Simposio
SCOMPENSO CARDIACO ACUTO E COMORBILITÀ NELL'ANZIANO

Fisiopatologia e clinica

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Azienda Ospedaliero-Universitaria Careggi, Firenze

Torino, 27 -30 Novembre 2013

Indice della presentazione

SCOMPENSO CARDIACO ACUTO

1) FISIOPATOLOGIA ⟺ COMORBILITA’

2) SEGNI E SINTOMI ⟺ COMORBILITA’

Indice della presentazione

SCOMPENSO CARDIACO ACUTO

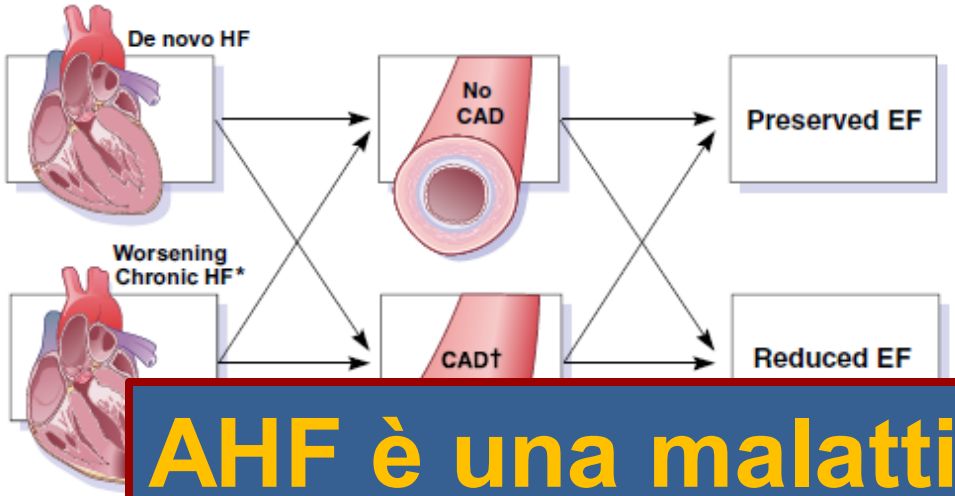
1) FISIOPATOLOGIA ⟺ COMORBILITA’

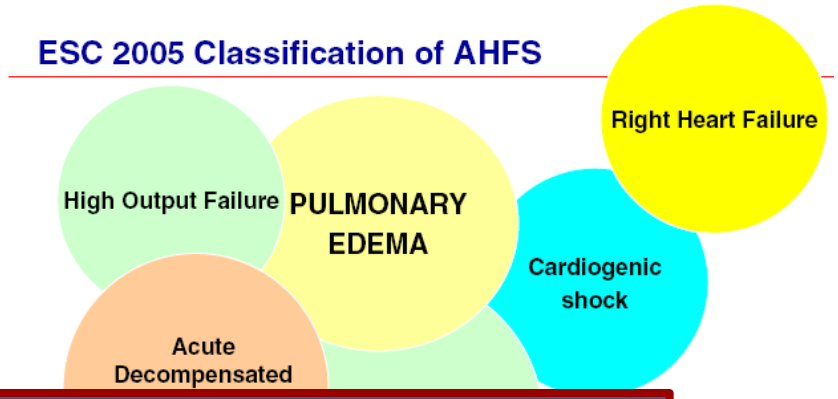
2) SEGNI E SINTOMI ⟺ COMORBILITA’

STATE-OF-THE-ART PAPER

Acute Heart Failure Syndromes

Mihai Gheorghiade, MD, FACC,* Peter S. Pang, MD†
Chicago, Illinois





AHF è una malattia d'organismo e non una malattia d'organo

AHFS are characterized by severe hemodynamic and neurohormonal abnormalities that may cause myocardial injury and/or renal dysfunction or may be a result of it (11,37,38). These abnormalities may be caused or precipitated by ischemia, hypertension, atrial fibrillation, other noncardiac conditions (e.g., renal insufficiency), or untoward drug effects (11,39–42).

