

אי ספיקת לב כרונית – אפידמיולוגיה, אבחון וטיפול פרמקולוגי

דר' אברהם שוטן

מכון הלב

מרכז רפואי הילל יפה

חדרה

ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008

**The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2008
of the European Society of Cardiology**

**Developed in collaboration with the Heart Failure Association of the ESC (HFA) and
endorsed by the European Society of Intensive Care Medicine (ESICM)**

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**European Heart Journal
Doi:10.1093/eurheart/ehn 309;1-55**

**European Journal of Heart Failure
doi:10.1016/j.ejheart.2008.08.005**

**ACC/AHA PRACTICE Guidelines 2009 Focused Update Incorporated Into the ACCF/AHA
2005 guidelines for the Diagnosis and Management of Heart Failure in Adults:
A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines**

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HFSA 2010 Comprehensive Heart Failure Practice Guideline

Heart Failure Society of America

St. Paul Minnesota

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Definition of Heart Failure

Heart failure is a clinical syndrome in which patients has the following features:

- **Symptoms typical of heart failure**

(breathlessness at rest or on exercise, fatigue, tiredness, ankle swelling)

and

- **Signs typical of heart failure**

(Tachycardia, tachypnoea, pulmonary rales, pleural effusion, ↑JVP, peripheral oedema, hepatomegaly)

and

- **Objective evidence of a structural or functional abnormality of the heart at rest**

(Cardiomegaly, S3, cardiac murmurs, abnormality on echocardiogram, ↑BNP)

Stages of Heart Failure

A At **high risk** for developing HF, but **without structural** heart disease or **symptoms** of HF

B Structural heart disease, but **without symptoms** of HF

Pre-heart failure

Heart Failure

C Structural heart disease **with prior** or **current symptoms** of HF

D Refractory HF requiring **specialized interventions**

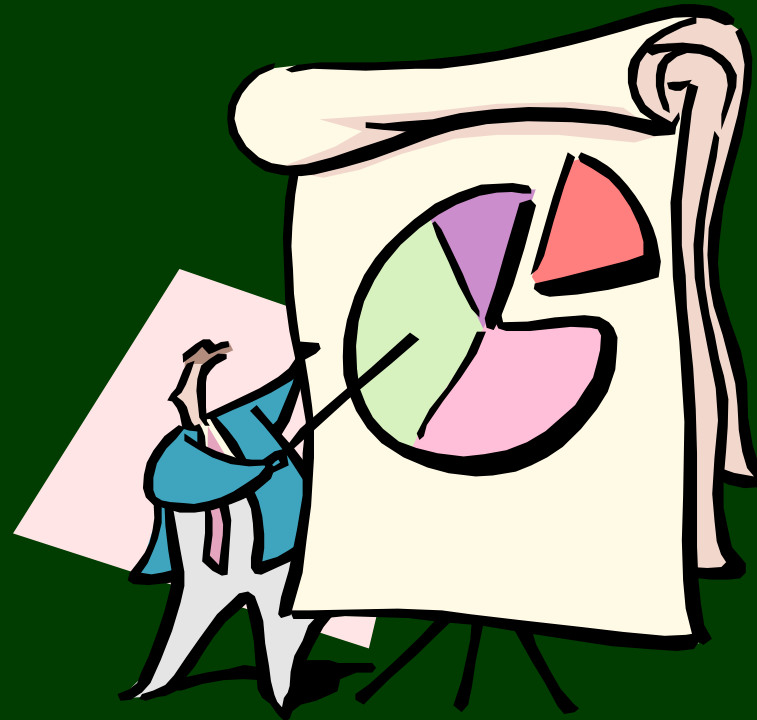
Epidemiology of Heart Failure – Europe

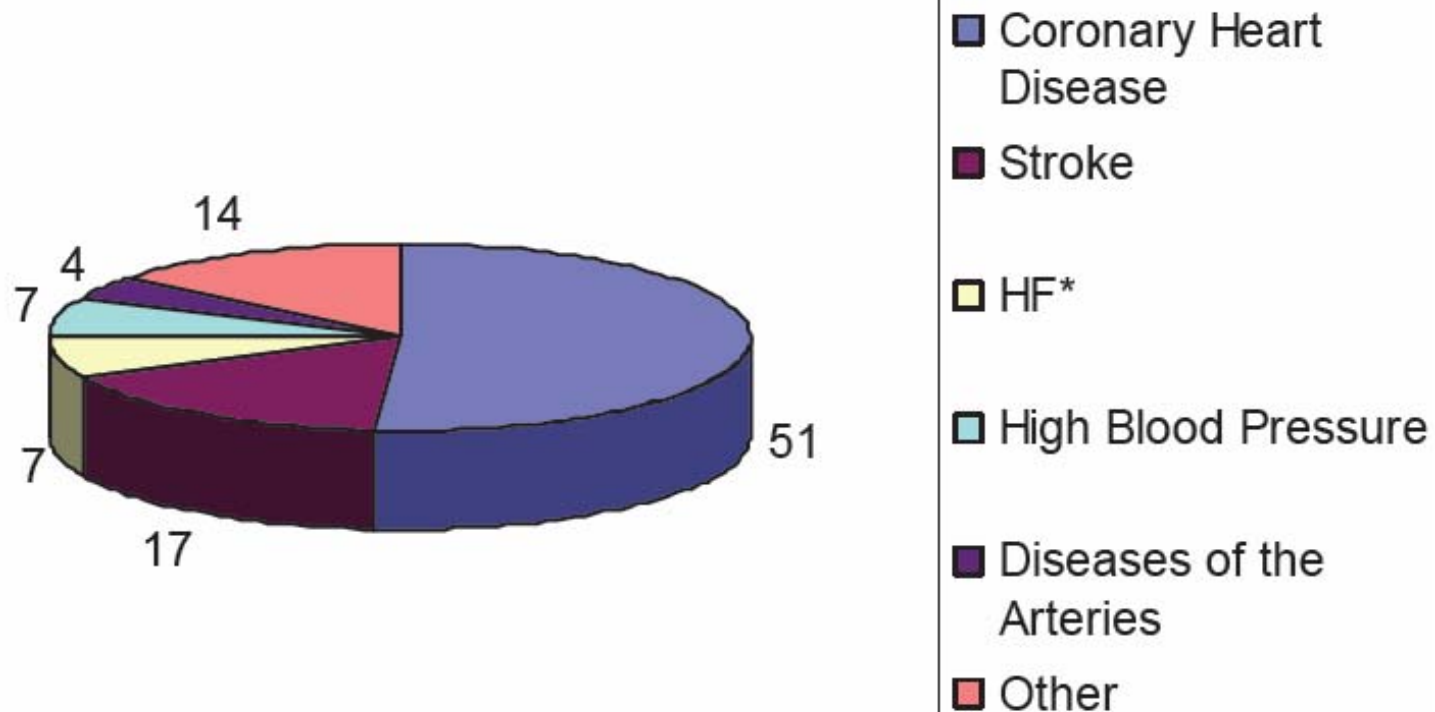
Prevalence:

- **≥15,000,000** patients (Population: >900 million, 51 countries)
 - Additional similar prevalence Asymptomatic LV dysfunction
 - HF & asymptomatic ventricular dysfunction ~ **4%**
 - HF **2-3%**, rises sharply at age **75 years (mean age)**. At age 70-80 years **10-20%**
 - In younger age more common in men (CAD). In elderly equal between sexes
 - **PLVEF ~ 50%**; more common in elderly, women, hypertension and diabetes
- 50% diagnosed HF will die within 4 yrs**
- 40% are dead or readmitted within 1 yr**
- Accuracy of diagnosis by clinical means alone is often inadequate, particularly in women, elderly, & obese

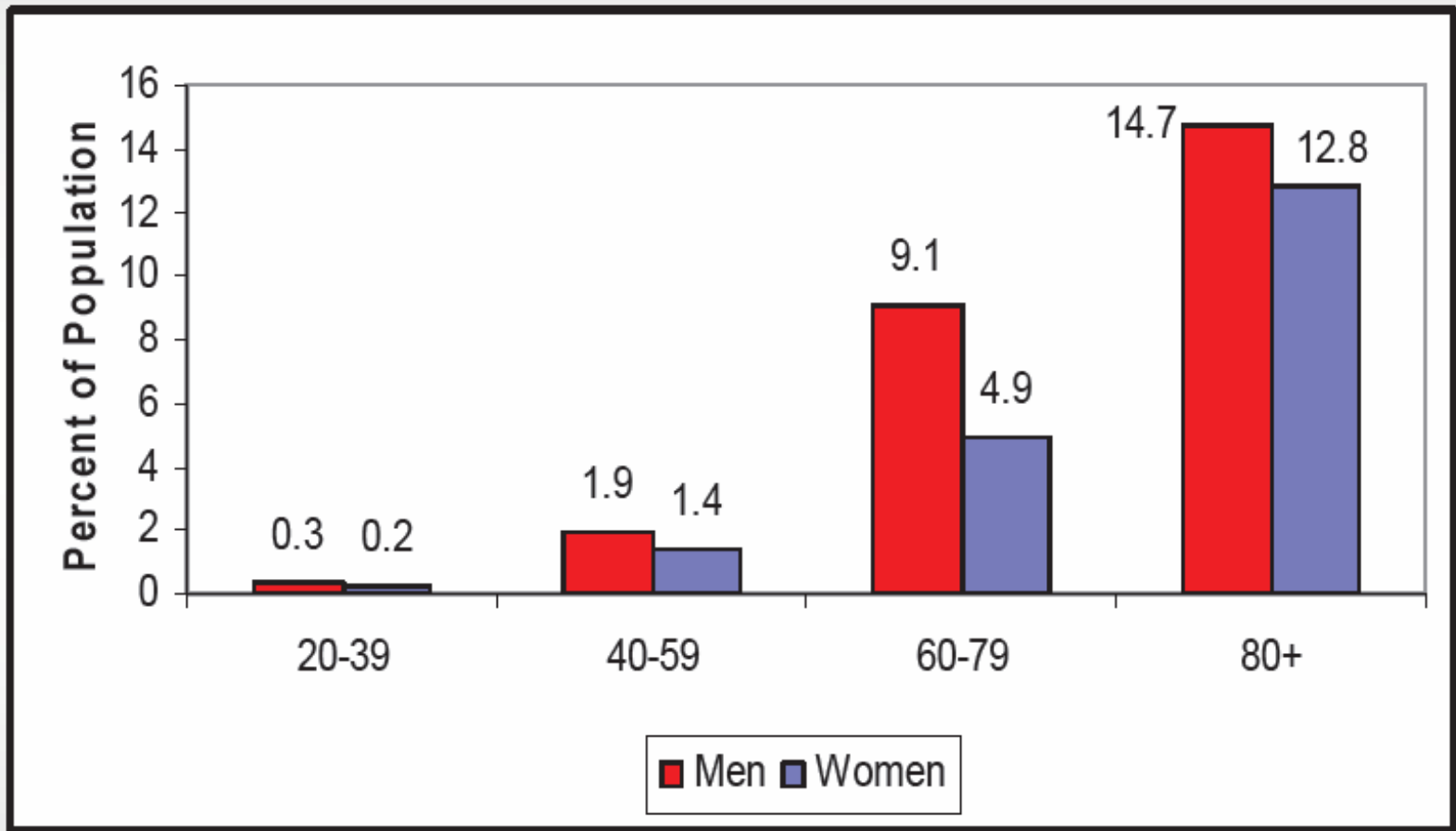
Heart Disease and Stroke Statistics - 2010 Update

