



MEDICAL  
UNIVERSITY  
OF LODZ

# Prevention of heart failure



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## 2016 Guidelines for the diagnosis and treatment of acute and chronic heart failure



## 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

Developed with the special contribution of the Heart Failure Association (HFA) of the ESC

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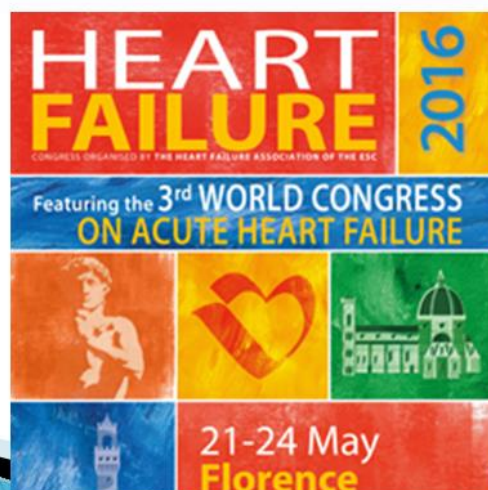
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## ESC Levels of evidence

<b>Level of Evidence A</b>	Data derived from multiple randomized clinical trials or meta-analyses.
<b>Level of Evidence B</b>	Data derived from a single randomized clinical trial or large non-randomized studies.
<b>Level of Evidence C</b>	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.



## ESC Classes of recommendations

Classes of recommendations	Definition	Suggested wording to use
<b>Class I</b>	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/ is indicated.
<b>Class II</b>	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
<b>Class IIa</b>	<i>Weight of evidence/opinion is in favour of usefulness/efficacy.</i>	Should be considered.
<b>Class IIb</b>	<i>Usefulness/efficacy is less well established by evidence/opinion.</i>	May be considered.
<b>Class III</b>	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended.



# Definition of heart failure:

- ▶ A state in which the heart cannot provide sufficient cardiac output to satisfy the metabolic needs of the body
- ▶ It is commonly termed congestive heart failure (CHF) since symptoms of increase venous pressure are often prominent



# Definition of heart failure

**With preserved (HFpEF), mid-range (HFmrEF)  
and reduced ejection fraction (HFrEF)**

Type of HF		HFrEF	HFmrEF	PFpEF
<b>CRITERIA</b>	1	Symptoms ± Signs	Symptoms ± Signs	Symptoms ± Signs
	2	LVEF <40%	LVEF 40–49%	LVEF ≥ 50%
	3	–	1.Elevated levels of natriuretic peptides. 2.At least one additional criterion: a.relevant structural heart disease (LVF and/or LAE); b.diastolic dysfunction (for details see Section 4.3.2.).	1.Elevated levels of natriuretic peptides. 2.At least one additional criterion: a.relevant structural heart disease (LVF and/or LAE); b.diastolic dysfunction (for details see Section 4.3.2.).

# Ethiology:

- ▶ It is a common end point for many diseases of cardiovascular system
- ▶ It can be caused by :
  - Inappropriate work load (volume or pressure overload)
  - Restricted filling
  - Myocyte loss



# The most common causes of heart failure

- ▶ **Volume over load:** regurgitate valve, high output status
- ▶ **Pressure overload:** systemic hypertension, outflow obstruction
- ▶ **Loss of muscles:** post MI, chronic ischemia, connective tissue diseases, infection, poisons (alcohol, cobalt, Doxorubicin)
- ▶ **Restricted Filling:** pericardial diseases, restrictive cardiomyopathy, tachyarrhythmia
- ▶ **Non-cardiac diseases causing high-output cardiac failure:** anaemia, thyrotoxicosis, septicaemia, Paget's disease of bone, and arteriovenous fistulae

WHAT CAUSES IT?

# Established and Hypothesized Risk Factors for heart failure



5-FU indicates 5-fluorouracil;  
 SNP, single-nucleotide polymorphism;  
 LVID, left ventricular internal dimension;  
 LVH, left ventricular hypertrophy;  
 NSAIDs, nonsteroidal antiinflammatory drugs;  
 IGF, insulinlike growth factor;  
 TNF, tumor necrosis factor;  
 IL, interleukin;  
 CRP, C-reactive protein;  
 HR, heart rate.