Acute Heart Failure Syndromes

Gli estremi fenotipici dell' AHF

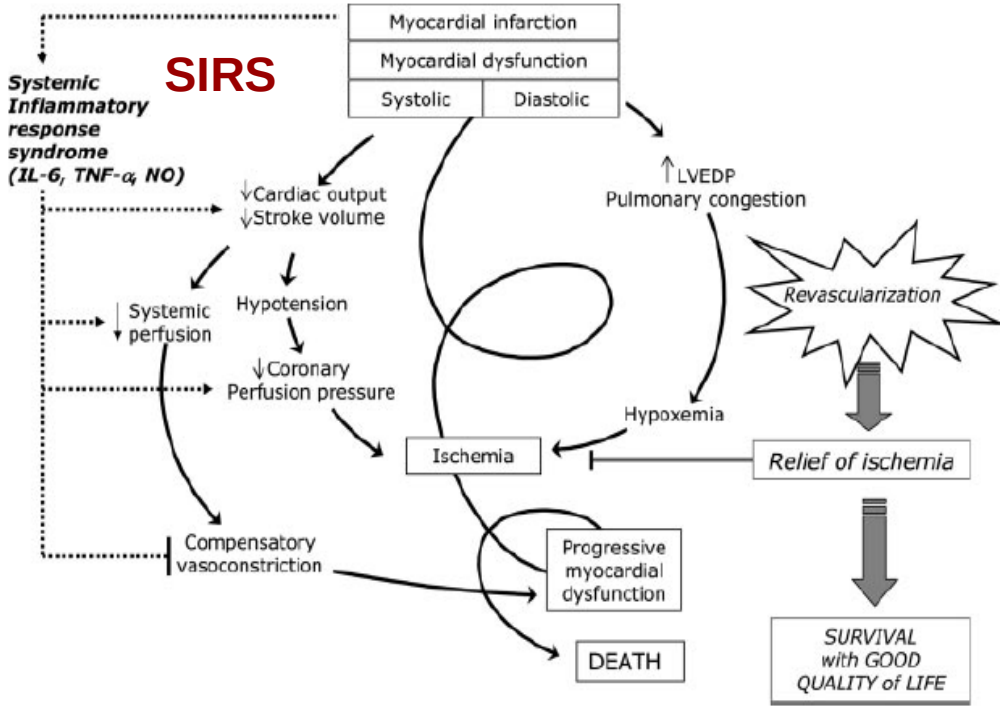
Shock cardiogeno

Acute decompensated chronic HF

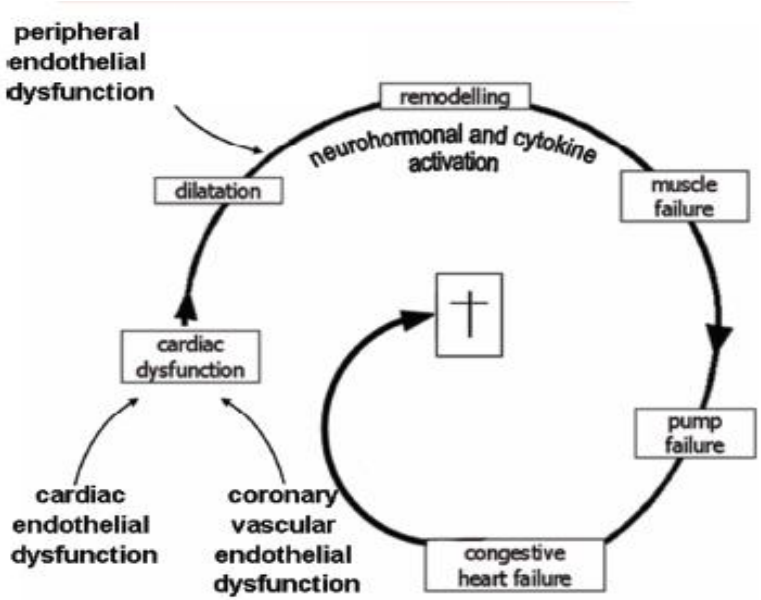
Cardiogenic Shock

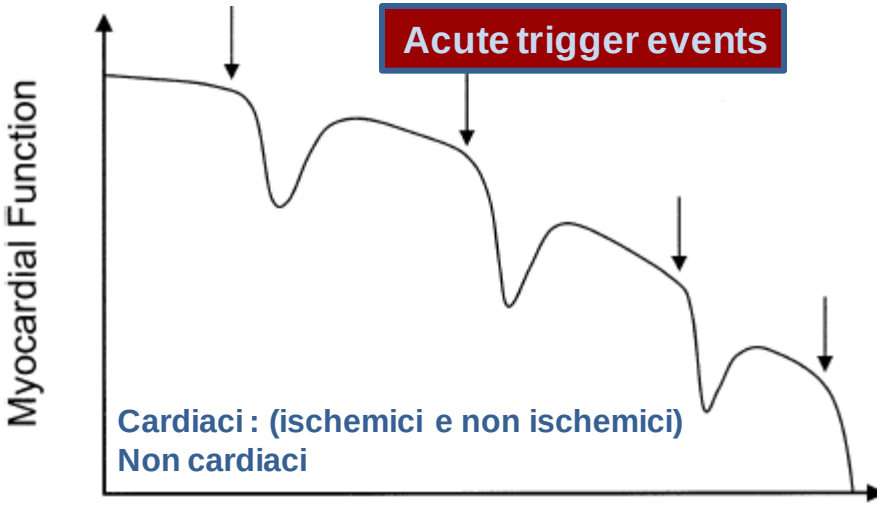
Current Concepts and Improving Outcomes

Harmony R. Reynolds, MD; Judith S. Hochman, MD

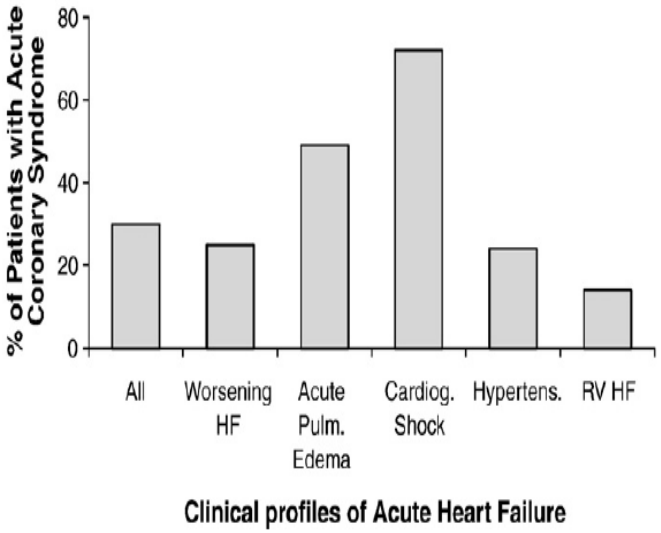


Crush and Burns



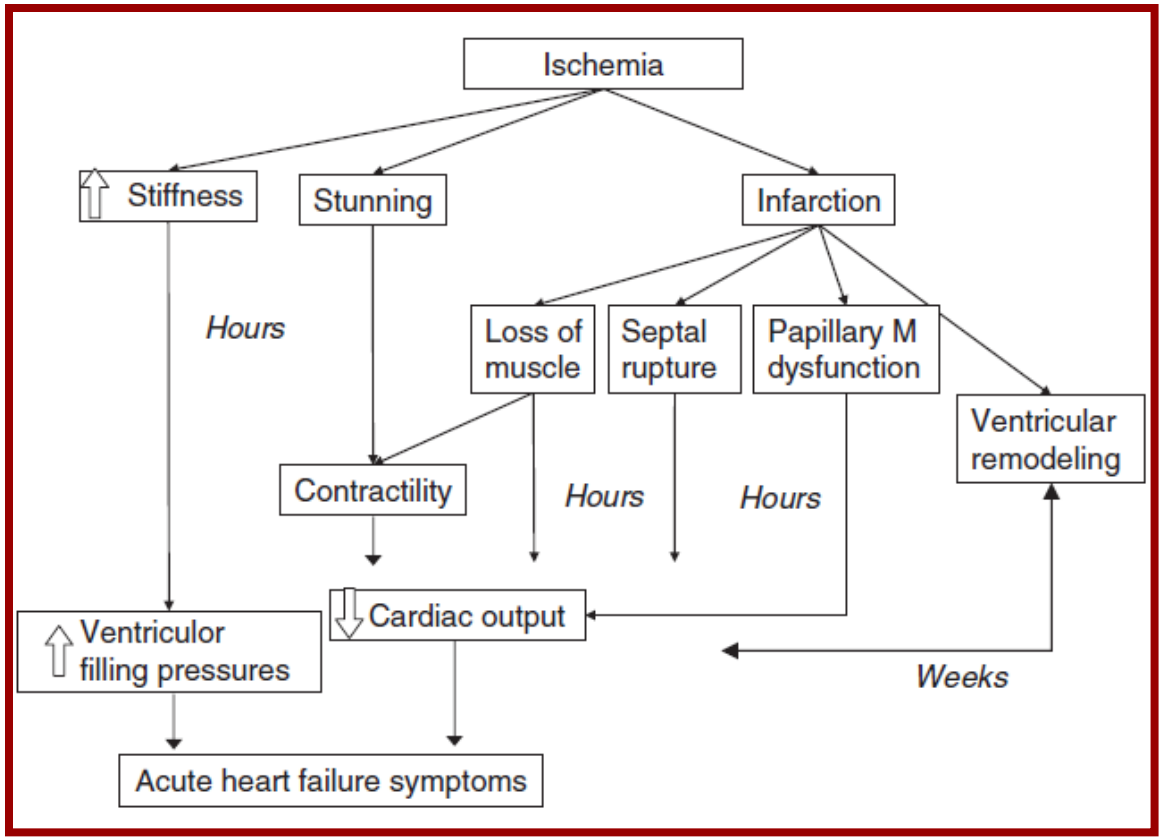


Ruolo fisiopatologico dell'ischemia miocardica



Clinical profiles of Acute Heart Failure

1) The role of ACS as the pathogenic mechanism of acute HF may vary according to the clinical scenario and ACS account for more than half of the cases of cardiogenic shock, the clinical profile of acute HF associated with the highest in-hospital mortality rate .



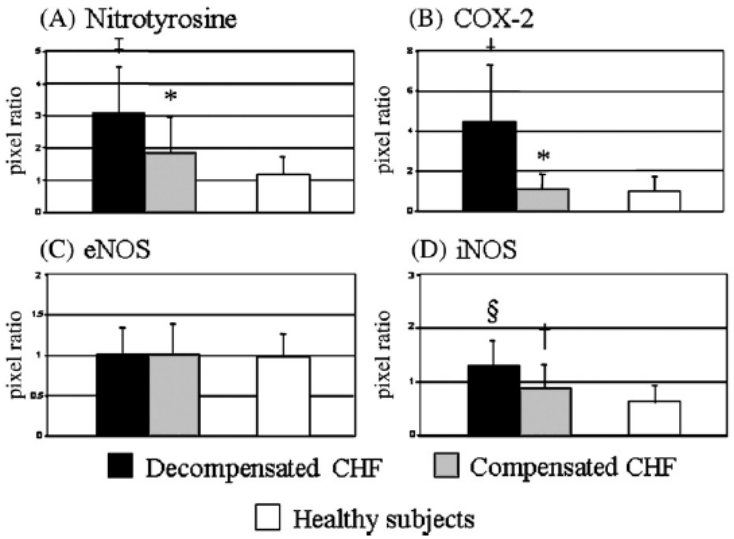
2) On the other hand, myocardial ischemia and necrosis may occur during an episode of acute HF as a consequence of a transient reduction in coronary perfusion due to increased left ventricular filling pressure, reduced systemic arterial blood pressure, tachycardia, coronary vasoconstriction and endothelial dysfunction mediated by neurohormonal activation