Donald Lloyd-Jones



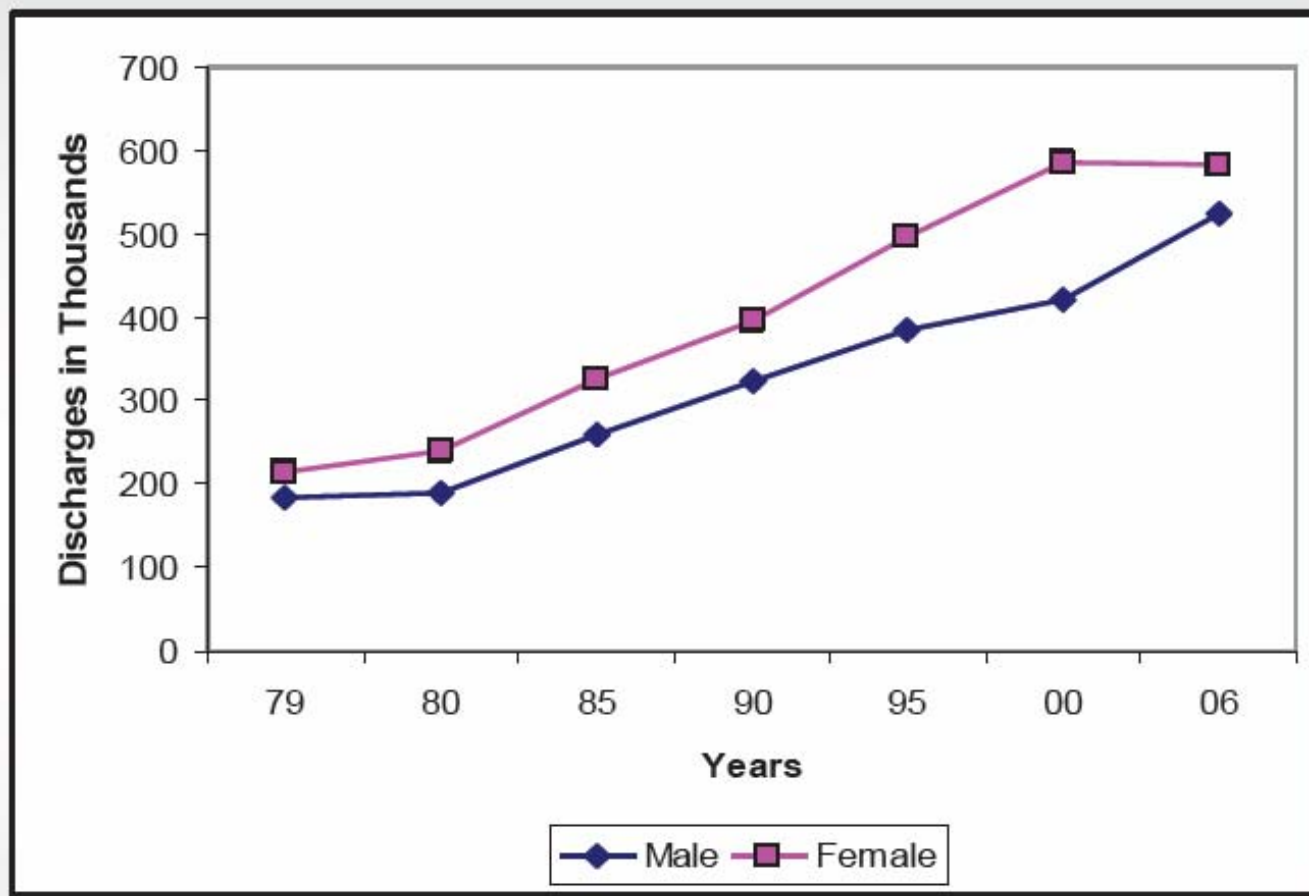


Percentage breakdown of deaths from cardiovascular diseases (United States: 2006) * - Not a true underlying cause.
Source: NCHS.



Prevalence of heart failure by age and sex

(NHANES: 2003-2006). Source: NCHS and NHLBI.



Hospital discharges for heart failure by sex.

(United States: 1979-2006). Source: NHDS/NCHS and NHLBI.

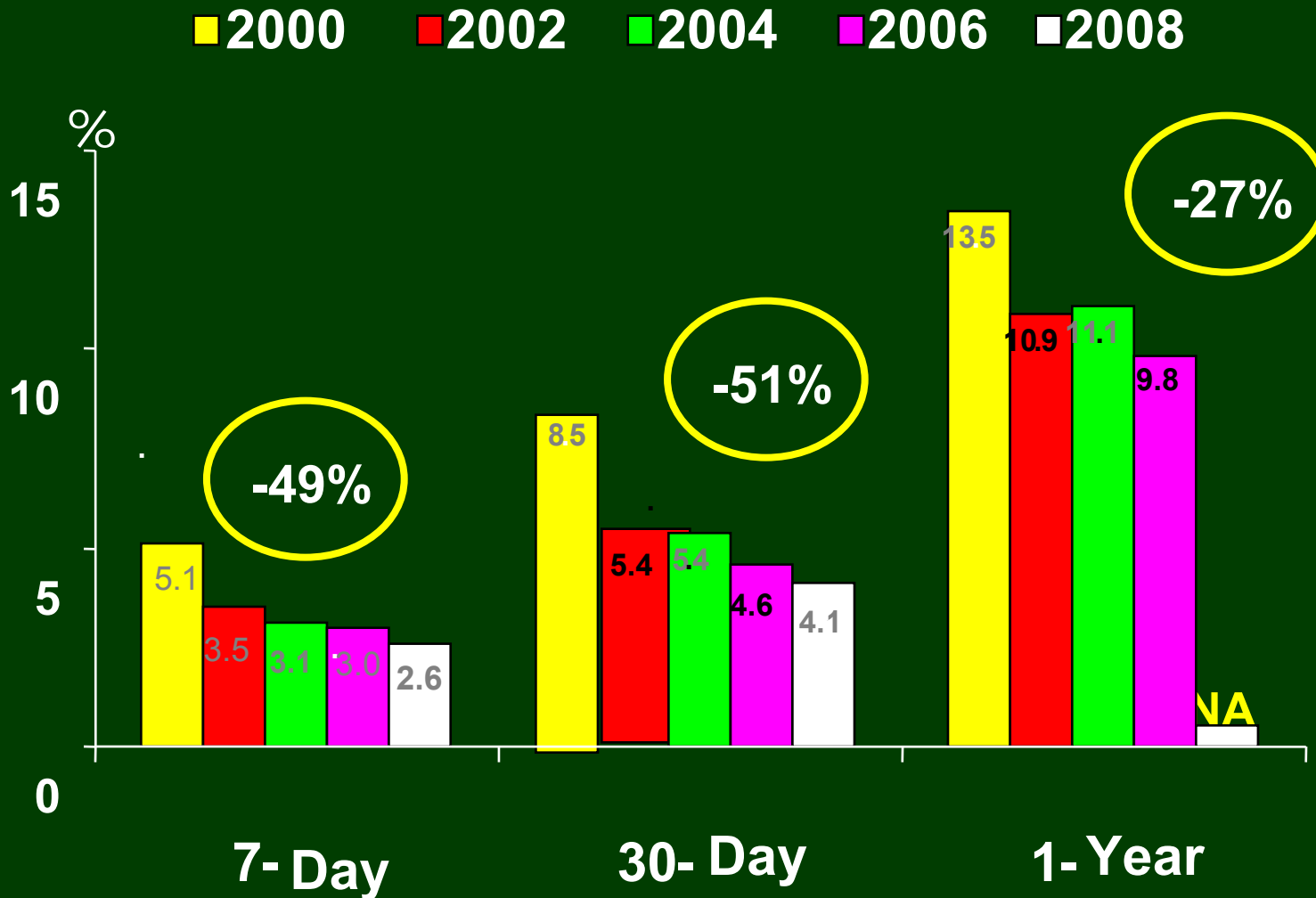
Note: Hospital discharges include people discharged alive, dead and status unknown.

ACSIS: 2000 - 2008 Trend

ACSIS	2000	2002	2004	2006	2008
No. of Pts	(n=1795)	(n=2049)	(n=2093)	(n=2077)	(n=1766)
Age: (Mean) yrs	63	64	64	64	63
M/F	75/25	76/24	74/26	77/23	79/21
1st Hosp. Ward: Cardiology	83	81	81	80	89
Admission ECG	56	49	49	43	44
ST↑	44	51	51	57	56
NST					
Killip Admission ≥2	18	21	22	18	13

ACSIS: 2000-2008

Trend of Early and Late Mortality



HFSIS 2003 – Age by Gender

4102 Patients

```
graph TD; A[4102 Patients] --> B[Men  
2339 Patients  
57%]; A --> C[Women  
1763 Patients  
43%]; B --> D[71.5 ± 12.4 yrs]; C --> E[75.9 ± 11.4 yrs];
```

A flowchart illustrating the distribution of 4102 patients by gender and age. The total number of patients is 4102. This is divided into 2339 men (57%) and 1763 women (43%). The average age for men is 71.5 ± 12.4 years, and for women, it is 75.9 ± 11.4 years. A central arrow points from the total patient count to the age data at the bottom.