Major Clinical Risk Factors	Toxic Risk Precipitants
• Age, male sex	• Chemotherapy (anthracyclines, cyclophosphamide, 5-FU, trastuzumab)
• Hypertension, LVH	
• Myocardial infarction	• Cocaine, NSAIDs
• Diabetes mellitus	• Thiazolidinediones
• Valvular heart disease	• Doxazosin
• Obesity	• Alcohol
Minor Clinical Risk Factors	Genetic Risk Predictors
• Smoking	
• Dyslipidemia	
• Sleep-disordered breathing	
• Chronic kidney disease	
• Albuminuria	• SNP (eg, $\alpha$ 2CDe1322-325, $\beta$ 1Arg389)
• Homocysteine	
• Immune activation, IGF1, TNF $\alpha$ , IL-6, CRP	
• Natriuretic peptides	Morphological Risk Predictors
• Anemia	• Increased LVID, mass
• Dietary risk factors	• Asymptomatic LV dysfunction
• Increased HR	• LV diastolic dysfunction
• Sedentary lifestyle	
• Low socioeconomic status	
• Psychological stress	

# What Increases Risk?

## **Non-modifiable risk factors !**

- Age (risk increases proportionally with advancing age)
- Sex (male)
- Genetic risk predictors

## **Modifiable risk factors !!**

- High Cholesterol
- Smoking
- High Blood Pressure
- Diabetes
- Obesity
- Alcohol
- Physical Inactivity



## Prevent or delay the development of overt heart failure or prevent death before the onset of symptoms (1)

Recommendations	Class	Level
Treatment of hypertension is recommended to prevent or delay the onset of HF and prolong life.	<b>I</b>	<b>A</b>
Treatment with statins is recommended in patients with or at high-risk of CAD whether or not they have LV systolic dysfunction, in order to prevent or delay the onset of HF and prolong life.	<b>I</b>	<b>A</b>
Counselling and treatment for smoking cessation and alcohol intake reduction is recommended for people who smoke or who consume excess alcohol in order to prevent or delay the onset of HF.	<b>I</b>	<b>C</b>
Treating other risk factors of HF (e.g. obesity, dysglycaemia) should be considered in order to prevent or delay the onset of HF.	<b>IIa</b>	<b>C</b>
Empagliflozin should be considered in patients with type 2 diabetes in order to prevent or delay the onset of HF and prolong life.	<b>IIa</b>	<b>B</b>
ACE-I is recommended in patients with asymptomatic LV systolic dysfunction and a history of myocardial infarction in order to prevent or delay the onset of HF and prolong life.	<b>I</b>	<b>A</b>

# Hypertension



Recommendations	Class	Level
Treatment of hypertension is recommended to prevent or delay the onset of HF and prolong life.	<b>I</b>	<b>A</b>