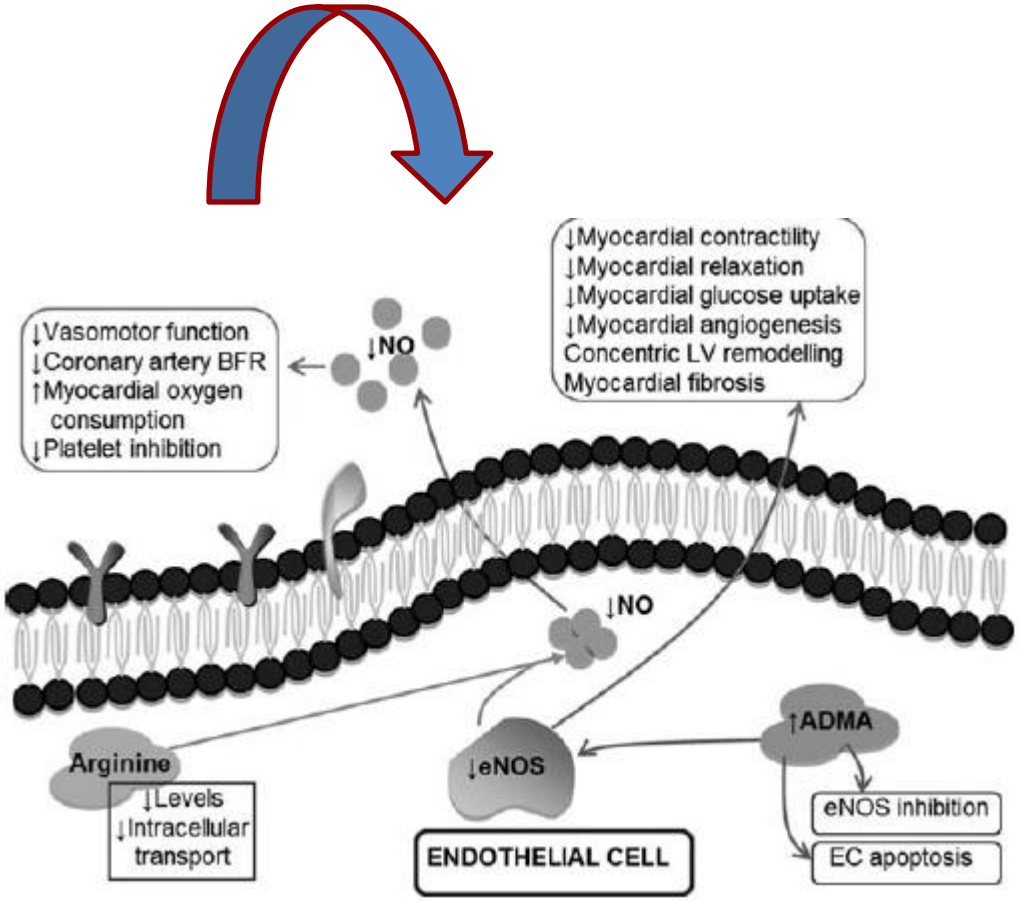
Ruolo fisiopatologico dell'infiammazione e della disfunzione endoteliale nell' AHF

Review

Acute heart failure as "acute endothelitis" — Interaction of fluid overload and endothelial dysfunction

Paolo C. Colombo [a,*], Duygu Onat [a], Hani N. Sabbah [b]





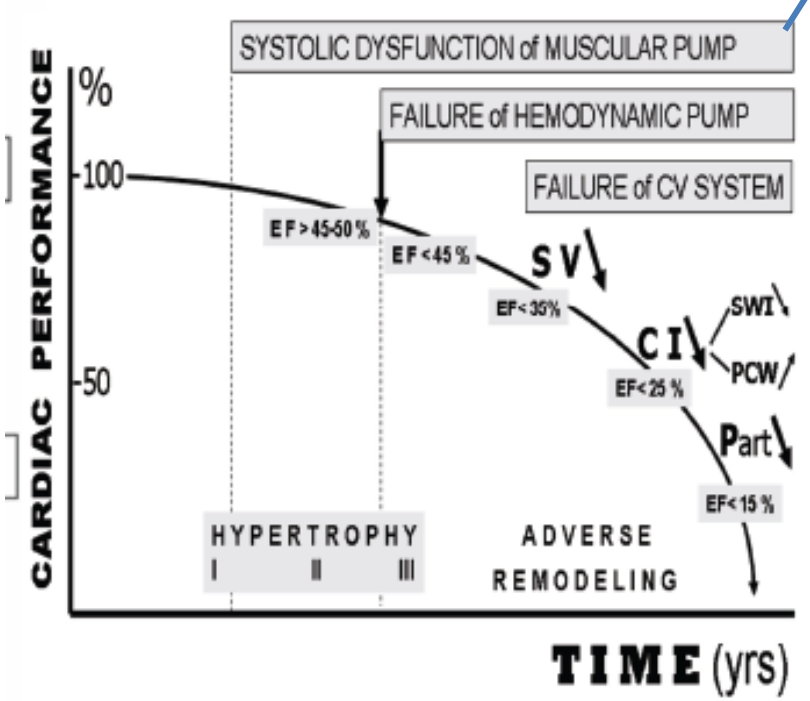
Acute Heart Failure Syndromes

Gli estremi fenotipici dell' AHF

Shock cardiogeno
- Uomo giovane adulto
- Prevalentemente affetto
- da ischemia miocardica

Acute decompensated HF
- Donna anziana, con comorbilità
- Con trigger più spesso non ischemico

Acute decompensated HF



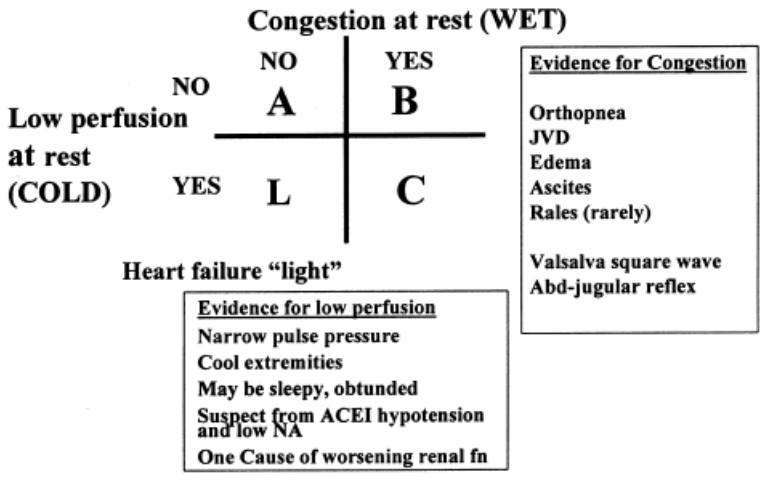
Preserved EF

Reduced EF

Flushing pulmonary edema

THE PATHOGENESIS OF ACUTE PULMONARY EDEMA ASSOCIATED WITH HYPERTENSION

SANJAY K. GANDHI, M.D., JOHN C. POWERS, M.D., ABDEL-MOHSEN NOMEIR, M.D., KAREN FOWLE, R.T., R.D.C.S., DALANE W. KITZMAN, M.D., KEVIN M. RANKIN, M.D., AND WILLIAM C. LITTLE, M.D.



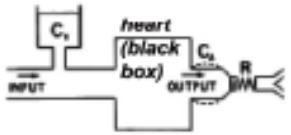
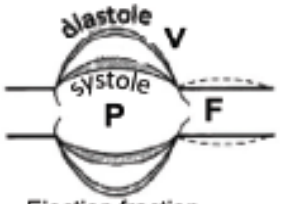
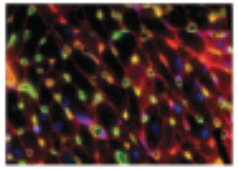
The Heart Failure Spectrum