Men

2339 Patients

57%

71.5 ± 12.4 yrs

Women

1763 Patients

43%

75.9 ± 11.4 yrs

HFSIS 2003 – All-Cause Mortality

Period	Mortality n = 4,102 %
Hospital	4.7
30-day	7.6
6-month	18.7
1-year	28.2
2-year	40.2
3-year	50.3
4-year	57.7

Objectives of treatment in chronic heart failure

1. Prognosis

Reduce mortality

2. Morbidity

Relieve symptoms and signs

Improve quality of life

Eliminate oedema and fluid retention

Increase exercise capacity

Reduce fatigue and breathlessness

Reduce need for hospitalization

Provide for end of life care

3. Prevention

Occurance of myocardial damage

Progression of myocardial damage

Remodelling of the myocardium

Reoccurrence of symptoms and fluids accumulation

Hospitalization

High Risk Pts for Developing HF (Stage A) – Therapy

ACC/AHA 2009

	I	IIa	IIb	III	
A					Control HTN, Dyslipidemia, DM controlled
C					Control Diabetes Mellitus
C					Avoid smoking, excessive alcohol, illicit drugs
B					Ventricular rate controlled or sinus rhythm restored
C					Thyroid disorders treated
C					Periodic evaluation for signs and symptoms of HF



High Risk Pts for Developing HF (Stage A) – Therapy - cont'

ACC/AHA 2009

	I	IIa	IIb	III	
C					Atherosclerotic cardiovascular disease - secondary prevention
C					LV evaluation: family history CMP, cardiotoxic interventions
		A			ACE-I when Atherosclerotic CVD, DM or HTN + risk factors
		C			ARBs when Atherosclerotic CVD, DM or HTN + risk factors
				C	Routine use of nutritional supplements solely to prevent HF

Patients with Cardiac Structural Abnormalities or Remodeling Who Have Not Developed HF Symptoms (Stage B) – Therapy

ACC/AHA 2009

	I	IIa	IIb	III	
A,B,C					All Class I recommendations for Stage A should apply
A					Beta-blockers & ACEIs in all pts recent / remote MI (any EF)
C					Beta-blockers in all pts without MI and reduced EF
A					ACEIs in all pts without MI and reduced EF
B					ARB in post-MI pts intolerant of ACEIs and low LVEF
C					Treat according to current STEMI guidelines
A					Coronary revascularization according to current guidelines
B					Valve replacement / repair according to current guidelines

Patients with Cardiac Structural Abnormalities or Remodeling Who Have Not Developed HF Symptoms (Stage B) – **Therapy** – cont'
ACC/AHA 2009

I	IIa	IIb	III	
	B			ACEIs or ARBs in pts with hypertension & LVH
	C			ARBs in pts with low EF intolerant of ACEIs
A				ICD in ischemic CMP \geq 40 days post-MI & LVEF of \leq 30%
		C		ICD in nonischemic CMP & LVEF of \leq 30%
			C	Digoxin in low LVEF & sinus rhythm
			C	Nutritional supplements
			C	Calcium channel blockers low LVEF after MI

Killip Classification (acute MI)

- Class I – No signs of HF (pulmonary rales and/or S3)
- Class II – Rales at $\leq 50\%$ lung fields and/or S3
- Class III – Rales at $> 50\%$ lung fields or pulmonary edema
- Class IV – Cardiogenic Shock



Patients with Current or Prior Symptoms of HF (Stage C): Reduced LVEF – Therapy

ACC/AHA 2009

	I	IIa	IIb	III	
A, B, C					All Class I recommendations for Stage A & B should apply
C					Diuretics & salt restriction when fluid retention
A					ACEIs unless contraindicated
A					BB (carvedilol, bisoprolol, metoprolol succinate) unless contraindicated
A					ARB (approved) in ACEI intolerant
B					avoid or withdraw NSAIDs, most antiarrhythmic & most CCBs
B					Exercise training in ambulatory patients
A					ICD as secondary prevention in cardiac arrest, VF, unstable VT

Patients with Current or Prior Symptoms of HF (Stage C): Reduced LVEF – Therapy – cont'

ACC/AHA 2009

	I	IIa	IIb	III	
A					ICD as primary prevention in IHD \geq 40 d post-MI & LVEF \leq 35%
A					ICD as primary prevention in nonischemic CMP & LVEF \leq 35%
A					CRT in NYHA FC III-IV & LVEF \leq 35% with dyssynchrony (QRS $>$ 0.12)
B					Aldosterone antagonist in NYHA FC III-IV, Creat $<$ 2.5 M / $<$ 2.0 F, K $<$ 5.0
A		A			ARB as alternative first –line to ACEI NYHA II-III, other indications
B		B			Digitalis to decrease hospitalizations for HF
B^A		B			Hydralazine & Nitrate in addition ACEI & BB when symptom persists
A		A			Treat AF & HF either rhythm or rate control

Clinical Profiles of CHF

Congestion at rest

		NO	YES
Low perfusion at rest	NO	A Warm & Dry (Low Profile)	B Warm & Wet (Complex)
	YES	L Cold & Dry	C Cold & Wet

Signs/symptoms of congestion:

Orthopnea / PND
JV Distension
Hepatomegaly
Edema
Rales
Abd-Jugular Reflex

Possible evidence of low perfusion:

Narrow pulse pressure
Sleepy / obtunded
Low serum sodium

Cool extremities
Hypotension with ACE inhibitor
Renal/hepatic dysfunction

Adapted from Warner Stevenson

Patients with Refractory End-Stage Heart Failure (Stage D)

ACC/AHA 2009

	I	IIa	IIb	III
B				
C				
A				
C				
C				
B				

Meticulous identification and control of fluid retention

Referral for cardiac transplantation in potentially eligible patients

Referral to an HF program with expertise in refractory HF

Options for end-of-life care should be discussed with the patient and family when severe symptoms persist despite application of all recommended therapies

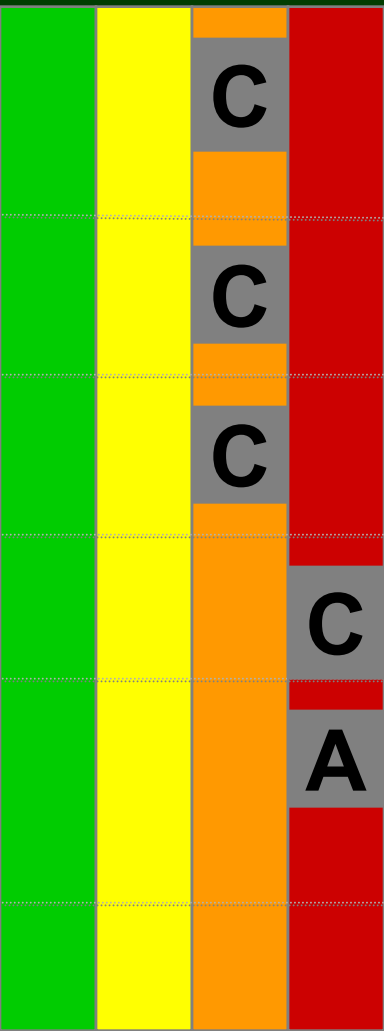
ICD – receive information about the option to inactivate defibrillation

LVAD as permanent or “destination” therapy is reasonable in highly selected with refractory end-stage HF and estimated 1-yr mortality >50%

Patients with Refractory End-Stage Heart Failure (Stage D)

ACC/AHA 2009

I IIa IIb III



Pulmonary artery catheter placement may be reasonable to guide therapy in refractory end-stage HF and persistently severe symptoms

MV repair or replacement is not well established for severe 2nd MR

Continuous I.V. positive inotropes may be considered for palliation

Partial left ventriculectomy is not recommended in nonischemic CMP

Routine intermittent infusions of vasoactive & positive inotropic agents are not recommended

Diastolic Dysfunction - Etiology

1. Myocardial **Ischemia**
2. Left Ventricular **Hypertrophy**
3. **Anatomic** - AS, MS, Constrictive Pericarditis
4. **Hypertension** (Hypertensive Heart Disease)
5. **Diabetic** Heart Disease
6. **Aging** Heart

Heart Failure Patients' Characteristics

Jessup M, Brozena S: Medical Progress: Heart Failure N Engl J Med 2003;348:2007-18

Characteristic	Diastolic	Systolic
Age	Frequently elderly	All ages, more 50-70 yrs
Sex	Frequently female	More often male
LVEF	Preserved or Normal $\geq 40\%$	Depressed $\leq 40\%$
LV size	Usually Normal often concentric LVH	Usually Dilated
LVH on ECG	Usually present	Sometimes
Chest X-ray	Congestion \pm cardiomegaly	Congestion cardiomegaly
Gallop	S4	S3

Patients with HF and Normal LVEF – Therapy

I	IIa	IIb	III	
A				Control systolic & diastolic hypertension according to guidelines
C				Control ventricular rate in atrial fibrillation
C				Diuretics to control pulmonary congestion and peripheral edema
	C			Coronary revascularization in symptomatic / demonstrable ischemia
		C		Restoration & maintenance of sinus rhythm in atrial fibrillation
		C		BB, ACEI, ARB, or CCB in controlled HTN to minimize HF symptoms
		C		Digitalis to minimize HF symptoms is not well established
				Prevent Tachycardia – BB, non-dihydropyridines CCB

Flexible diuretic regimen



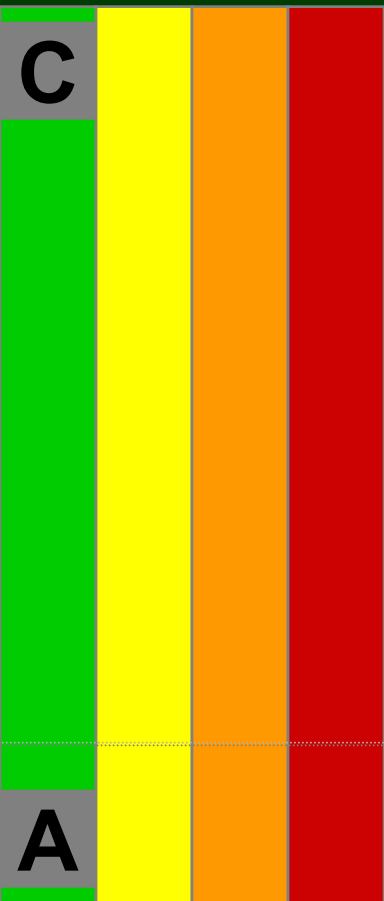
individualize for each patient
for example, for a 2-lb weight gain

- double diuretic dose (or boost with thiazide)
- when diuresis noted by patient, supplement usual K^+ dose
- re-check serum K^+ soon

The Hospitalized Patient – Diagnosis of HF

ACC/AHA 2009

I IIa IIb III



The diagnosis of heart failure is primarily based on signs & symptoms derived from a thorough history and physical exam.