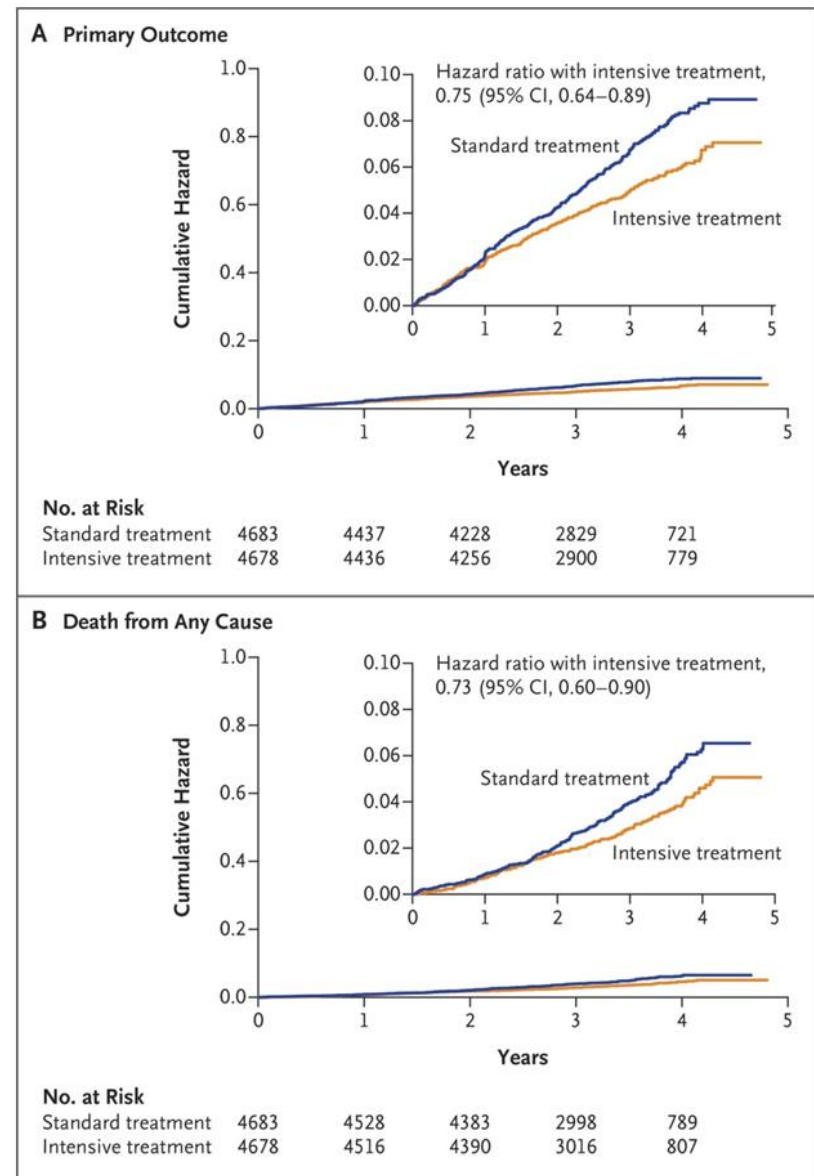
- ▶ Hypertension is one of the most common risk factors for CAD, and in turn HF, with a **2- to 3-fold categorical increased risk for the occurrence of HF**
- ▶ The recent study has already demonstrated that treating hypertension to a **lower goal [systolic blood pressure (SBP) <120 mmHg vs. <140 mmHg]** in older hypertensive subjects ( $\geq 75$  years of age) or high-risk hypertensive **patients without diabetes** reduces the risk of cardiovascular disease, death and hospitalization for HF.

Reference EBJ (2016) 37 (27):2129-2200 -<https://doi.org/10.1093/eurheartj/ehw128>

# Systolic Blood Pressure Intervention Trial (SPRINT)

Cumulative hazards for the primary outcome (a composite of myocardial infarction, acute coronary syndrome, stroke, acute decompensated heart failure, or death from cardiovascular causes) (Panel A) and for death from any cause (Panel B).

Significantly lower rate of the primary composite outcome in the intensive-treatment group (<120 mmHg) than in the standard-treatment group (<140 mmHg) (1.65% per year vs. 2.19% per year; hazard ratio with intensive treatment, 0.75; 95% confidence interval [CI], 0.64 to 0.89;  $P < 0.001$ ). All-cause mortality was also significantly lower in the intensive-treatment group (hazard ratio, 0.73; 95% CI, 0.60 to 0.90;  $P = 0.003$ ).



# Dyslipidemia

Treatment with statins is recommended in patients with or at high-risk of CAD whether or not they have LV systolic dysfunction, in order to prevent or delay the onset of HF and prolong life.

**I**

**A**

- ▶ Dyslipidemia is associated with an increased risk of HF, although it is not clear whether this association is independent of a predisposition to atherosclerosis and MI.
- ▶ An increased ratio of total cholesterol to high-density lipoprotein cholesterol is strongly associated with an increased risk of HF.
- ▶ High cholesterol levels, low levels of high-density lipoprotein cholesterol, and high triglyceride levels are all correlated with greater LV mass and impaired diastolic function, particularly in hypertensive subjects.