Time for a Phenotype-Oriented Approach

Gilles W. De Keulenaer, MD, PhD; Dirk L. Brutsaert, MD, PhD

Reductionist Sciences

Integrative Physiology

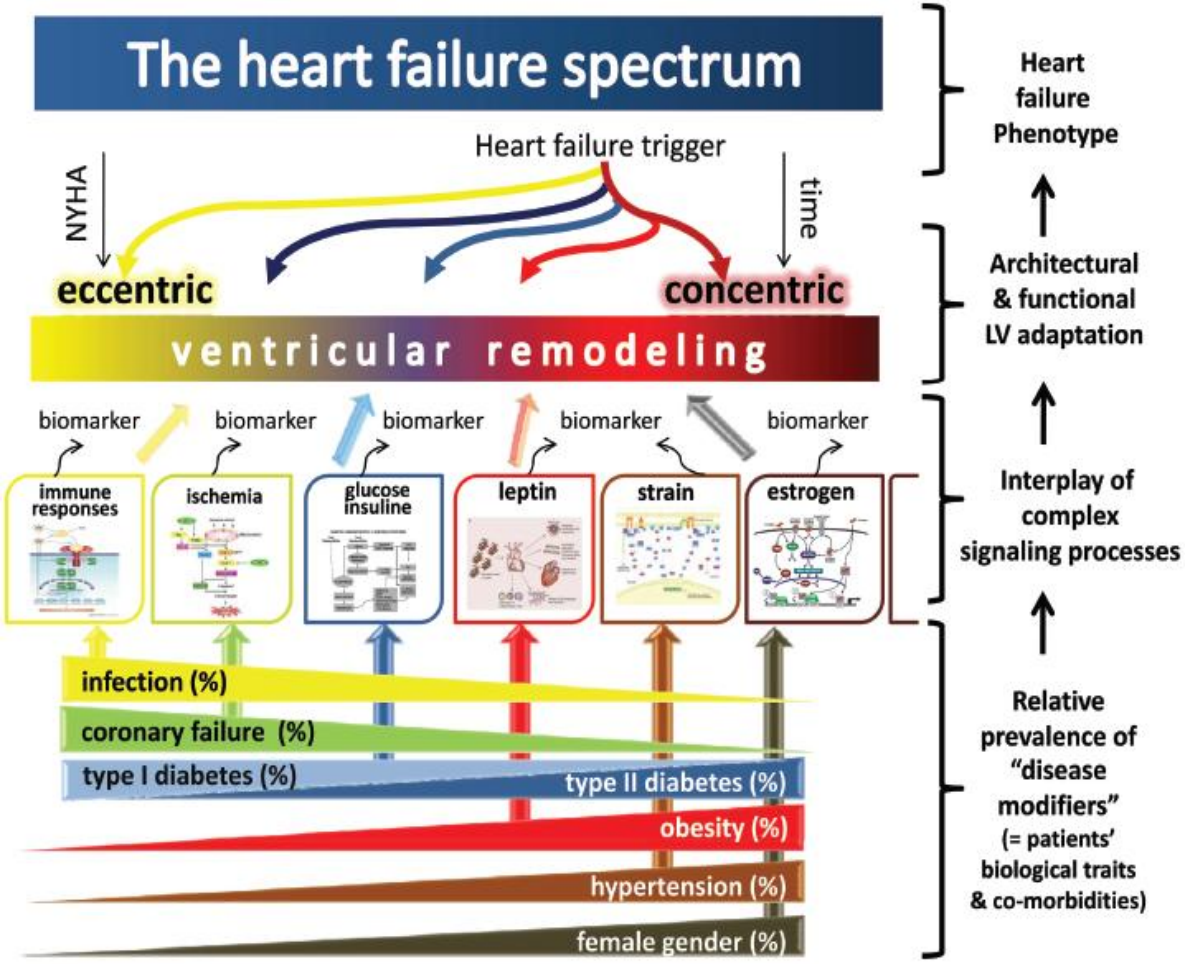
ORGANISM	ORGAN	TISSUE	CELL	GENE
HYDRODYNAMIC INPUT-OUTPUT SYSTEM	HEMODYNAMIC COMPRESSION PUMP	MUSCULAR SUCTION PUMP	PLURI-CELLULAR TISSUE PUMP	GENOME EPIGENOME PROTEOME
				
• Cardiac output • Stroke volume • Peripheral resistence • PCWP, arterial pressure • Blood volume • Renal function	• Ejection fraction • Elastance (Emax) • Dp/dtmax • LV EDV • LA volume	• Contractility • Load dependency • LV twisting/torsion, • LV untwisting/suction • Myocardial strain (rate)	• BNP; CRP; Tn-I • Endothelin, NO • Neuregulin • TGF-β • MMP's • ST-2	• cDNA micro-arrays • SNP's • micro-RNA's • GWAS • Scale-free networks
Swan-Ganz catheter PICO catheter	***LV catheter 2D ECHO***	***Tissue Doppler Cardiac MRI***	***Biomarkers Molecular Imaging***	***Genomics Proteomics***
FORWARD *and* **BACKWARD Heart Failure**	**SYSTOLIC** *and* **DIASTOLIC Heart Failure**	**CONTRACTILITY** *and* **SUCTION Failure**	**(Non-specific) MULTI-BIOMARKER strategies**	**Modular NETWORKS of Genes-Proteins**

HFPEF = failing muscular suction pump

HFREF = failing muscular suction AND hemodynamic compression pump

CONTROVERSIES IN CARDIOVASCULAR MEDICINE

Are Systolic and Diastolic Heart Failure Overlapping or Distinct Phenotypes Within the Heart Failure Spectrum?



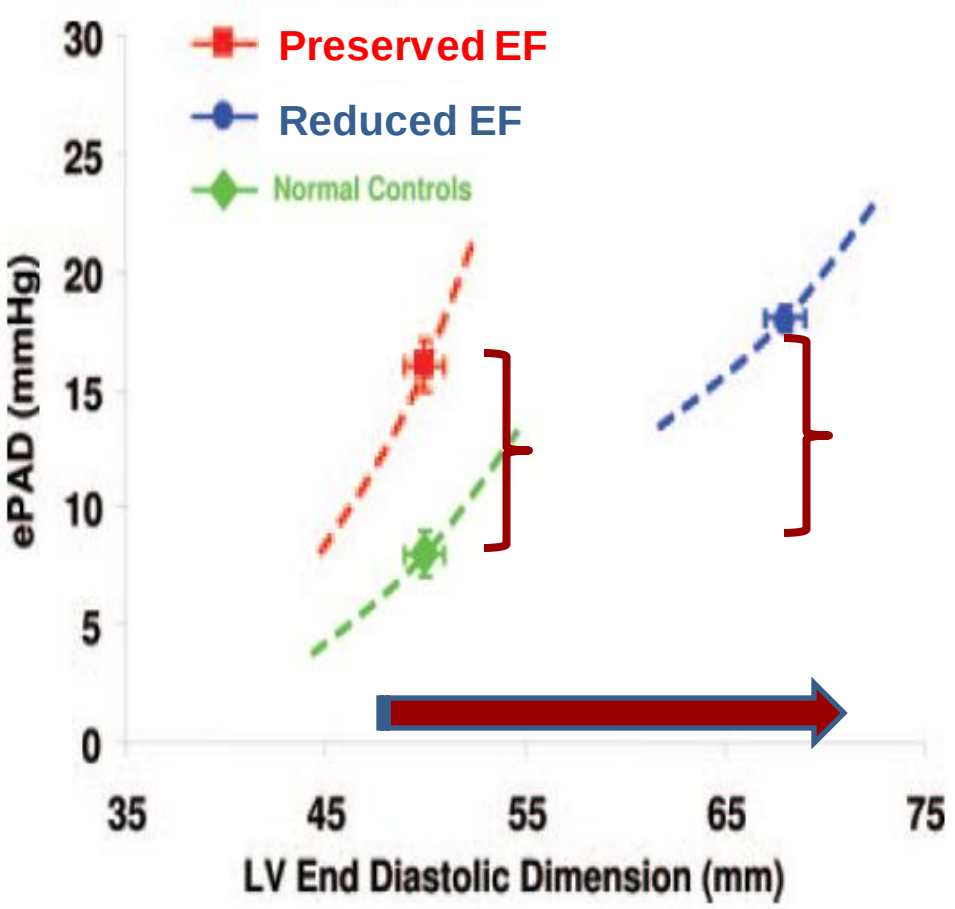
heart failure or cardiac fatigue is a clinical syndrome characterized by symptoms and signs of increased tissue/organ water and decreased tissue/organ perfusion,; Etiology may be either of cardiac (ischemic, hypertrophic, infectious, toxic) or non-cardiac (blood volume overload) origin. Regardless of(cardiac or noncardiac) etiology or cause, symptoms and signs may be related either to impaired cardiac relaxation and filling (predominantlydiastolic pump dysfunction/failure) or to impaired output of the cardiac pump (predominantlysystolic pump dysfunction/failure) **but almost always to a combination of both.**

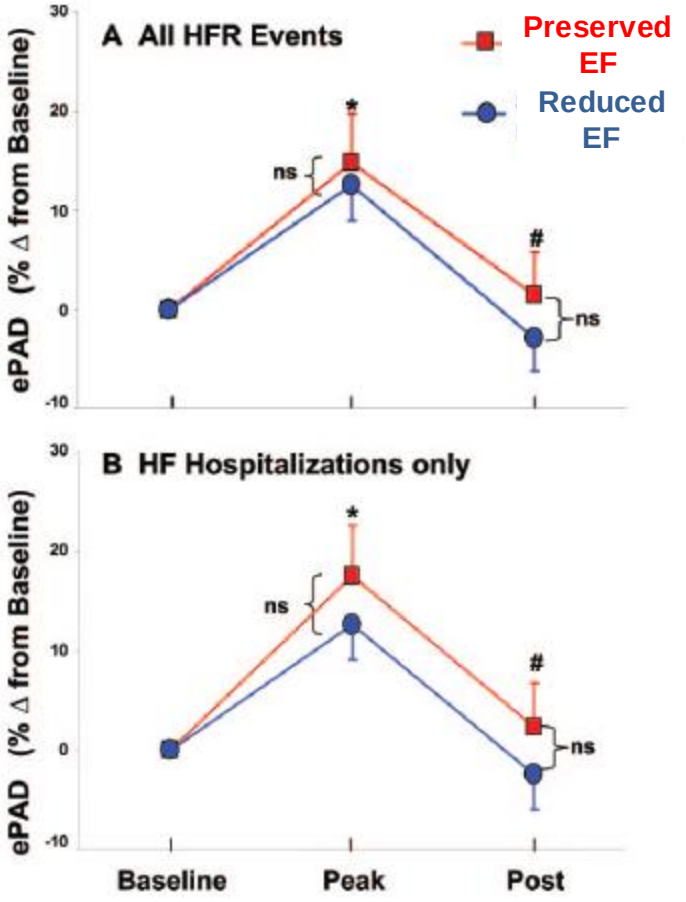
Transition From Chronic Compensated to Acute Decompensated Heart Failure: Pathophysiological Insights Obtained From Continuous Monitoring of Intracardiac Pressures