Clinicians should determine the following:

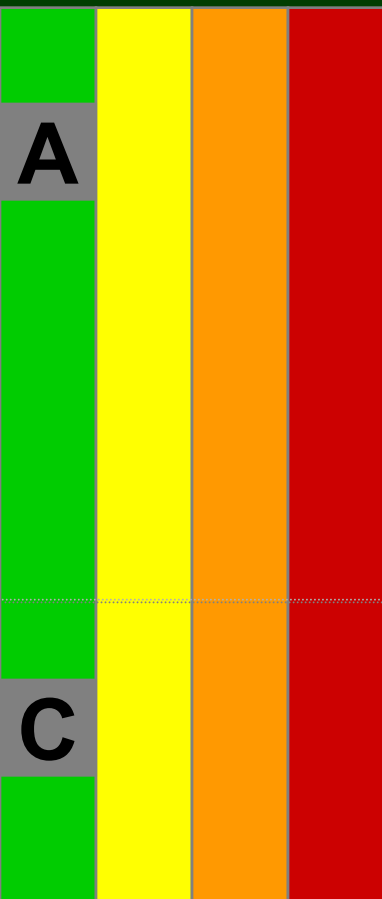
- a. Adequacy of systemic perfusion
- b. Volume status
- c. Contribution of precipitating factors and/or co-morbidities
- d. If the HF is new onset or an exacerbation of chronic disease
- e. Associated with preserved normal or reduced EF

Chest radiographs and echocardiography are key tests in assessment

The Hospitalized Patient – Diagnosis of HF - cont'

ACC/AHA 2009

I IIa IIb III



BNP or NT-proBNP should be measured in evaluation of dyspnea in which HF contribution is not known. Final diagnosis requires interpreting these results in the context of all available clinical data not be considered a stand-alone test

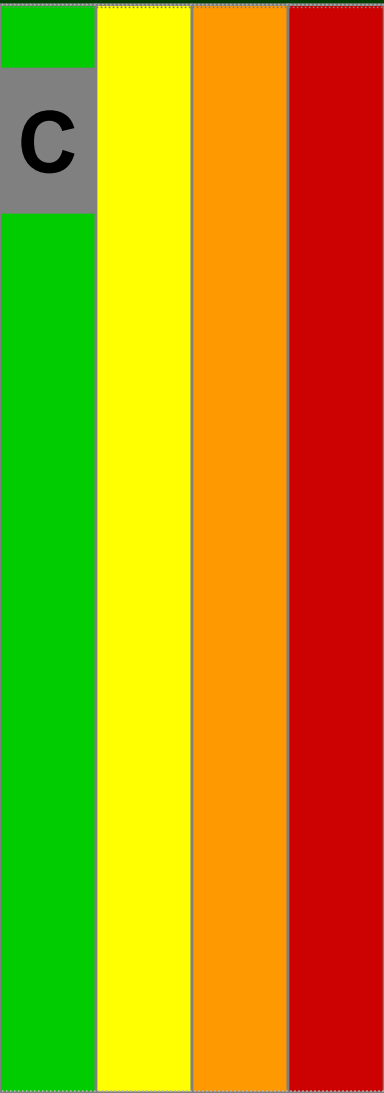
ACS precipitating HF should be promptly identified by ECG troponin testing, and treated accordingly



The Hospitalized Patient – Treatment Adjustment

ACC/AHA 2009

I IIa IIb III



Comprehensive written discharge instructions for all hospitalized HF patients and their caregivers is strongly recommended, with special emphasis on the following 6 aspects of care:

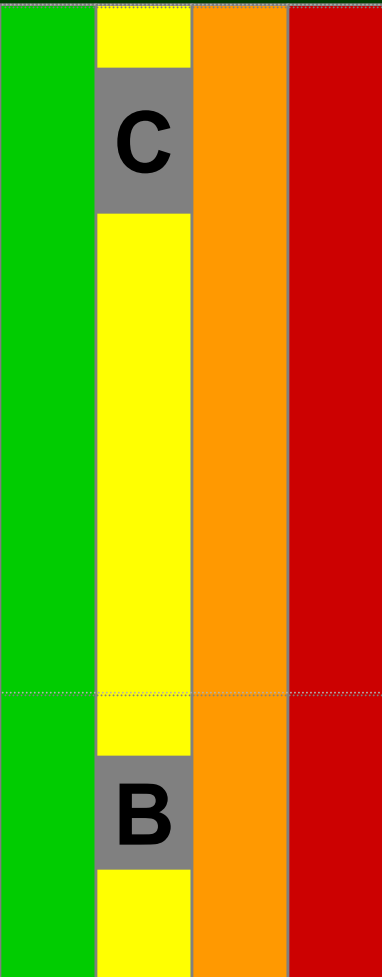
- 1. Diet**
- 2. Discharge medications, with a special focus on adherence, persistence, and uptitration to recommended doses of ACE-I/ARB and BB**
- 3. Activity level**
- 4. Follow-up appointments**
- 5. Weight monitoring**
- 6. What to do if HF symptoms worsen.**

The Hospitalized Patient – Treatment

Severe Symptomatic Fluid Overload

ACC/AHA 2009

I IIa IIb III



In patients with evidence of **severely symptomatic fluid overload** in the absence of systemic hypotension, vasodilators such as intravenous nitroglycerin, nitroprusside or nesiritide can be beneficial when added to diuretics and/or in those who do not respond to diuretics alone

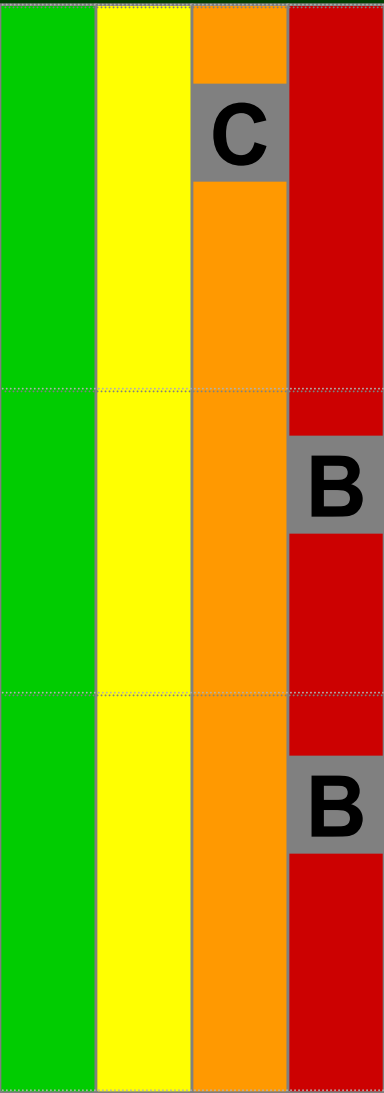
Ultrafiltration is reasonable for patients with refractory congestion not responding to medical therapy



The Hospitalized Patient – Intravenous Inotropic Drugs

ACC/AHA 2009

I IIa IIb III



Intravenous inotropes such as dopamine, dobutamine or milrinone might be reasonable for severe systolic dysfunction, low blood pressure & evidence of low cardiac output, with or without congestion, to maintain systemic perfusion & preserve end-organ performance

Use of parenteral inotropes in normotensive patients with acute decompensated HF without evidence of decreased organ perfusion is not recommended

Routine use of invasive hemodynamic monitoring in normotensive patients with acute decompensated HF and congestion with symptomatic response to diuretics & vasodilators is not recommended

The New England Journal of Medicine

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VOLUME 347

AUGUST 1, 2002

NUMBER 5



OBESITY AND THE RISK OF HEART FAILURE

SATISH KENCHIAH, M.D., JANE C. EVANS, D.Sc., DANIEL LEVY, M.D., PETER W.F. WILSON, M.D.,
EMELIA J. BENJAMIN, M.D., MARTIN G. LARSON, S.D., WILLIAM B. KANNEL, M.D., M.P.H.,
AND RAMACHANDRAN S. VASAN, M.D.

