SÍNDROME DE RESISTENCIA A DIURÉTICOS

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- R3 de M. Interna-

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POSITION PAPER

The use of diuretics in heart failure with congestion — a position statement from the Heart Failure Association of the European Society of Cardiology

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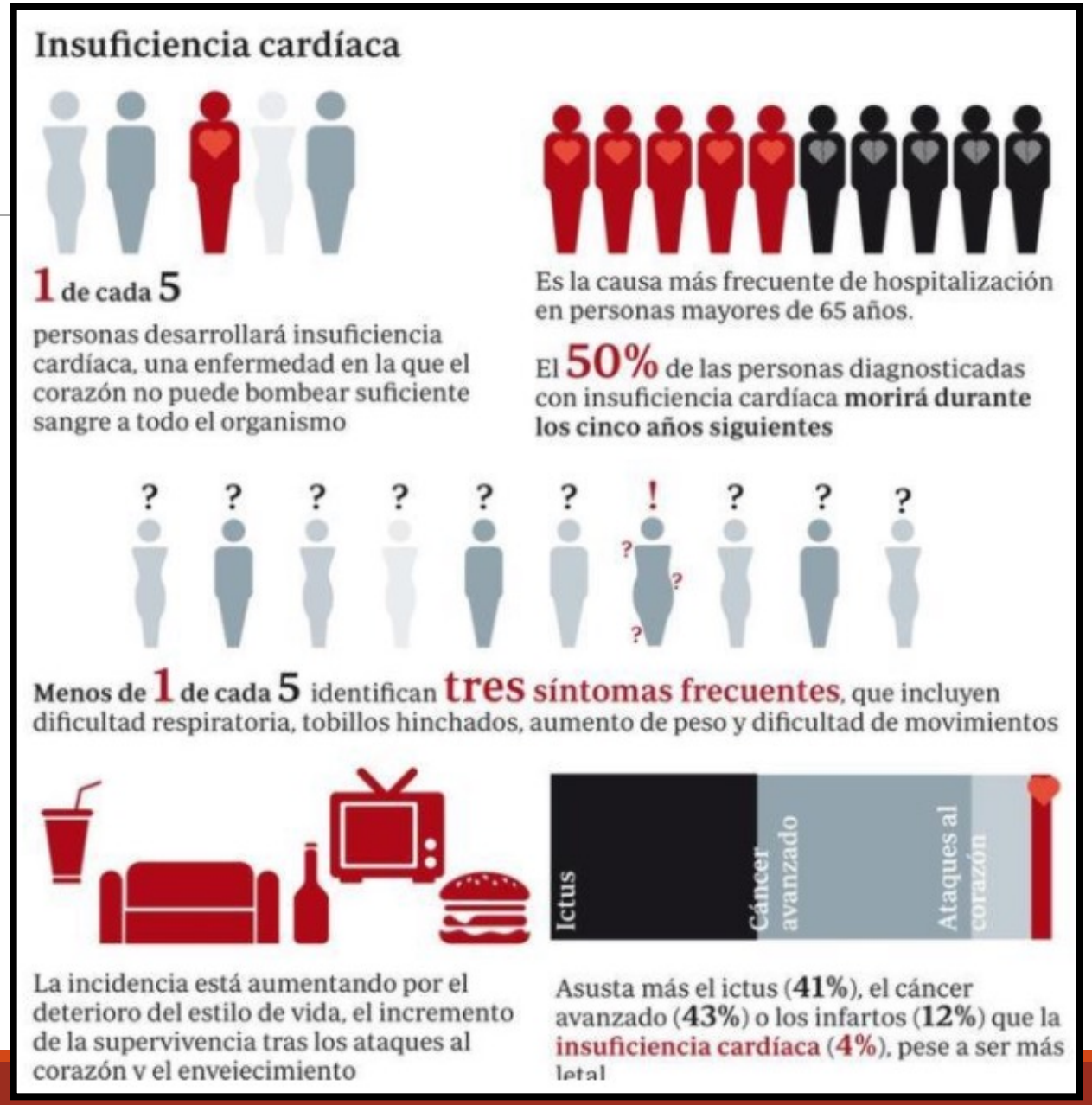
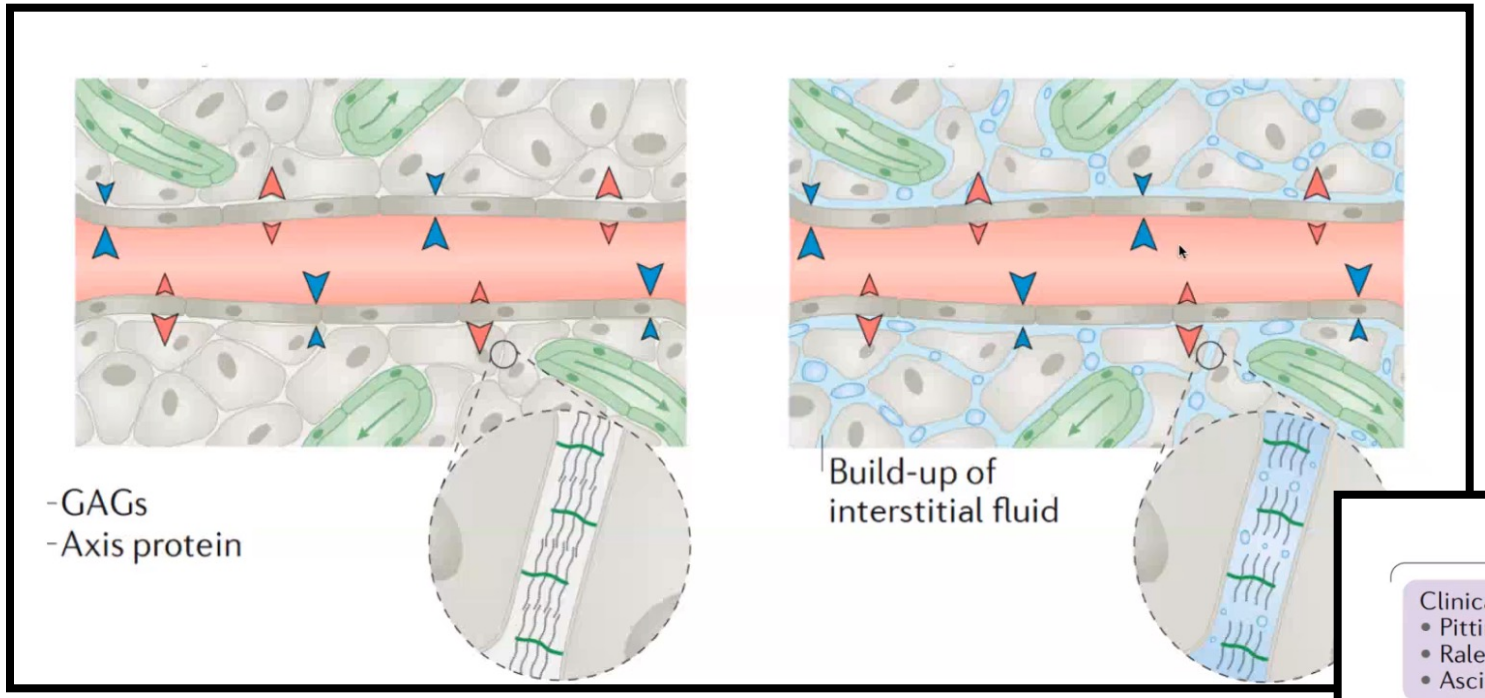
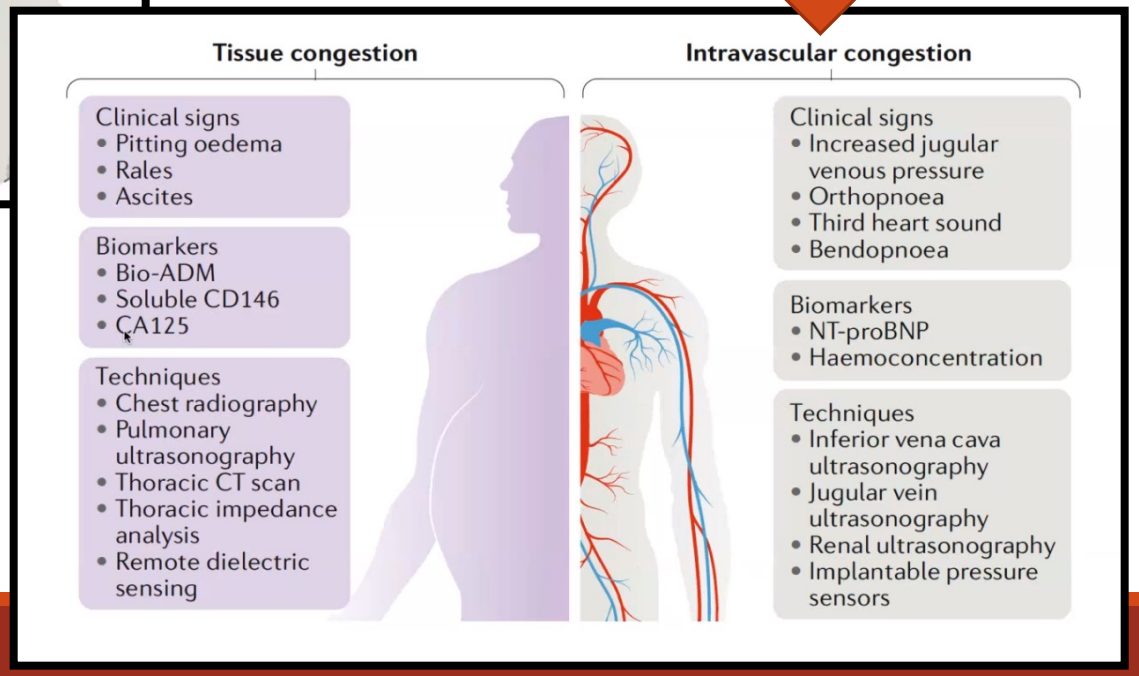
INTRODUCCIÓN