Michael R. Zile, Tom D. Bennett, Martin St. John Sutton, Yong K. Cho, Philip B. Adamson, Mark F. Aaron, Juan M. Aranda, Jr, William T. Abraham, Frank W. Smart, Lynne Warner Stevenson, Fred J. Kueffer and Robert C. Bourge

(*Circulation*. 2008;118:1433-1441.)

ePAD= pulmonary artery diastolic pressure





Factors Identified as Precipitating Hospital Admissions for Heart Failure and Clinical Outcomes

Findings From OPTIMIZE-HF

Arch Intern Med. 2008;168(8):847-854

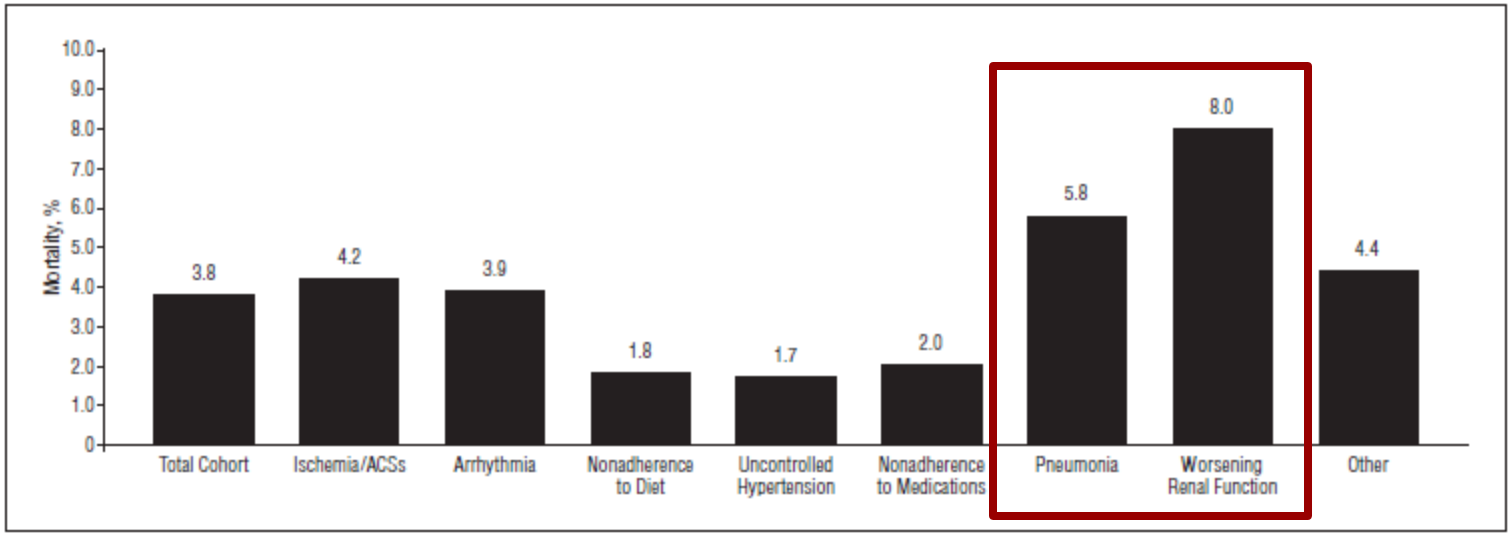


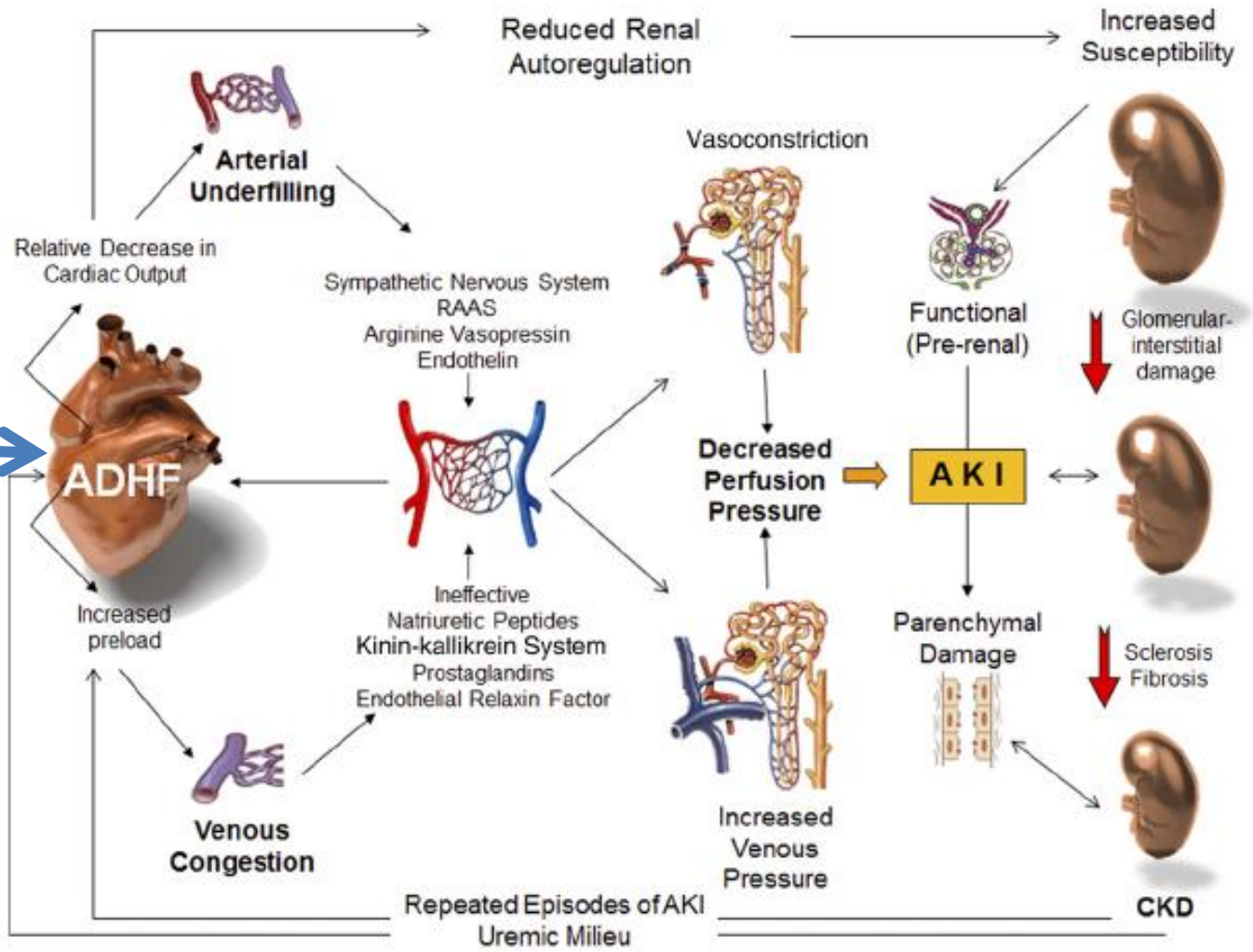
Figure. Unadjusted in-hospital mortality rates by precipitating factors for heart failure admission. ACSs indicates acute coronary syndromes.