# Cigarette Smoking

- Promotes insulin resistance (diabetes mellitus)
- Increases endothelial dysfunction (damage of vessels)
- Increases oxidative stress and may induce direct toxic effects on myocytes
- Increases blood pressure
- Decreases HDL (dyslipidemia)
- Increases heart attacks (coronary vasospasm)
- Cigarette smoke contains more than 4,000 chemicals, and 200 of these chemicals are poisonous



# Cigarette Smoking

Counselling and treatment for smoking cessation and alcohol intake reduction is recommended for people who smoke or who consume

I

C

**If you think YOU are smoking the cigarette, you are mistaken... It's the other way round !**



# Alcohol Consumption

- Excessive alcohol intake may increase the risk of HF by up to 45% by increasing blood pressure or by direct myocardial toxicity (toxic cardiomyopathy)
- Light to moderate alcohol consumption (up to 7 drinks/week) is inversely associated with the risk of HF, especially in men, both in the general population and in those with asymptomatic LV dysfunction



Counselling and treatment for smoking cessation and alcohol intake reduction is recommended for people who smoke or who consume excess alcohol in order to prevent or delay the onset of HF.

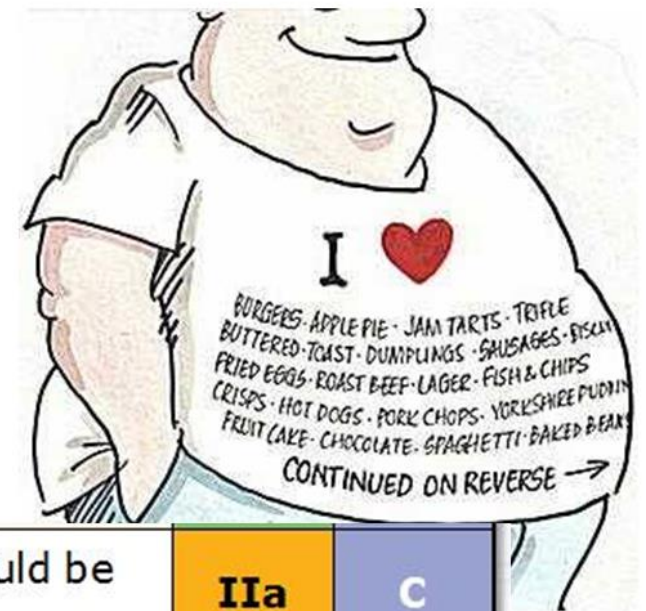
**I**

**C**

# Obesity

Obesity has recently been demonstrated to be a major cardiovascular risk factor and predisposes to HF by contributing to:

- atherogenic risk factors
- increasing preload and afterload, as well as through neurohormonal upregulation (but natriuretic peptide inadequacy)
- association with sleep-disordered breathing or chronic kidney disease.
- Normal Waist-Hip Ratio
  - < 0.85 for women;
  - < 0.95 for men
- Pears or apples?



Treating other risk factors of HF (e.g. obesity, dysglycaemia) should be considered in order to prevent or delay the onset of HF.

**IIa**

**C**

# Pears and Apples

Apple- shaped are at a higher risk

**Pear-shaped paunch** store fat on the hips and thighs, just below the surface of the skin.

**Apple-shaped paunch** store body fat around the abdomen and chest, surrounding internal organs



# Diabetes

- Diabetes mellitus is consistently associated with a 2- to 5-fold increase in the risk of HF-more so in women.
- Diabetes is an important predictor of HF in patients with asymptomatic LV dysfunction.
- With every 1% increase in hemoglobin A1c, there is an 8% to 16% increase in the risk of hospitalization for worsening of HF and death.
- Diabetes may predispose to HF by promoting atherogenic risk traits, obesity, LV hypertrophy, disease of the coronary microvasculature, endothelial dysfunction, autonomic dysfunction, and metabolic abnormalities.

Treating other risk factors of HF (e.g. obesity, dysglycaemia) should be considered in order to prevent or delay the onset of HF.