After adjustment for established risk factors,

for each increment of 1 in BMI

Increase in the risk of heart failure

Men – 5%

women – 7%

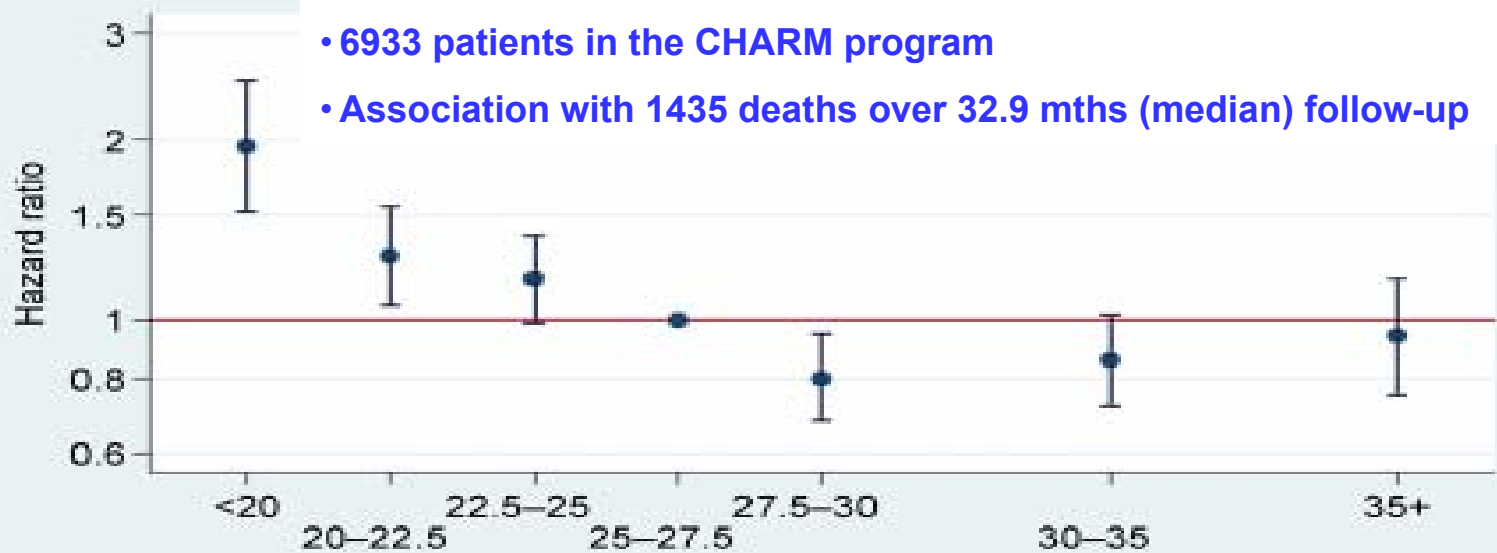
Weight loss and mortality risk in patients with chronic heart failure in the candesartan in heart failure: assessment of reduction in mortality and morbidity (CHARM) programme

Pocock SJ, McMurray JJV, Dobson J, Yusuf S, Granger CB, Michelson EL, Ostergren J, Pfeffer MA, Solomon SD, Anker SD, Swedberg KB on behalf of the CHARM Investigators

Eur Heart J 2008;29:2641–2650

BMI and Mortality

(B)



- 6933 patients in the CHARM program
- Association with 1435 deaths over 32.9 mths (median) follow-up

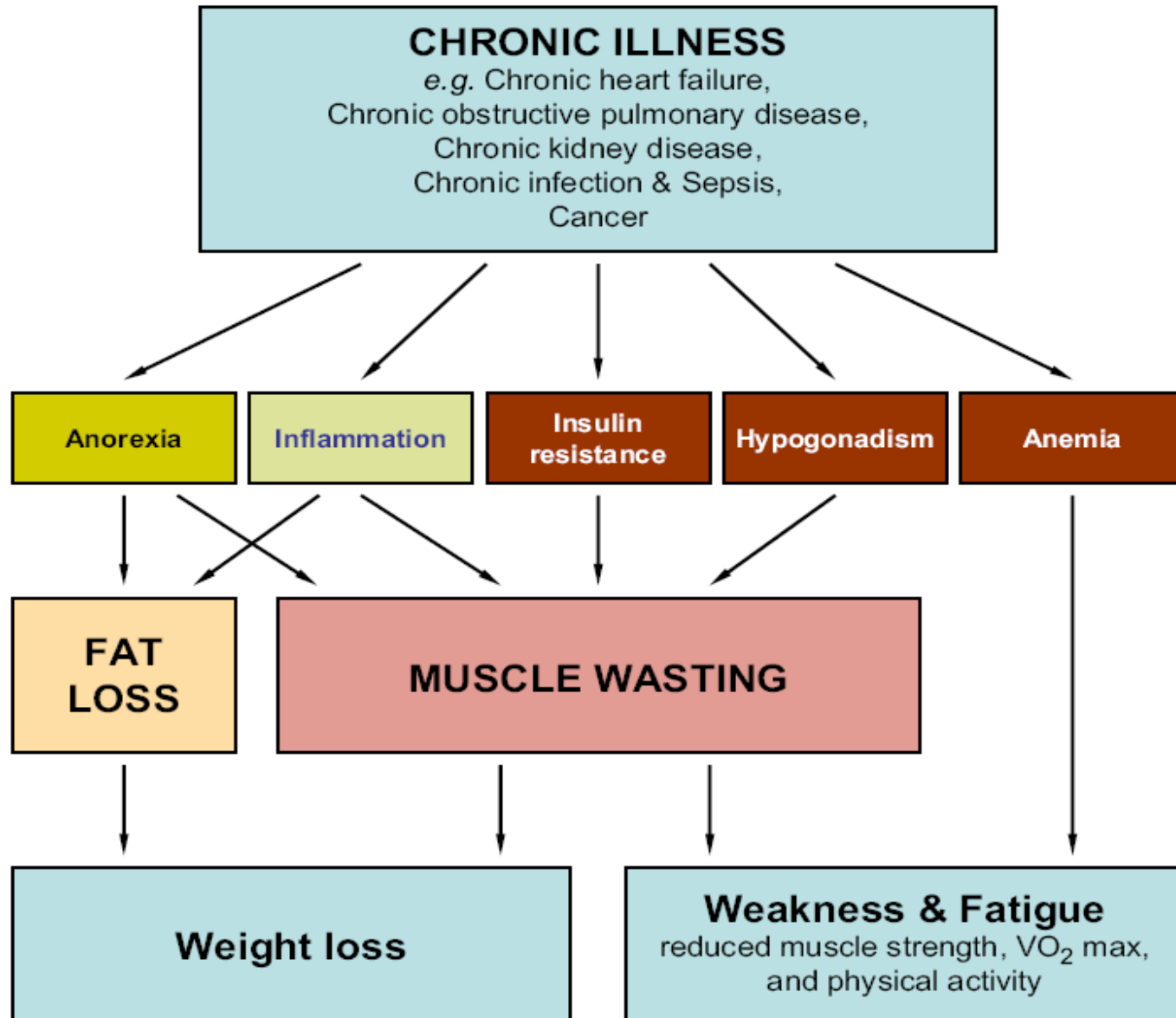
BMI: mean of baseline and 6 month values (kg/m²)

No. patients	190	550	1113	1457	1389	1484	750
No. deaths	83	168	280	303	236	243	122
Death rate per 100 person-years	20.6	12.8	10.3	8.3	6.6	6.4	6.5

Mortality hazard ratios (and 95% CIs) adjusted for baseline predictors, and crude death rates per 100 person-years, BMI in the fixed 6 month Cox model.

Cachexia: A new definition

Clinical Nutrition (2008) 27, 793-799



Cachexia: A new definition

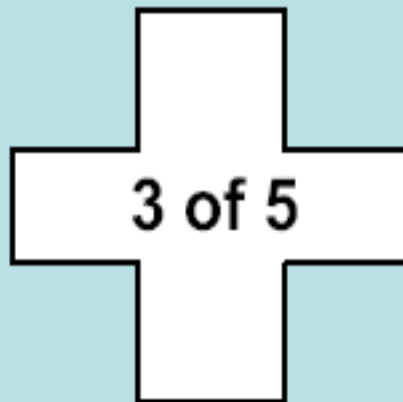
Clinical Nutrition (2008) 27, 793-799

- Cachexia is infrequently identified or diagnosed and rarely treated.
- In elderly nursing home patients a $\geq 5\%$ weight loss in a month is associated with a 10-fold increase risk of death

Sullivan DH et al. Prognostic significance of monthly weight fluctuations among older nursing home residents. J Gerontol A Biol Sci Med Sci 2004;59:M633-9.

CACHEXIA DIAGNOSIS

Weight loss of at least 5%
in 12 months or less
(or BMI $< 20 \text{ kg/m}^2$)



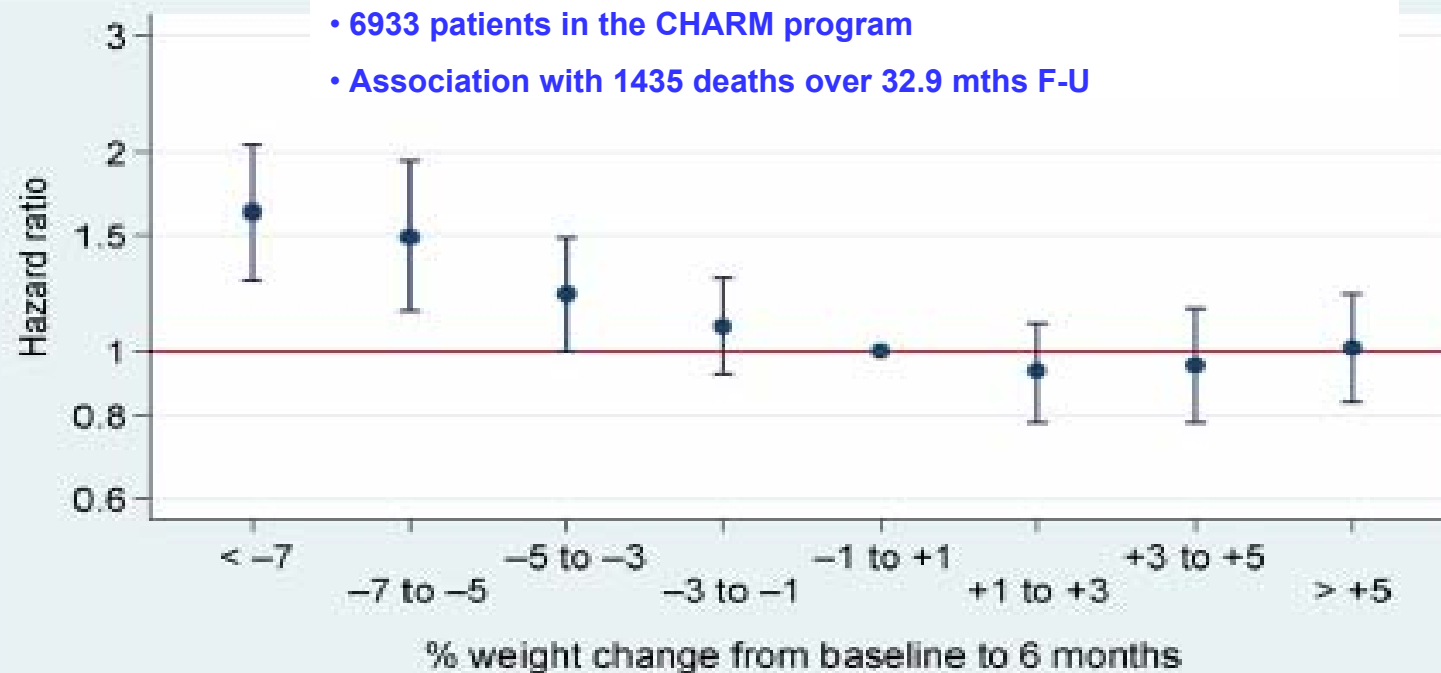
- Decreased muscle strength
- Fatigue
- Anorexia
- Low fat-free mass index
- Abnormal biochemistry:
 - Increased inflammatory markers (CRP, IL-6)
 - Anemia (Hb $< 12 \text{ g/dL}$)
 - Low serum albumin ($< 3.2 \text{ g/dL}$)