Table 2. Precipitating Factors and Multivariate Risk-Adjusted In-Hospital Clinical Outcomes

Factor	No. of Patients	Adjusted Length of Stay Ratio	*P* Value	In-Hospital Mortality: Adjusted Odds Ratio (95% Confidence Interval)	In-Hospital Mortality: *P* Value
Ischemia/acute coronary syndrome	7155	0.99	.22	1.20 (1.03-1.40)	.02
Arrhythmia	6552	1.04	<.001	0.85 (0.71-1.01)	.07
Nonadherence to diet	2504	0.96	.01	0.69 (0.48-1.00)	.05
Uncontrolled hypertension	5220	0.96	<.001	0.74 (0.55-0.99)	.04
Nonadherence to medications	4309	0.96	<.001	0.88 (0.67-1.17)	.39
Pneumonia/respiratory process	7426	1.08	<.001	1.60 (1.38-1.85)	<.001
Worsening renal function	3304	1.09	<.001	1.48 (1.23-1.79)	<.001
Other	6171	0.99	.23	1.15 (0.97-1.36)	.10

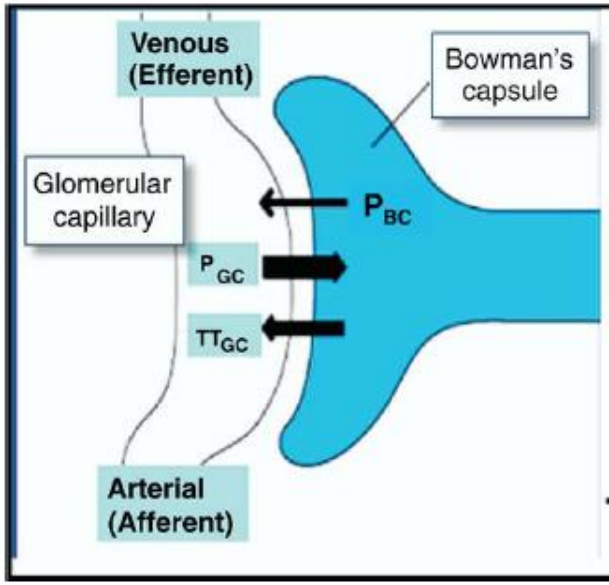
La sindrome cardio-renale
Type 1

Starting point



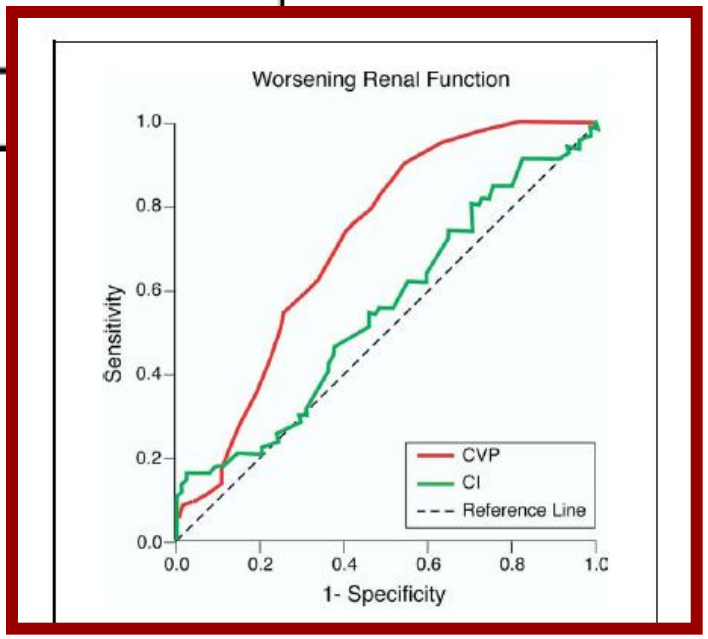
Importance of Venous Congestion for Worsening of Renal Function in Advanced Decompensated Heart Failure

JACC 2009



Forces	Normal: Afferent end of glomerular capillary (mmHg)	Normal: Efferent end of glomerular capillary (mmHg)	↑ RA pressure: Afferent end of glomerular capillary (mmHg)	↑ RA pressure: Efferent end of glomerular capillary (mmHg)
1. Favoring Filtration				
Glomerular-capillary hydrostatic pressure, P_{GC}	**60**	**58**	**55**	**63**
2. Opposing Filtration				
a. Hydrostatic pressure in Bowman's capsule, P_{BC}	**15**	**15**	**15**	**15**
b. Oncotic pressure in glomerular capillaries, π_{GC}	**21**	**33**		
Net filtration pressure (1-2)	**24**	**10**		
Filtration pressure:	*14 mmHg*			

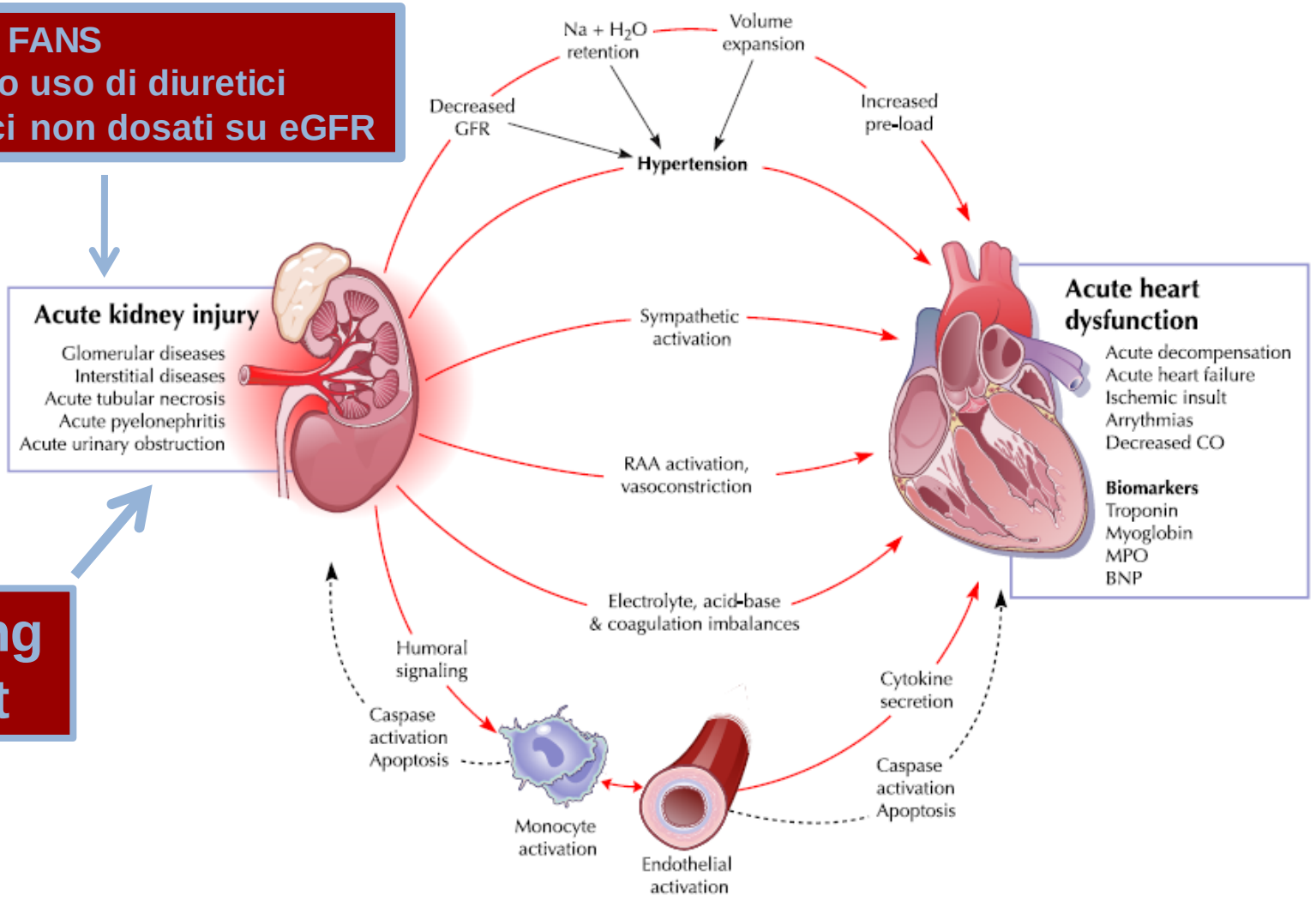
Our data imply that, apart from intrinsic renal insufficiency, the presence of venous congestion, rather than reduced cardiac output, may be the primary hemodynamic factor driving WRF in this patient population.