La insuficiencia cardiaca es una de las enfermedades más prevalentes en el mundo y pese a que en los últimos años la supervivencia ha mejorado, las tasas de mortalidad absolutas se mantienen alrededor del **20% en el primer año** y **50% a los cinco años** posteriores al diagnóstico.



Congestión intravascular vs tisular





Este documento se centra en el uso de diuréticos en la insuficiencia cardiaca que cursa con congestión intravascular

1. La evaluación de la congestión y la euvolemia clínica.
2. La evaluación de la respuesta/resistencia diurética.
3. Enfoque hacia estrategias diuréticas farmacológicas escalonadas.
4. Manejo de alteraciones electrolíticas comunes.

1 EVALUACIÓN DE LA CONGESTIÓN Y LA EUVOLEMIA

Muchos pacientes son dados de alta con congestión clínica residual

En el estudio de Evaluación de Estrategias de Optimización de Diuréticos (DOSE-AHF)

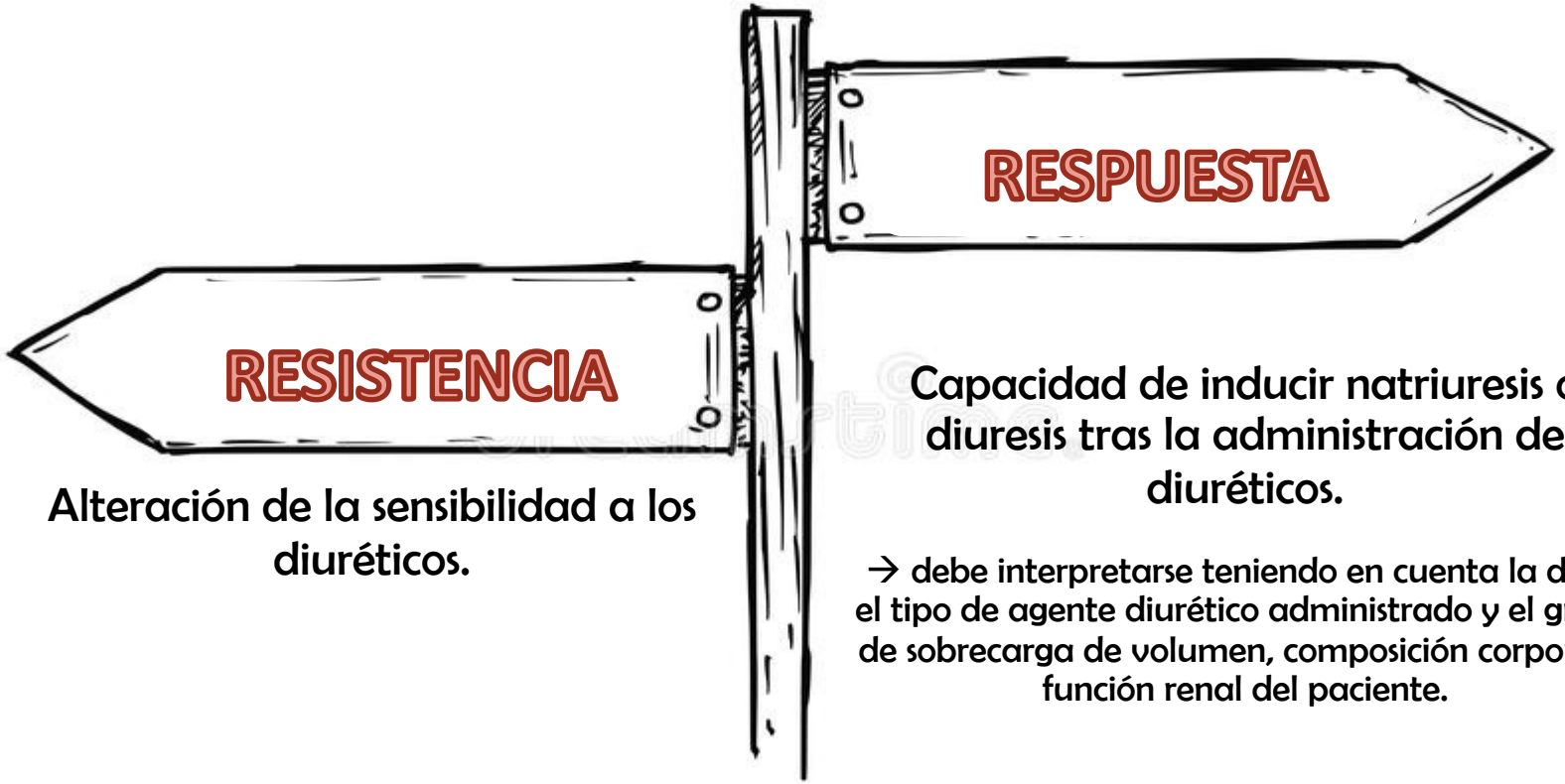
sólo el 15% de los pacientes fueron evaluados como euvolémicos

después de la terapia descongestiva.

	Variable	EUVOLEMIA				CONGESTED