CHARM: Weight loss and mortality risk in chronic heart failure

Pocock SJ, et al. Eur Heart J 2008;29:2641–2650

6-month Weight Loss and Mortality

(A)



	< -7	-7 to -5	-5 to -3	-3 to -1	-1 to +1	+1 to +3	+3 to +5	> +5
No. patients	282	248	567	1221	1443	1382	823	967
No. deaths	98	73	151	254	271	242	150	196
Death rate per 100 person-years	15.7	12.8	11.1	8.4	7.4	6.8	7.2	8.0

Mortality hazard ratios (and 95% CIs) adjusted for baseline predictors, and crude death rates per 100 person-years, for percentage weight change in the fixed 6 month Cox model.

The obesity paradox: weighing the benefit

Doehner W, Clark A, Anker SD

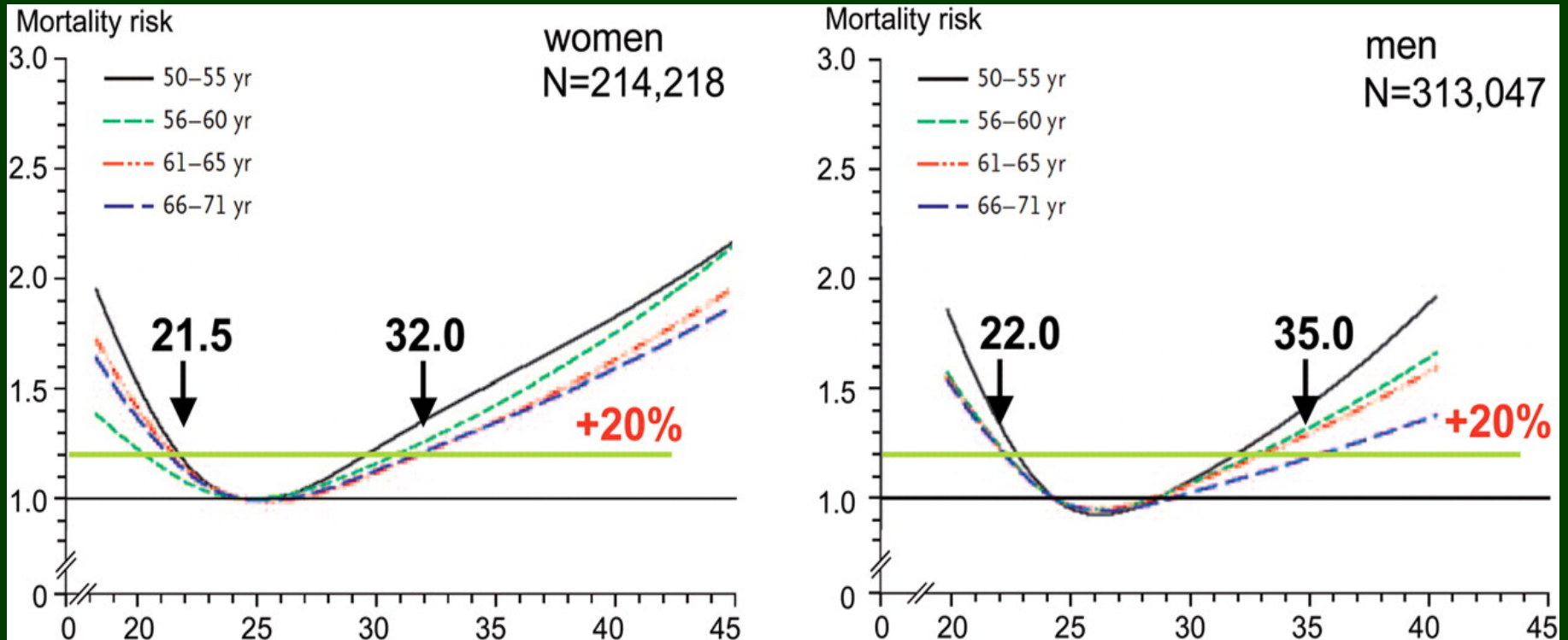
Eur Heart J. 2010;31:146-8

- **Survival benefit in patients with chronic cardiovascular diseases for overweight and moderately obese patients**
- **Chronic heart failure – studies including >30 000 patients over a broad spectrum of disease severity: overweight is associated with decreased mortality**
- **Acutely decompensated heart failure (ADHERE – 108,937 pts) – higher BMI is associated with lower in-hospital mortality**

Fonarow GC et al. *An obesity paradox in acute heart failure: analysis of body mass index and inhospital mortality for 108,927 patients in the Acute Decompensated Heart Failure National Registry.* Am Heart J 2007;153:74-81.

Association of BMI and mortality risk in age subgroups in men and women.

The NIH–AARP Diet and Health Study is a contemporary investigation with vital status ascertained from 1995–1996 through end of 2005. Many of the participants, who were 50 to 71 years old at baseline, are from the baby-boomer generation



Doehner W et al. Eur Heart J 2010;31:146-148

Association of BMI and mortality risk in age subgroups in men and women. The green line indicates a 20% increased risk of death, showing a similar risk for men aged over 66 years with a BMI of 22 kg/m² and with a BMI 35 of kg/m².

Adapted from Adams et al. *Overweight, obesity, and mortality in a large prospective cohort of persons 50 to 71 years old.*

N Engl J Med 2006;355:763-778.

Cardiorenal Syndromes: Definition and Classification

House AA, Anand I, Bellomo R, Cruz D, Bobek I, Anker SD, Aspromonte N, Bagshaw S, Berl T, Daliento L, Davenport A, Haapio M, Hillege H, McCullough P, Katz N, Maisel A, Mankad S, Zanco P, Mebazaa A, Palazzuoli A, Ronco F, Shaw A, Sheinfeld G, Soni S, Vescovo G, Zamperetti N, Ponikowski P, Ronco C: **Definition and classification of Cardio-Renal Syndromes: workgroup statements from the 7th ADQI Consensus Conference.** Nephrol Dial Transplant. 2010;25(5):1416-20

Cardiorenal Syndromes – general definition

ADQI – Acute Dialysis Quality Initiative

Disorders of the heart and kidneys whereby acute or chronic dysfunction in one organ may induce acute or chronic dysfunction of the other



ADQI (Acute Dialysis Quality Initiative) Classification

Type 1 – Acute Cardiorenal Syndrome

Acute worsening of cardiac function leading to renal dysfunction

Type 2 – Chronic Cardiorenal Syndrome

Chronic abnormalities of cardiac function leading to renal dysfunction

Type 3 – Acute Renocardiac Syndrome

Acute worsening of renal function causing cardiac dysfunction

Type 4 – Chronic Renocardiac Syndrome

Chronic abnormalities in renal function leading to cardiac disease

Type 5 – Secondary Cardiorenal Syndrome

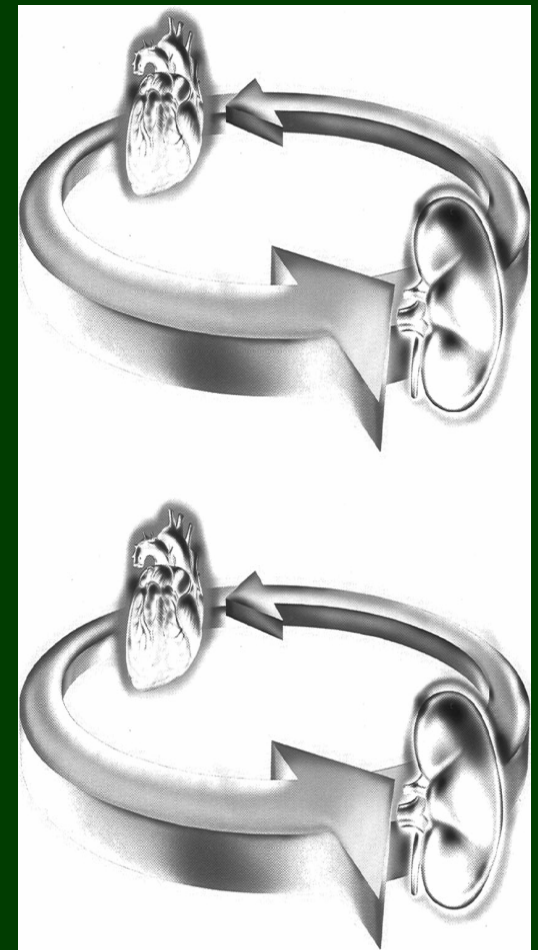
Systemic conditions causing simultaneous dysfunction of the heart and kidney



Secondary Cardiorenal Syndrome (Type 5)

Both organs simultaneously are targeted by systemic illness, either acute or chronic