**IIa**

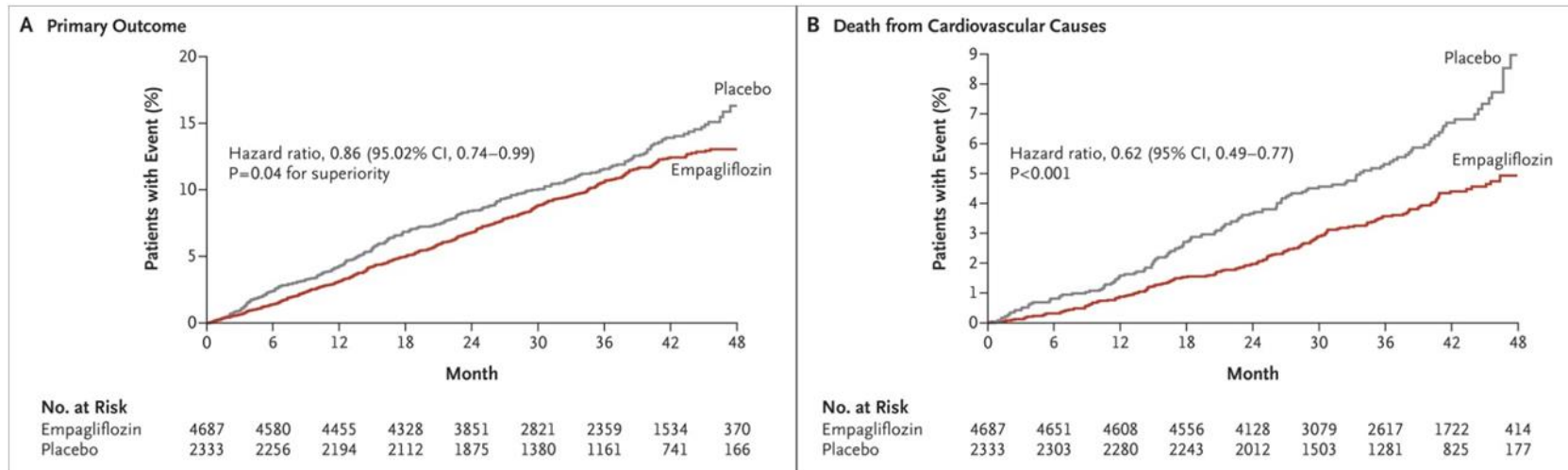
**C**

Empagliflozin should be considered in patients with type 2 diabetes in order to prevent or delay the onset of HF and prolong life.