Clinical congestion	Orthopnea	None		Mild	Moderate	Severe/worst
	JVP (cm)	<8 and no HJR	<8	8-10 or HJR+	11-15	>16
	Hepatomegaly		Absent	Liver edge	Moderate pulsatile enlargement	Massive enlargement and tender
	Edema		None	+1	+2	+3/+4
	6MWT	>400m	300-400m	200-300m	100-200m	<100m
Technical evaluation	NP (one of both): -BNP -NT-proBNP		<100 <400°	100-299 400-1500	300-500 1500-3000	>500 >3000
	Chest X-ray	clear	clear	cardiomegaly	- pulmonary venous congestion* - small pleural effusions*	- Interstitial or alveolar edema
	Vena Cava imaging [45]	none of two: - Max diameter >2.2 cm - collapsibility <50%		One of two: - Max diameter >2.2 cm - collapsibility <50%		Both: - Max diameter >2.2 cm - collapsibility <50%
	Lung Ultrasound [44]	<15 B-lines when scanning 28-sites		15-30 B-lines when scanning 28-sites		>30 B-lines when scanning 28-sites

2

EVALUACIÓN DE LA RESPUESTA/RESISTENCIA DIURÉTICA

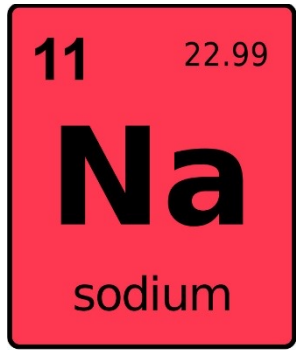


Capacidad de inducir natriuresis o diuresis tras la administración de diuréticos.