- Sepsis
- Systemic lupus erythematosus
- Amyloidosis
- Diabetes mellitus



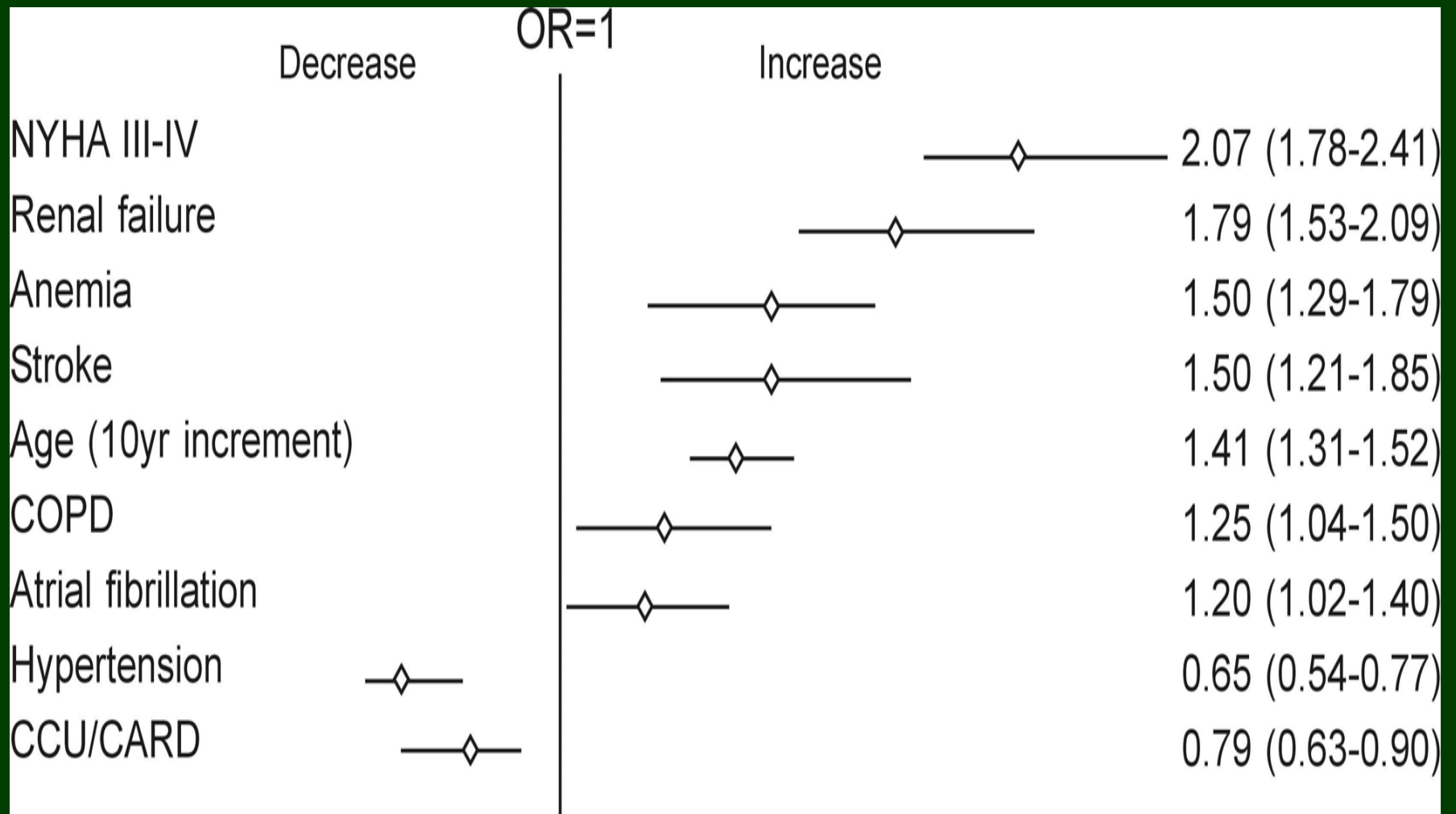
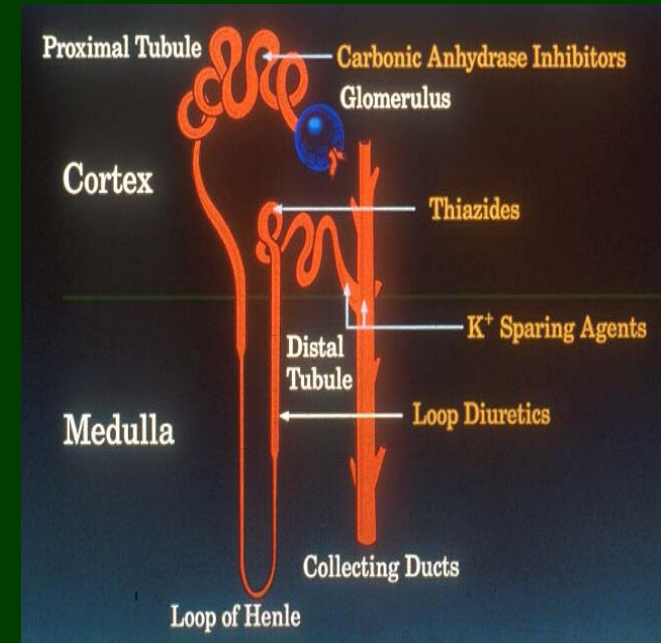


Fig.2: parameters associated with 1year mortality

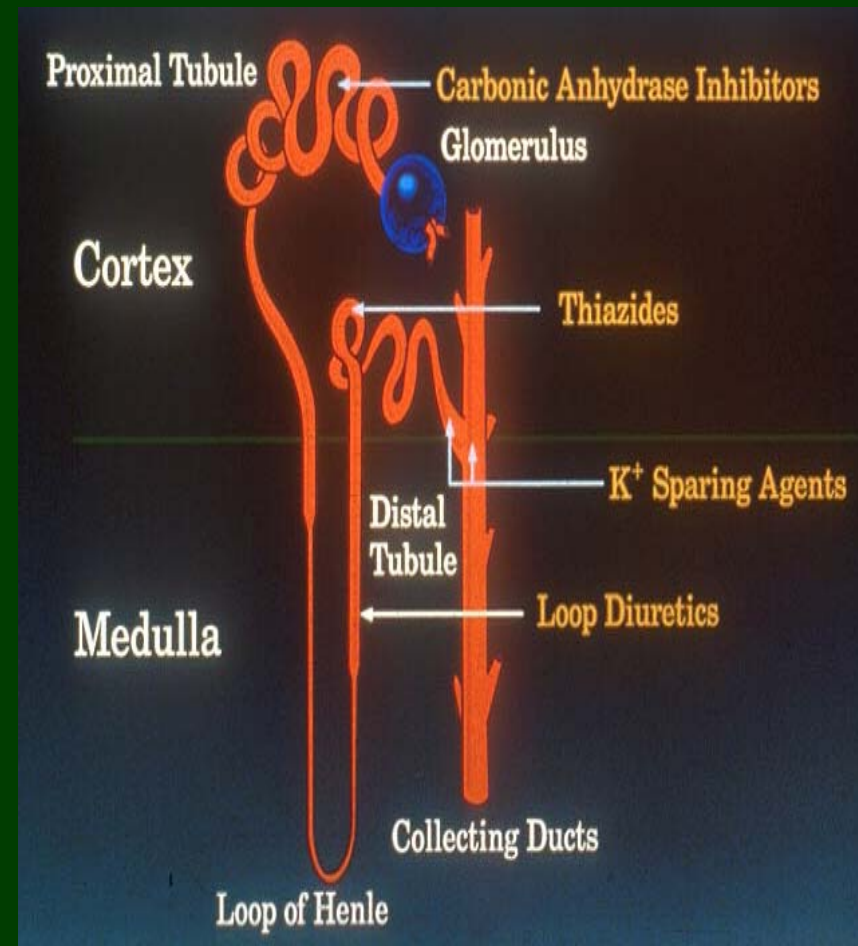
Diuretic Resistance

- **Suboptimal dosage of diuretic**
- **Increased sodium intake**
- **Delayed intestinal absorption of oral drugs**
- **Use of NSAIDs**
- **Decreased diuretic tubular secretion and renal underperfusion**
- **Chronic diuretic use associated with hypertrophy of the distal nephron with rebound sodium uptake after volume loss**
- **Diuretics indirectly stimulate adenosine release from the macula densa, contributing to declining GFR**



Diuretic Resistance - Treatment

- **Combined diuretics**
- **Alternative loop diuretics: Bumetanide, Torsemide** (a better pharmacokinetic profile with increased bioavailability)
- **Natriuretic Peptides: BNP, ANP, CD-NP**
- **Vasopressin Antagonists**
- **Adenosin antagonists**
- **Ultrafiltration** (UNLOAD study)



Clinical Profiles of CHF

Congestion at rest

		NO	YES
Low perfusion at rest	NO	A Warm & Dry (Low Profile)	B Warm & Wet (Complex)
	YES	L Cold & Dry	C Cold & Wet

Signs/symptoms of congestion:

Orthopnea / PND
JV Distension
Hepatomegaly
Edema
Rales
Abd-Jugular Reflex

Possible evidence of low perfusion:

Narrow pulse pressure
Sleepy / obtunded
Low serum sodium

Cool extremities
Hypotension with ACE inhibitor
Renal/hepatic dysfunction

Adapted from Warner Stevenson

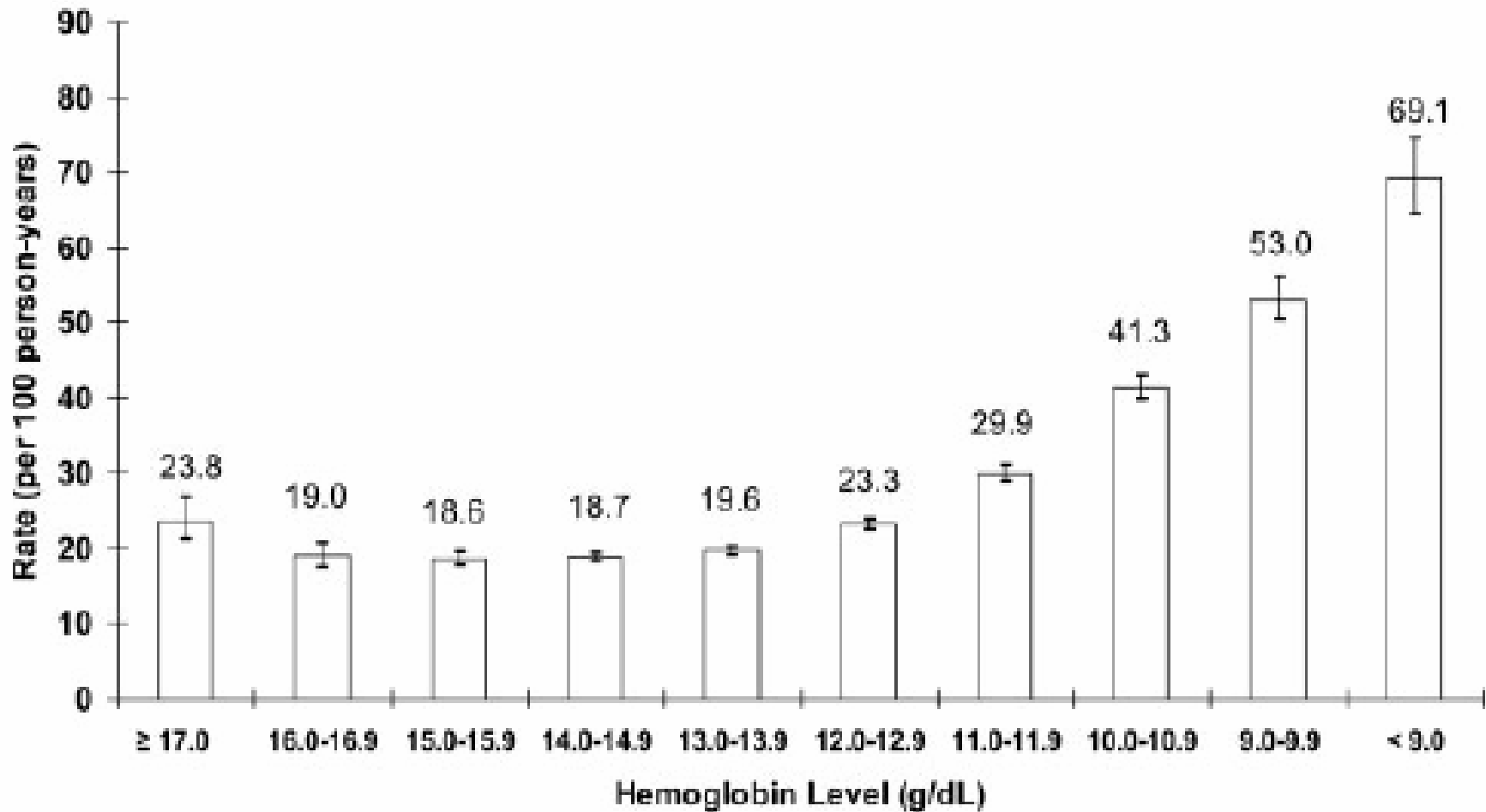
Profiles of Cardiorenal Syndrome

	Fluid Status	CO / CI	SVR	Proteinuria	Treatment
Hypovolemia	Dry	Low	Normal or High	—	Fluids, stop diuretics
Excess Vasoconstriction	Wet or Normal	Low	High	—	ACE-I, Neseritide
Cardiogenic Shock	Wet or Normal	Low		—	Positive inotropics, Intra Aortic Pulsating Balloon, Cardiac surgery, LVAD, Transplantation
Excess Vasodilation	Normal or Wet	Normal or Low	Normal or Low	—	Reduce / stop Ace-I / ARB, Nitrates R/O Sepsis Positive inotops, Vasopressin?
Diuretic Resistance	Wet	Normal	Normal	—	Continuous I.V. Diuretic (hypertonic NaCl?), Distal tubular diuretic, Neseritide, Ultrafiltration / Dialysis
Intrinsic Renal Disease	Wet	Normal	Normal	Usually	Distal tubular diuretic, Neseritide, Ultrafiltration / Dialysis

The Anemia in Chronic Heart Failure: Outcomes and Resource Utilization (ANCHOR) Study

Circ 2006;113:2713

59 772 adults with heart failure, Kaiser Permanente of Northern California,
During 1.1.1996-31.12.2002, mean age was 72 years and 46% were women



Hemoglobin in HF Patients



**For Each
1 g/dL
Decrease
in Hb**



**15.8% Annual
Increase
In Mortality
Risk**

Anemia - Definition

World Health Organization (WHO):

Men – Hb \leq 13.0 g/dL

Women – Hb \leq 12.0 g/dL

McCullough PA, Lapor NE. Anemia: a modifiable risk factor for heart disease. Introduction. Rev Cardiovasc Med. **2005**;6(Suppl 3):S1–S3

The National Kidney Foundation (American):

Hb \leq 12.5 g/dL in men and postmenopausal women

\leq 11.0 g/dL in premenopausal women

Target: $11.0 \leq$ Hb \leq 13.0 g/dL

KDOQI, National Kidney Foundation. KDOQI clinical practice guidelines and clinical practice recommendations for anemia in chronic kidney disease. Am J Kidney Dis **2006**;47:Suppl 3:S11-S145.

These standard definitions of anemia **are not based** on well established physiological or population norms.

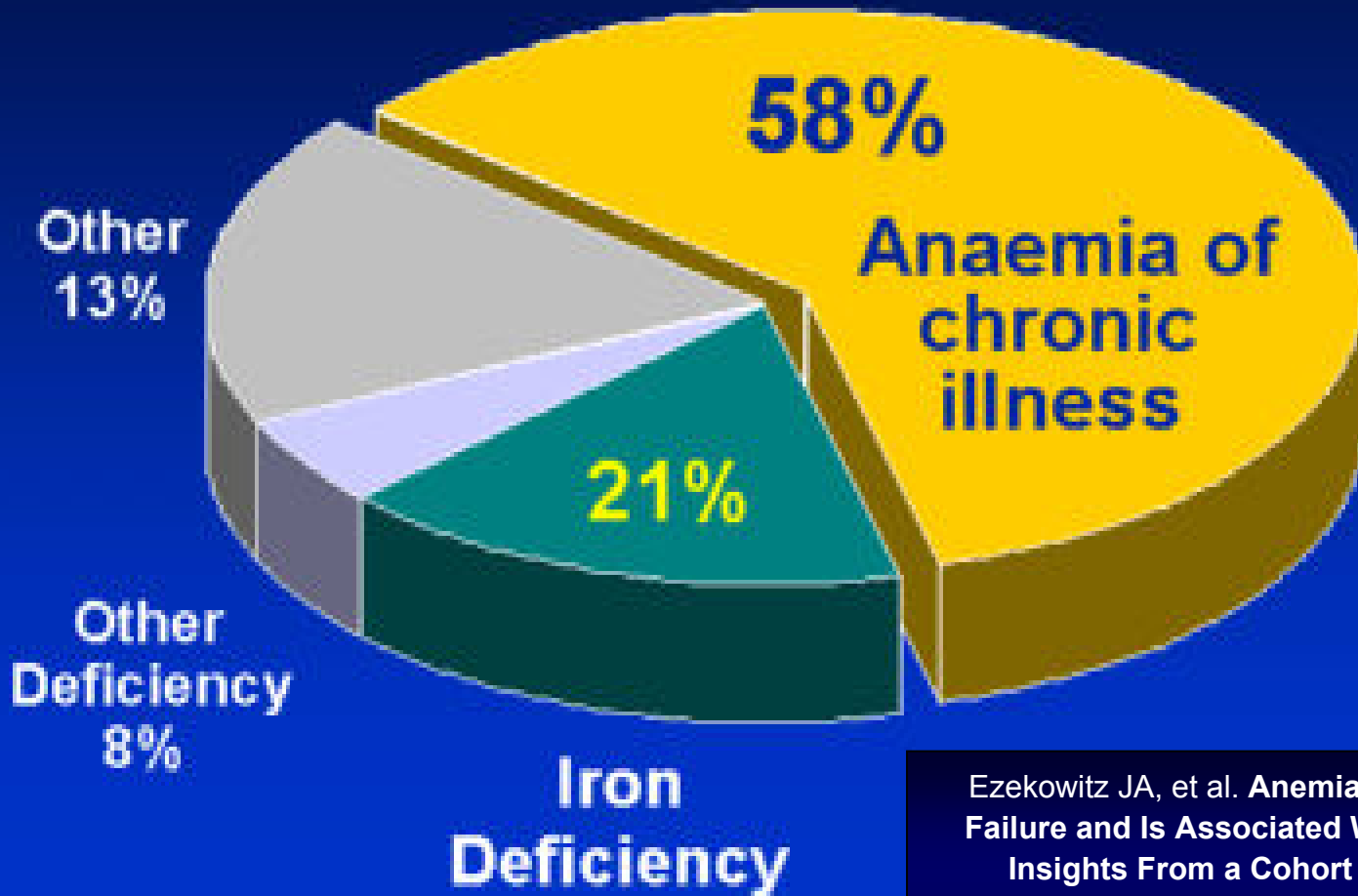
Other study-specific definitions of anemia including **arbitrary** or **statistically defined** hemoglobin and hematocrit categories and **administrative diagnostic codes** from hospital records.

Etiology of Anemia in cardiac disease

138 acute-care hospitals in Alberta, Canada, During 4.1993 – 3.2001

12 065 pts with **new-onset HF**. median age 78 years

2,085 (17%) had anemia



Ezekowitz JA, et al. Anemia Is Common in Heart Failure and Is Associated With Poor Outcomes. Insights From a Cohort of 12 065 Patients With New-Onset Heart Failure. *Circulation*. 2003;107:223

Therapeutic Efficacy in Heart Failure

	Symptoms Relief	LV Remodelling	Mortality
Diuretics	+++	↔	+?
Aldosterone Antagonists	+	++	++
ACE-I	++	+++	++
All Antagonists	++	+++	++
Nitrates/Hydralazine	++	++	++
Positive Inotropics	+	↔	↑
Digoxin	+	+?	↔
Beta Blockers	+ ↔	++	+++
Calcium Channel Blockers	↔ ↑	↔	↑?
Amlodipine / Felodipine	↔ +	+?	↔

Systolic Heart Failure - Treatment

Jessup M, Brozena S: Medical Progress: Heart Failure. N Engl J Med 2003;348:2007-18 *modified*
ACC/AHA 2005 Guideline Update for Diagnosis and Management of Chronic Heart Failure