La sindrome cardio-renale
Type 3

- ✓Abuso di FANS
- ✓Incongruo uso di diuretici
- ✓Antibiotici non dosati su eGFR

Starting point



RESEARCH ARTICLE Open Access

Patients with worsening chronic heart failure who present to a hospital emergency department require hospital care

Masoud Shafazand[1*], Harshidaben Patel[2], Inger Ekman[2], Karl Swedberg[1] and Maria Schaufelberger[1]

Table 2 Reasons for hospital admission in patients with worsening CHF (The pati one reason)

Reason for hospital admission	Proportion
Pneumonia/respiratory disease	35.4%
Need to monitor cardiac rhythm	15.6%
Communication problem (such as dementia, stroke and aphasia)	22.3%
Pulmonary oedema	11.3%
Myocardial infarction	6.2%
Anaemia*	5.2%
Pathologic blood chemistry other than haemoglobin**	3.7%
Hypotension	2.1%

Pneumonia and other respiratory diseases were the most common reason for hospital admission among patients with CHF in our study

Systemic Inflammatory Response Syndrome After Acute Myocardial Infarction Complicated by Cardiogenic Shock

Arch Intern Med. 2005;165:1643-1650

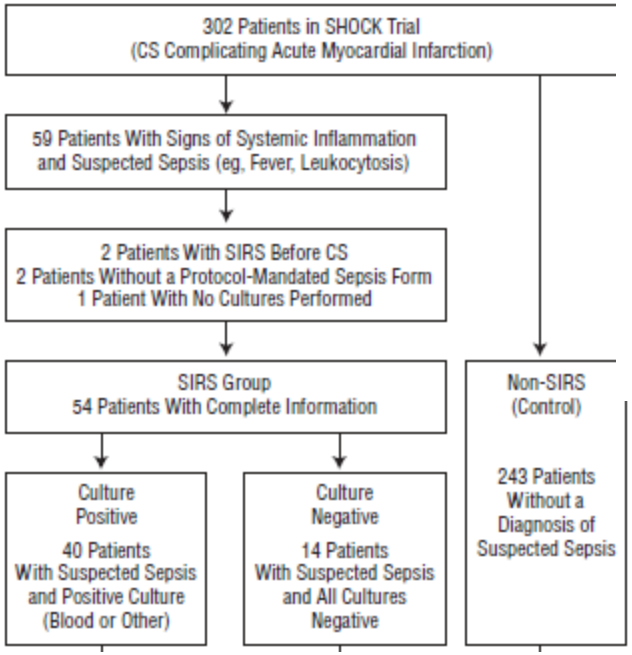


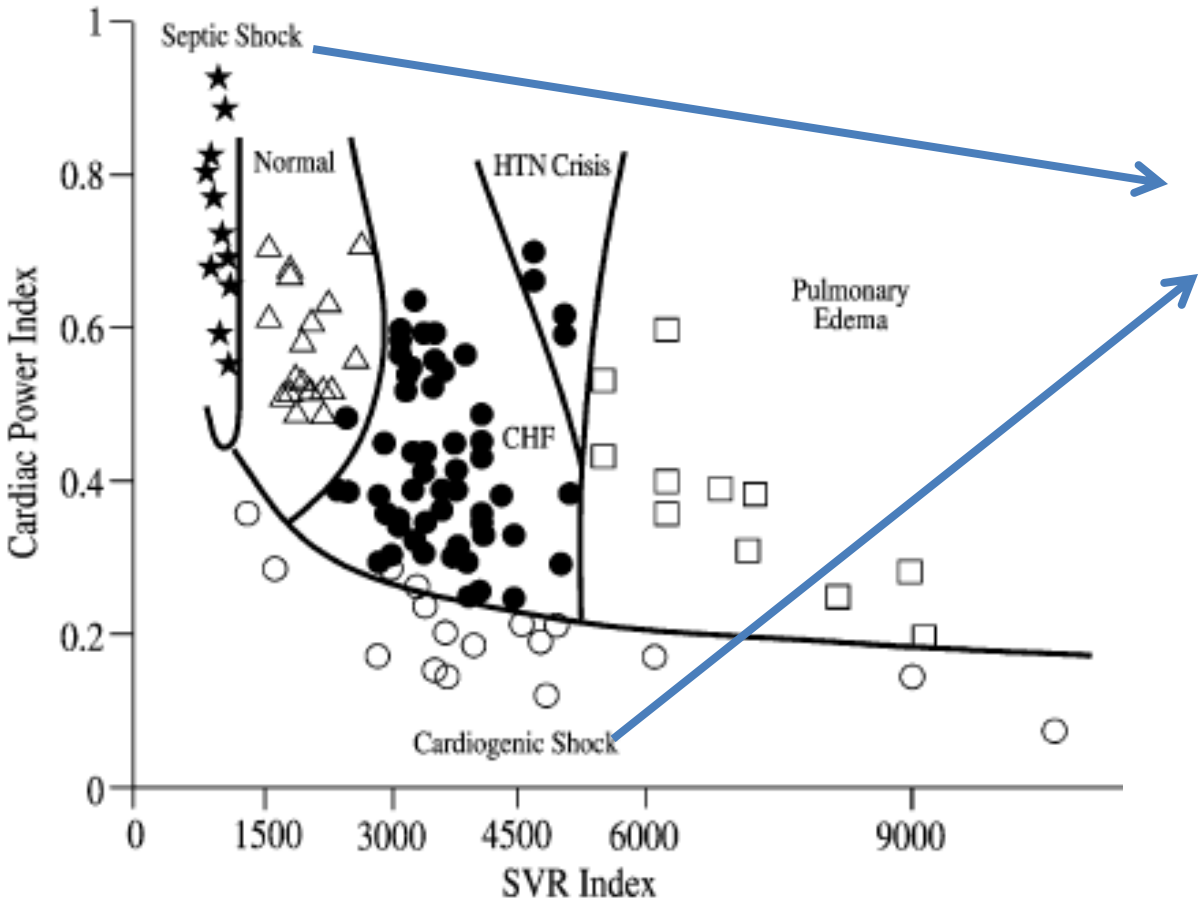
Table 2. Hemodynamic Measurements of the 297 Study Patients*

Measurement	SIRS: Culture-Positive (n = 40)	SIRS: Culture-Negative (n = 14)	Non-SIRS Control (n = 243)	*P* Value†
In-hospital left ventricular ejection fraction, same day or after shock, %	30 ± 12 (n = 31)	25 ± 9 (n = 4)	28 ± 11 (n = 128)	.66
Pulmonary capillary wedge pressure, mm Hg	24 ± 7 (n = 39)	24 ± 4 (n = 11)	24 ± 8 (n = 215)	.92
Cardiac index, L/min per square meter	1.8 ± 0.6 (n = 39)	1.8 ± 0.4 (n = 11)	1.8 ± 0.6 (n = 206)	.39
Systolic blood pressure, mm Hg	85 ± 16 (n = 39)	81 ± 14 (n = 11)	89 ± 21 (n = 229)	.48
Diastolic blood pressure, mm Hg	51 ± 15 (n = 36)	51 ± 12 (n = 8)	55 ± 15 (n = 215)	.27
Heart rate, beats/min	101 ± 22 (n = 39)	108 ± 25 (n = 12)	102 ± 23 (n = 229)	.59
SVR, median (IQR), dyne/s per centimeter§	1051 (862-1486) (n = 31)	1174 (705-1370) (n = 11)	1402 (1088-1807) (n = 168)	.006

Table 4. Logistic Regression Model for Predictors of Culture-Positive SIRS for 210 Study Patients

Predictor	OR for Culture-Positive SIRS (95% CI)	*P* Value
Age*	0.67 (0.45-1.00)	.047
Coronary artery bypass grafting (yes vs no)	3.01 (1.32-6.86)	.009
SVR†	1.21 (1.04-1.40)	.01

AHF ha sempre elevate resistenze periferiche?