→ debe interpretarse teniendo en cuenta la dosis y el tipo de agente diurético administrado y el grado de sobrecarga de volumen, composición corporal y función renal del paciente.

Alteración de la sensibilidad a los diuréticos.

+

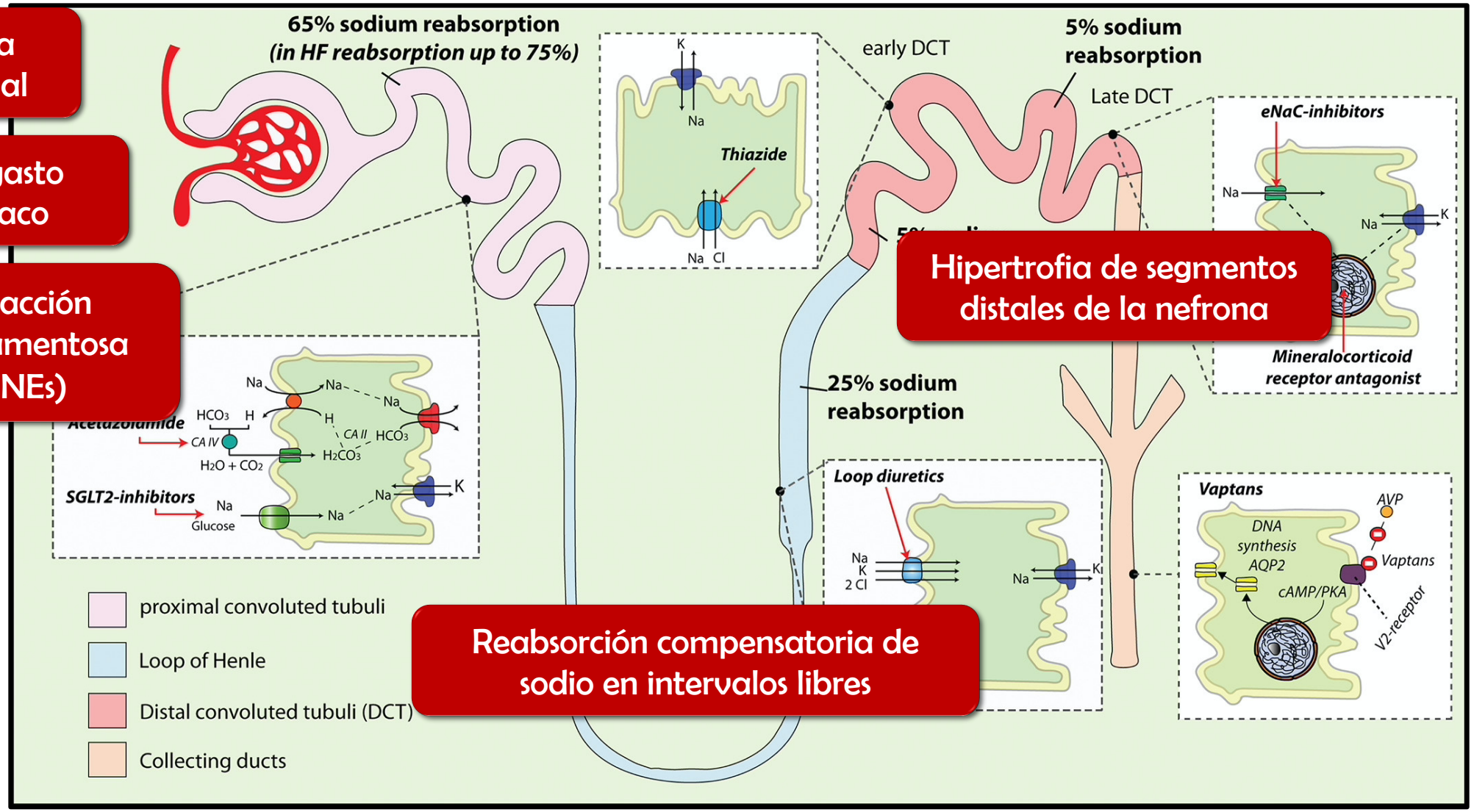


