	152.9	155.5	

Caso 1

1. ¿está el paciente hipertenso? Sí, HTA estadio 1

2. ¿por qué está hipertenso?

- HTA primaria (adolescentes, obesos, historia familiar)
- HTA secundaria
 - Causa renal
 - Causa cardíaca
 - Causa endocrinológica



Caso 1

1. ¿está el paciente hipertenso? Sí, HTA estadio 1

2. ¿por qué está hipertenso?

- HTA primaria (adolescentes, obesos, historia familiar)

3. ¿Cómo lo trato?



Sobrepeso en Guatemala

- En Guatemala... 2010 vrs 2014

Country name	Region	Overweight (BMI ≥ 25) Crude adjusted estimates					
		Males	[95% CI]	Females	[95% CI]	Both sexes	[95% CI]

Grenada	AMR	48.2	[39.8–56.7]	61.9	[53.9–69.7]	55.0	[49.5–60.8]
Guatemala	AMR	43.1	[35.7–50.8]	52.1	[45–59.1]	47.7	[42.6–52.8]
Guinea	AFR	16.7	[12.1–21.9]	29.3	[23.9–35.1]	23.0	[19.3–26.4]

Grenada	AMR	44.2	[37.6–51.1]	58.6	[52.2–65.2]	51.4	[46.8–56]
Guatemala	AMR	41.2	[35.4–47.3]	50.1	[44.7–55.6]	45.7	[41.9–49.5]
Guinea	AFR	15.8	[12.3–19.5]	27.0	[23–31.2]	21.4	[18.6–24.2]
Guinea–Bissau	AFR	16.2	[12.5–20.5]	26.8	[22.4–31.6]	21.5	[18.4–24.5]

Obesidad en Guatemala

- En Guatemala... 2010 vrs 2014

Country name	Region	Obesity (BMI ≥ 30) Crude adjusted estimates					
		Males	[95% CI]	Females	[95% CI]	Both sexes	[95% CI]
Grenada	AMR	16.9	[10.8–24.1]	22.2	[24–40.7]	24.6	[18.8–29.9]
Guatemala	AMR	11.3	[6.9–16.6]	21.2	[15.4–27.8]	16.4	[12.3–20.6]
Guinea	AFR	2.8	[1.5–4.8]	8.9	[5.9–12.4]	5.9	[3.9–7.6]
Grenada	AMR	13.9	[9.5–18.9]	20.1	[22.7–35.9]	21.5	[17.4–25.7]
Guatemala	AMR	10.2	[7–14.3]	19.5	[15.1–24.3]	15.0	[11.9–18.1]
Guinea	AFR	2.5	[1.5–3.8]	7.5	[5.4–10]	5.0	[3.8–6.3]

Tratamiento



BOTERO

- Reducir peso
- Reducir sal:
 - 1.2 gramos por día (4-8 años)
 - 1.5 gramos por día (>8 años)

Torrance B, McGuire KA, Lewanczuk R, McGavock J. Overweight, physical activity and high blood pressure in children: a review of the literature. Vasc Health Risk Manag. 2007;3:139–149.

La Sal

1 gramo de sal

=

400 miligramos de sodio

=

17 miliequivalentes de sodio

OMS recomienda < 5 gramos/día
(3 gramos es buena idea)



1 cucharadita = 3 gramos de sal
(1200 mg de sodio)

HTA y la Sal



Información Nutricional

Porción: 146g (1 porción grande)

Porciones por envase: 1

Cantidades por <i>Porción</i>		%VD*
Valor Energético	412 kcal	21%
Carbohidratos	49 g	16%
Proteínas	5,8 g	8%
Grasas Totales	21 g	38%
<i>de las cuales:</i>		
grasas saturadas	2 g	9%
grasas trans	0 g	
Fibra	6,6 g	26%
Sodio	442 mg	18%

laky men - sopa instantánea

Porciones:

Calorías	180	Sodio	1.860 mg
Grasas totales	8 g	Potasio	0 mg
Saturadas	3 g	Carbohidratos totales	18 g
Polinsaturados	2 g	Fibra dietética	2 g
Monoinsaturados	2 g	Azúcares	10 g
Trans	0 g	Proteínas	4 g
Colesterol	0 mg		

Información Nutricional

Porción: 25g (1 taza de té)

Cantidades por *Porción*

	%VD*	
Valor Energético	131 kcal	7%
Carbohidratos	13 g	4%
Proteínas	1,9 g	3%
Grasas Totales	7,9 g	14%
<i>de las cuales:</i>		
grasas saturadas	0,7 g	3%
grasas monoinsaturadas	6,3 g	
grasas poliinsaturadas	0,5 g	
grasas trans	0 g	
colesterol	0,5 mg	
Fibra	1,5 g	6%
Sodio	178 mg	7%

Para concluir....

1. ¿está hipertenso mi paciente?
 - i. Mido P/A anualmente en mayores de 2 años
 - ii. Brazaletes adecuados (ancho igual al 50% de circunferencia del brazo)
 - iii. Primero y quinto ruidos de Korotkoff
 - iv. Reviso la tabla
2. ¿por qué está hipertenso?
 - i. ¿es la causa primaria o secundaria?
3. ¿cómo lo trato?
 - i. Disminuyendo volumen (diuréticos: furosemida)
 - ii. Disminuyendo vasoconstricción (enalapril, amlodipina)



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Gracias