Spesso NELL'ANZIANO COESISTONO

Cotter et al. Eur. J Heart Fail. 2003

Indice della presentazione

SCOMPENSO CARDIACO ACUTO

1) FISIOPATOLOGIA ⟺ COMORBILITA’

2) SEGNI E SINTOMI ⟺ COMORBILITA’

The clinical cornerstones

Dispnea

Congestione

Diagnosis of heart failure in older adults: predictive value of dyspnea at rest

A. Ahmed et al. / Arch. Gerontol. Geriatr. 38 (2004) 297–307

Dyspnea at rest on admission	Framingham criteria: Yes	Framingham criteria: No	Total	
Yes	772 (a)	203 (b)	975 (a + b)	Predictive value positive (post-test likelihood of disease) = a / (a + b) = 772 / 975 = 79%
No	69 (c)	47 (d)	116 (c + d)	Predictive value negative (post-test likelihood of NO disease) = d / (c + d) = 47 / 116 = 40%
Total	841 (a + c)	250 (b + d)	109 (a + b +	

Sensitivity (true positive rate) = a / (a + c) = 772 / 841 = 92%

Specificity (true negative rate) = b / (b + d) = 47 / 250 = 19%

Pr…ence (pre-test likelihood …isease) = (a + c) / (a + b + c + d) = 841 / 1091 = 77%

19%

Dyspnea at rest is a non-specific symptom and may result from a variety of other non-cardiac causes

an absence of this symptom is more useful than its presence in making a diagnosis of heart failure. In otherwords, when dyspnea at rest is absent, the possibility of a diagnosis of heart failure is likely to be low

Thoracic Kyphosis and Ventilatory Dysfunction in Unselected Older Persons: An Epidemiological Study in Dicomano, Italy

Mauro Di Bari, MD, PhD, Melisenda Chiarlone, MD,* Daniela Matteuzzi, MD,* Simona Zacchei, MD,* Claudia Pozzi, MD,* Vincenzo Bellia, MD,† Francesca Tarantini, MD, PhD,* Riccardo Pini, MD,* Giulio Masotti, MD,* and Niccoló Marchionni, MD**

	Unadjusted			Adjusted*		
	Kyphosis (n = 130)	No Kyphosis (n = 193)		Kyphosis (n = 126)	No Kyphosis (n = 185)	
Variable	Mean ± SEM		*P*-value	Mean ± SEM		*P*-value
FVC_{SS} (% of predicted)	91.1 ± 1.7	97.8 ± 1.2	.001	82.8 ± 3.0	89.1 ± 3.0	.002
FVC_{KHS} (% of predicted)	87.5 ± 1.7	95.8 ± 1.2	<.001	79.7 ± 3.0	87.4 ± 3.0	<.001
$FEV1_{SS}$ (% of predicted)	88.8 ± 2.0	96.6 ± 1.4	.001	70.2 ± 3.3	77.7 ± 3.3	.001
$FEV1_{KHS}$ (% of predicted)	85.4 ± 1.9	94.6 ± 1.3	<.001	67.3 ± 3.3	76.2 ± 3.2	<.001
FEV1/FVC (%)	69.2 ± 1.0	71.2 ± 0.6	.017	59.7 ± 1.4	61.6 ± 1.4	.052

*Least square means, adjusted for age, sex, smoking history, and diagnosis of chronic bronchitis and asthma.
SEM = standard error of the mean; FVC = forced vital capacity; SS = standing stature; KHS = knee-height-derived stature; FEV1 = forced expiratory volume in 1 second.

In conclusion, this study provides evidence that thoracic kyphosis is a frequent cause of dyspnea and ventilatory dysfunction in older persons.

Noncardiac Comorbidity Increases Preventable Hospitalizations and Mortality Among Medicare Beneficiaries With Chronic Heart Failure

Joel B. Braunstein, MD,*† Gerard F. Anderson, PHD,*‡ Gary Gerstenblith, MD,† Wendy Weller, PHD,‡ Marlene Niefeld, MPP,‡ Robert Herbert,‡ Albert W. Wu, MD, MPH*‡
Baltimore, Maryland

(J Am Coll Cardiol 2003;42:1226–33)

Table 2. Twenty Most Common Noncardiac Chronic Disease Conditions for Patients Age ≥65 Years With CHF (n = 122,630)

Chronic Disease Defined by CCS Code	% Prevalence (n)
Essential hypertension	55 (67,211)
Diabetes mellitus	31 (38,175)
COPD and bronchiectasis	26 (32,275)

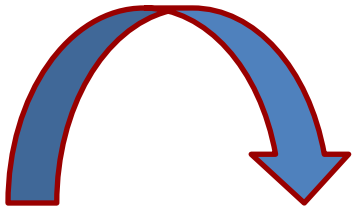


Table 4. Association of Noncardiac Comorbidity With Any Ambulatory Care Sensitive Condition Hospitalization Among Medicare Beneficiaries With CHF

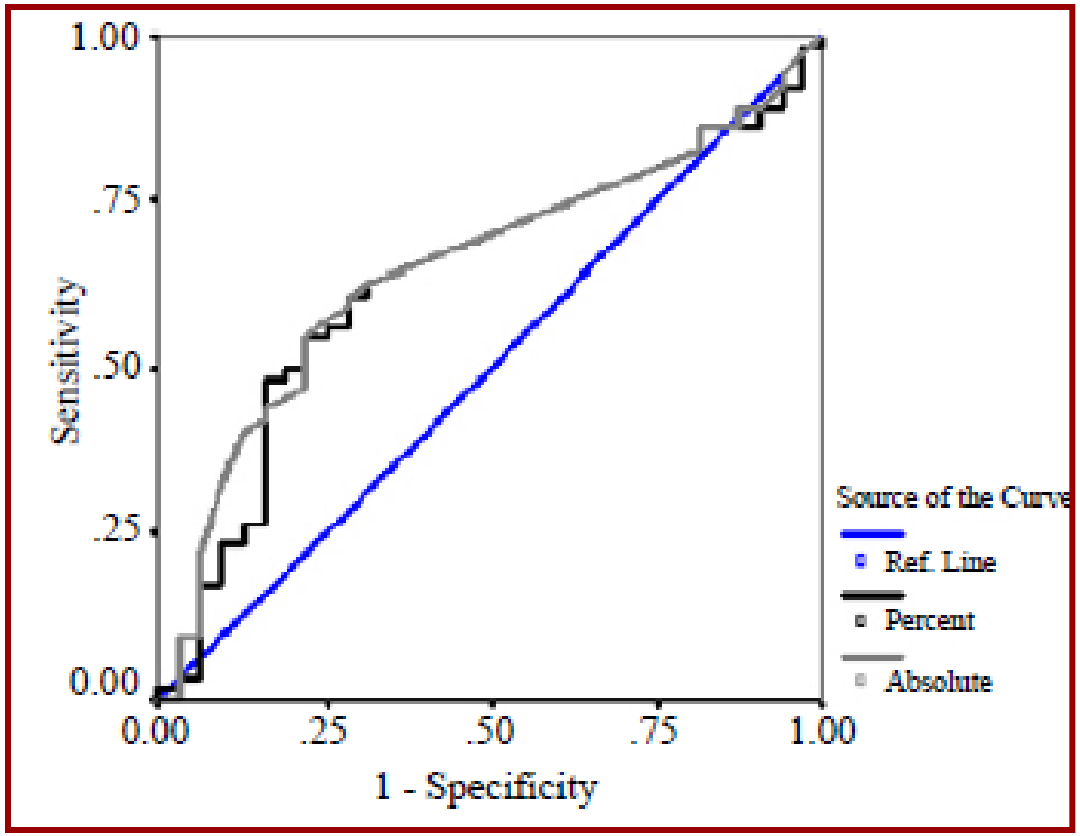
	Risk Ratio (95% CI) (n = 122,630)	
Condition	**Unadjusted**	**Adjusted***
COPD/bronchiectasis	1.92 (1.88–1.96)	1.46 (1.42–1.51)
Lower respiratory disease, failure or insufficiency	1.82 (1.77–1.86)	1.70 (1.65–1.76)
Asthma	1.54 (1.48–1.60)	1.13 (1.07–1.19)

Review

Fluid overload in acute heart failure — Re-distribution and other mechanisms beyond fluid accumulation

European Journal of Heart Failure 10 (2008) 165–169

Weight gain



The pathophysiology of acute heart failure—Is it all about fluid accumulation?

Am Heart J 2008;155:9-18.

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Senza che sia presente "FLUID ACCUMULATION"

↓ Riserva contrattile

↑ Stiffness Vsx

↑ Wedge pressure

Central fluid redistribution

Pulmonary congestion

SOCIETÀ ITALIANA DI GERONTOLOGIA E GERIATRIA

58° Congresso Nazionale

..Patients with acute HF are a heterogeneous population with respect to both clinical profiles at presentation and pathophysiological mechanisms. Specific pathophysiologic substrates act as precipitating or concomitant factors in acute HF and significantly affect prognosis and represent targets for treatment……..

Grazie a tutti e ora il testimone ai Colleghi