Inadecuada adherencia al tratamiento

Edema intestinal

Bajo gasto cardiaco

Interacción medicamentosa (AINEs)



Hipertrofia de segmentos distales de la nefrona

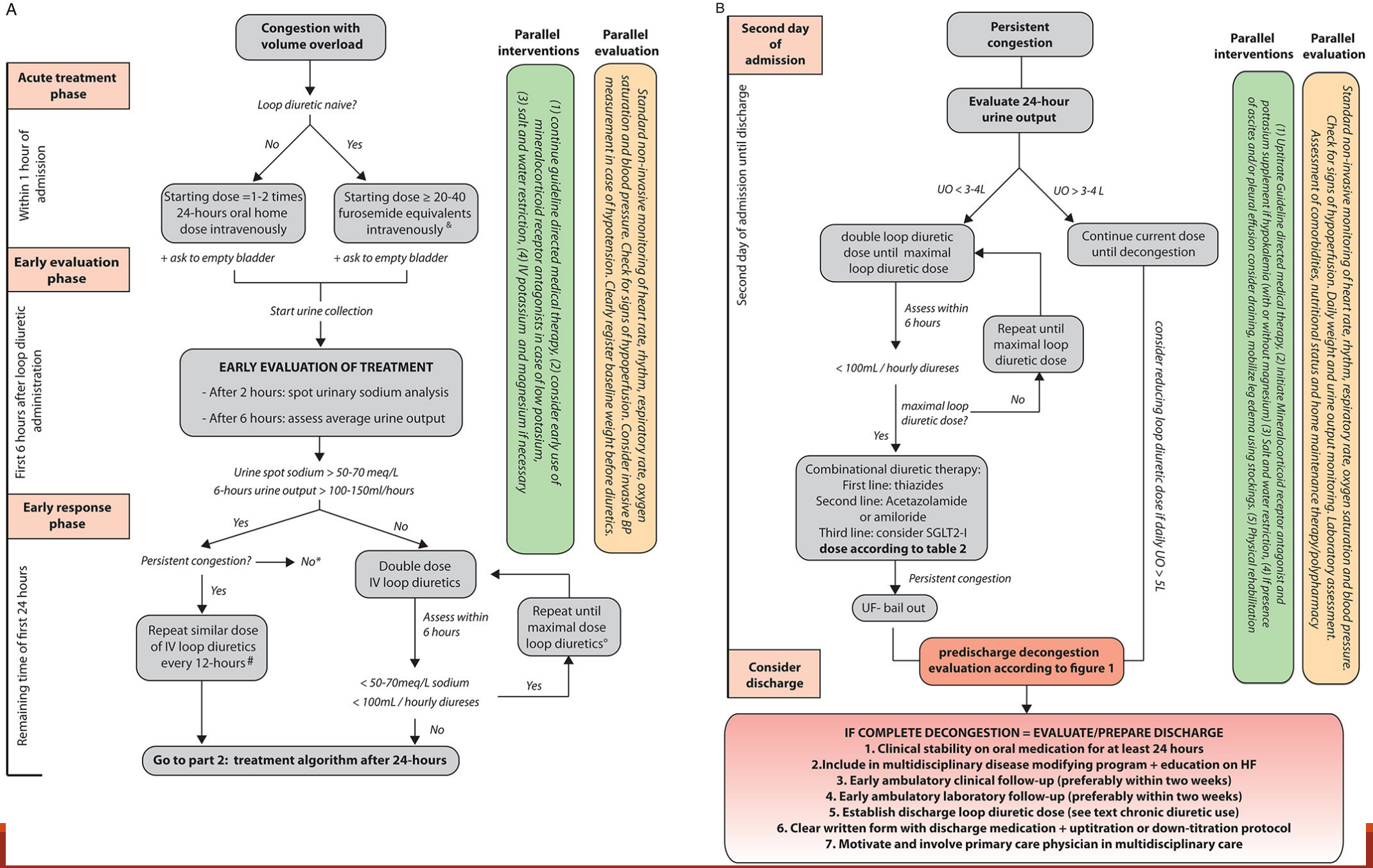
Reabsorción compensatoria de sodio en intervalos libres