**IIa**

**B**

# Cardiovascular Safety of Empagliflozin in Patients with Type 2 Diabetes

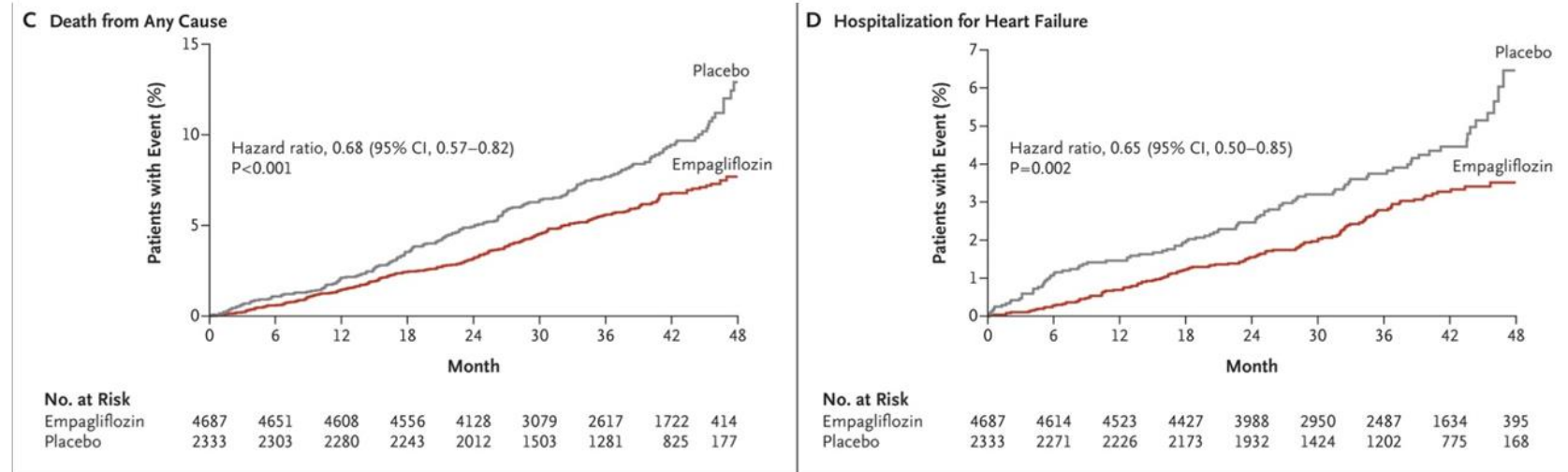


<http://www.nejm.org/doi/full/10.1056/NEJMoa1504720>

Empagliflozin (an inhibitor of sodium-glucose cotransporter 2), has been shown to improve outcome in patients with type 2 diabetes

Patients taking empagliflozin had lower rates of the primary outcome (composite events of CV death, non-fatal MI, or non-fatal stroke) than those on placebo (10.5% versus 12.1%, HR 0.86, P=0.04). The primary outcome was driven by CV deaths (12.4% versus 20.2%, HR 0.68).

# Cardiovascular Safety of Empagliflozin in Patients with Type 2 Diabetes



<http://www.nejm.org/doi/full/10.1056/NEJMoa1504720>

Treatment with empagliflozin reduced hospitalization for heart failure (HR 0.65, P=0.002) and all-cause mortality (5.7 versus 8.3%, HR=0.68, P<0.001).

Other hypoglycaemic agents have not been shown convincingly to reduce the risk of cardiovascular events and may increase the risk of HF. Intensification of hypoglycaemic therapy to drive down glycated haemoglobin (HbA1c) with agents other than empagliflozin does not reduce the risk of developing HF

# Physical Inactivity



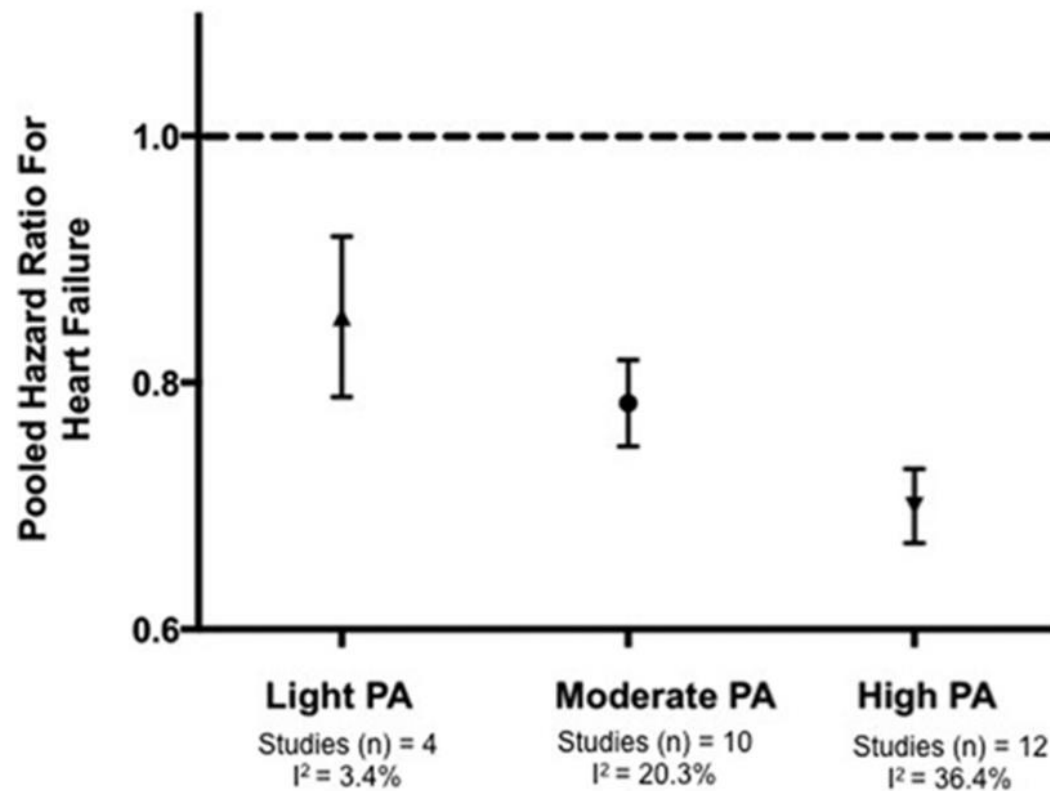
**Every morning my brain  
tells me to exercise...**

**..... and my body  
laughs at the idea**



# Association Between PA and HF Risk

- ▶ Low physical activity has been suggested to increase the risk of HF.



Doses of PA in excess of current guideline-recommended minimum levels (500 MET-min/week) might be required to provide more robust reductions in the risk of HF.

## To do and not to do messages from the Guidelines (7)

Recommendations	Class	Level
<b>Exercise, multidisciplinary management, and monitoring of patients with heart failure</b>		
It is recommended that regular aerobic exercise is encouraged in patients with HF to improve functional capacity and symptoms.	<b>I</b>	<b>A</b>
It is recommended that regular aerobic exercise is encouraged in stable patients with HFrEF to reduce the risk of HF hospitalization.	<b>I</b>	<b>A</b>
It is recommended that patients with HF are enrolled in a multidisciplinary care management programme to reduce the risk of HF hospitalization and mortality.	<b>I</b>	<b>A</b>

# Recommendation for your patients

Education topic	Patient skills	Professional behaviours
Smoking and recreational substance use	<ul style="list-style-type: none"> <li>• Stop smoking and taking recreational substances.</li> </ul>	<ul style="list-style-type: none"> <li>• Refer for specialist advice for smoking cessation and drug withdrawal and replacement therapy.</li> <li>• Consider referral for cognitive behavioural theory and psychological support if patient wishes support to stop smoking.</li> </ul>
Exercise	<ul style="list-style-type: none"> <li>• Undertake regular exercise sufficient to provoke mild or moderate breathlessness.</li> </ul>	<ul style="list-style-type: none"> <li>• Advice on exercise that recognizes physical and functional limitations, such as frailty, co-morbidities.</li> </ul>
Diet and alcohol	<ul style="list-style-type: none"> <li>• Avoid excessive fluid intake.</li> <li>• Recognize need for altered fluid intake such as:                             <ul style="list-style-type: none"> <li>→ Increase intake during periods of high heat and humidity, nausea/vomiting</li> <li>→ Fluid restriction of 1.5–2 L/day may be considered in patients with severe HF to relieve symptoms and congestion.</li> </ul> </li> <li>• Monitor body weight and prevent malnutrition.</li> <li>• Eat healthily, avoid excessive salt intake (&gt;6 g/day) and maintain a healthy body weight.</li> <li>• Abstain from or avoid excessive alcohol intake, especially.</li> </ul>	<ul style="list-style-type: none"> <li>• Individualize information on fluid intake to take into account body weight and periods of high heat and humidity. Adjust advice during periods of acute decompensation and consider altering these restrictions towards end-of-life.</li> <li>• Tailor alcohol advice to aetiology of HF; e.g. abstinence in alcoholic cardiomyopathy.</li> <li>• Normal alcohol guidelines apply (2 units per day in men or 1 unit per day in women). 1 unit is 10 mL of pure alcohol (e.g. 1 glass of wine, 1/2 pint of beer, 1 measure of spirit).</li> <li>• For management of obesity (see Section 11.15).</li> </ul>