3

ESTRATEGIAS DIURÉTICAS FARMACOLÓGICAS ESCALONADAS

La mayor parte del efecto diurético de los diuréticos de asa IV se produce dentro de las primeras 2h y vuelve a la excreción basal de sodio a las 6-8 h.

La evaluación temprana de la respuesta diurética permitirá la identificación de pacientes con una respuesta diurética deficiente, y con ello una **intensificación temprana** de la dosis de diurético de asa y/o el **uso combinado** de diuréticos con un modo de acción diferente.


A
Acute treatment phase
Within 1 hour of admission
Early evaluation phase
First 6 hours after loop diuretic administration
Early response phase
Remaining time of first 24 hours
Congestion with volume overload
Loop diuretic naive?
No
Yes
Starting dose =1-2 times 24-hours oral home dose intravenously
Starting dose ≥ 20-40 furosemide equivalents intravenously &
+ ask to empty bladder
+ ask to empty bladder
Start urine collection
EARLY EVALUATION OF TREATMENT
- After 2 hours: spot urinary sodium analysis
- After 6 hours: assess average urine output
Urine spot sodium > 50-70 meq/L
6-hours urine output > 100-150ml/hours
Yes
No
Persistent congestion?
No*
Yes
Repeat similar dose of IV loop diuretics every 12-hours #
Double dose IV loop diuretics
Assess within 6 hours
< 50-70meq/L sodium
< 100mL / hourly diureses
Yes
Repeat until maximal dose loop diuretics°
No
Go to part 2: treatment algorithm after 24-hours
Parallel interventions
(1) continue guideline directed medical therapy, (2) consider early use of mineralocorticoid receptor antagonists in case of low potasium, (3) salt and water restriction, (4) IV potassium and magnesium if necessary
Parallel evaluation
Standard non-invasive monitoring of heart rate, rhythm, respiratory rate, oxygen saturation and blood pressure. Check for signs of hypoperfusion. Consider invasive BP measurement in case of hypotension. Clearly register baseline weight before diuretics.
B
Second day of admission
Second day of admission until discharge
Persistent congestion
Evaluate 24-hour urine output
UO < 3-4L
UO > 3-4 L
double loop diuretic dose until maximal loop diuretic dose
Continue current dose until decongestion
Assess within 6 hours
Repeat until maximal loop diuretic dose
< 100mL / hourly diureses
maximal loop diuretic dose?
No
Yes
Combinational diuretic therapy:
First line: thiazides
Second line: Acetazolamide or amiloride
Third line: consider SGLT2-I
dose according to table 2
Persistent congestion
UF- bail out
predischarge decongestion evaluation according to figure 1
consider reducing loop diuretic dose if daily UO > 5L
Consider discharge
Parallel interventions
(1) Uptitrate Guideline directed medical therapy, (2) Initiate Mineralocorticoid receptor antagonist and pottasium supplement if hypokalemia (with or without magnesium) (3) Salt and water restriction, (4) If presence of ascites and/or pleural effusion consider draining, mobilize leg edema using stockings. (5) Physical rehabilitation
Parallel evaluation
Standard non-invasive monitoring of heart rate, rhythm, respiratory rate, oxygen saturation and blood pressure. Check for signs of hypoperfusion. Daily weight and urine output monitoring. Laboratory assessment. Assessment of comorbidities, nutritional status and home maintenance therapy/polypharmacy
IF COMPLETE DECONGESTION = EVALUATE/PREPARE DISCHARGE
1. Clinical stability on oral medication for at least 24 hours
2.Include in multidisciplinary disease modifying program + education on HF
3. Early ambulatory clinical follow-up (preferably within two weeks)
4. Early ambulatory laboratory follow-up (preferably within two weeks)
5. Establish discharge loop diuretic dose (see text chronic diuretic use)
6. Clear written form with discharge medication + uptitration or down-titration protocol
7. Motivate and involve primary care physician in multidisciplinary care

4 MANEJO DE ALTERACIONES ELECTROLÍTICAS

Table 3 Approach to electrolyte disturbances in acute heart failure

	Hyponatraemia	Hypokalaemia	Hyperkalaemia
Definition	$Na^+ < 135$ mEq/L	$K^+ < 3.5$ mEq/L	$K^+ > 5$ mEq/L
Diagnostic tests	• **P_{osm}**: should be <285 mOsm/L (else pseudo-hyponatraemia) • **Physical examination:** to differentiate between volume overload or volume depletion • **Urinary analysis:** U_{osm} and U_{Na}	• **ABG**: confirm on ABG, check pH status • **ECG**: check potential abnormalities • **Physical examination**: usually normal, however muscle weakness or paralysis present in severe cases • **Lab:** check for Mg deficit	• **ABG**: confirm on ABG, check pH status • **ECG**: check potential abnormalities • **Lab:** check renal function, exclude haemolysis as cause of pseudo-hyperkalaemia
Pathophysiology	• **Dilution**: impaired free water excretion. Clinical picture of volume overload with inappropriate high U_{osm} (≥ 100 mOsm/L). Typical in the setting of ADHF • **Depletion:** true body deficit of Na^+. Typical in the setting of chronic excessive diuretic use (and strict Na^+ intake). Clinical picture of volume depletion with low U_{osm} (< 100 mOsm/L) and U_{Na} (< 50 mEq/L)	• **Diuretic** use results in hypokalaemia • **Predisposing** factors in HF can play a role, for instance: cachexia with low K^+ intake and chronic hypomagnesaemia	Most likely due to combination of RAAS blocker agent and poor renal function with diminished renal potassium excretion capacity
Treatment	• **Dilution:** temporarily stop distal acting diuretics[a], limit water intake, promote distal nephron flow (loop diuretics, hypertonic saline, acetazolamide/SGLT2 inhibitor) or vaptans, correction of K^+ and Mg^{2+} deficiencies • **Depletion:** stop distal acting diuretics[a], calculate Na deficit and administer IV Na^+ correction of K^+ and Mg^{2+} deficiencies	• **Consider** discontinuation of thiazide diuretics • **Upfront** use of MRA during decongestion • **Increase** dose of RAAS blocking agent • **IV** substitution of K^+ and Mg^{2+}: peripheral or central depending on severity of K^+ deficit.	• **Acute hyperkalaemia:** if ECG abnormalities present, then prevent arrhythmias by IV calcium. Intermediate strategies include: insulin/albuterol/sodium HCO_3 IV. Ultimately potassium must be removed from the body with either diuretics, potassium binding resins, or RRT. • **Chronic hyperkalaemia:** reduces dose RAAS blocker, increase loop diuretic, potassium binders

ABG, arterial blood gas analysis; ADHF, acute decompensated heart failure; AVP, arginine vasopressin; ECG, electrocardiogram; HCO_3, bicarbonate; HF, heart failure; IV, intravenous; MRA, mineralocorticoid receptor antagonist; P_{osm}, plasma osmolality; RAAS, renin–angiotensin–aldosterone system; RRT, renal replacement therapy; SGLT2, sodium–glucose linked transporter-2; U_{osm}, urine osmolality; U_{Na}, urine sodium.

[a] Distal acting diuretics included thiazide-like diuretics, MRA and amiloride.

CONCLUSIONES

La estrategia diurética ideal está por llegar

Destacar el papel del sodio urinario para evaluar la idoneidad del tratamiento con diuréticos en la insuficiencia cardíaca aguda

Torasemida vs furosemida

TRANSFORM-HF: ToRsemide compArisoN With furoSemide FORManagement of Heart Failure (TRANSFORM-HF)

Gracias