# Recommendation for your patients

Education topic	Patient skills	Professional behaviours
Sleep and Breathing (see co-morbidities Section 11.16)	<ul style="list-style-type: none"> <li>• Recognize problems with sleeping, their relationship with HF and how to optimize sleep.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide advice such as timing of diuretics, environment for sleep, device support.</li> <li>• In presence of sleep-disordered breathing provide advice on weight reduction/control.</li> </ul>
Sexual activity (see co-morbidities Section 11.7)	<ul style="list-style-type: none"> <li>• Be reassured about engaging in sex, provided sexual activity does not provoke undue symptoms.</li> <li>• Recognize problems with sexual activity, their relationship with HF and applied treatment and how to treat erectile dysfunction.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide advice on eliminating factors predisposing to erectile dysfunction and available pharmacological treatment of erectile dysfunction.</li> <li>• Refer to specialist for sexual counselling when necessary.</li> </ul>
Psychosocial Aspects	<ul style="list-style-type: none"> <li>• Understand that depressive symptoms and cognitive dysfunction are found more frequently in people with HF, and that they may affect adherence.</li> <li>• Recognize psychological problems which may occur in the course of disease, in relation to changed lifestyle, pharmacotherapy, implanted devices and other procedures (including mechanical support and heart transplantation).</li> </ul>	<ul style="list-style-type: none"> <li>• Regularly communicate information on disease, treatment options and self-management.</li> <li>• Involve family and carers in HF management and self-care.</li> <li>• Refer to specialist for psychological support when necessary.</li> </ul>

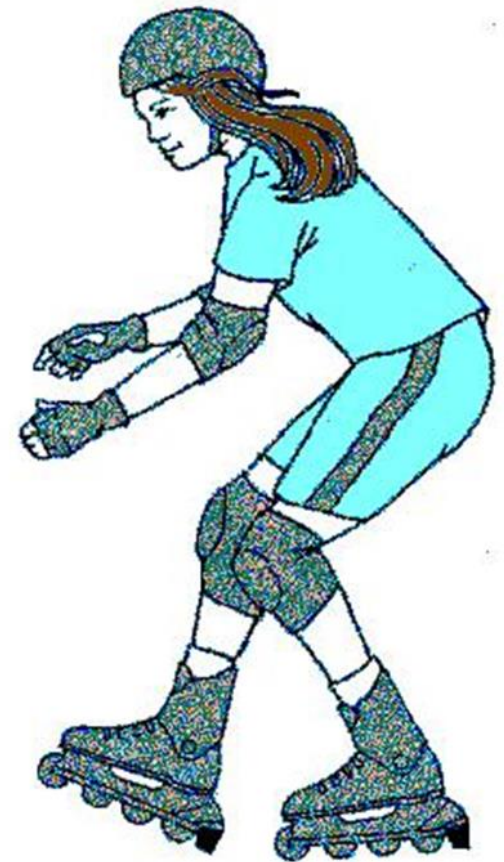
# Interactions of Risk Factors

- Risk operates across a continuum - no clear-cut line  
(Blood Pressure; Cholesterol; overweight; Smoking)
- The risk is multiplicative when many risk factors co-exist; risk factors often cluster together
- Majority of events arise in individuals with modest elevations of many risk factors than from marked elevation of a single risk factor



Everyday you make **choices** to try to help **protect yourself and your family**. In fact, protecting yourself has become second nature—you just do it.

But **do you know what you can do to help protect yourself** from this number 1 cause of Heart failure?



# Rule #1 Look before your eat

- Eat a variety of fruits and vegetables every day. (5 servings - they are naturally low in fat and high in vitamins and minerals and anti oxidants). Eat colored vegetables and fruits
- Eat a variety of grain products
- Choose nonfat or low-fat products.
- Use less fat meats- chicken, fish and lean cuts
- Switch to fat-free milk—toned/skimmed milk



# Dietary Guidelines

- Limit your intake of foods high in calories and low in nutrition, including foods like soft drinks, candy, junk food
- Limit foods high in saturated fat, trans-fat and cholesterol
- Eat less than 6 gms of salt a day
- Have no more than 1-2 alcoholic drink a day if you are a regular drinker




# Limit / Avoid

- Foods rich in Cholesterol and Saturated fats
  - Egg Yolk
  - Fatty meat & organ meat( Liver)
  - Butter chicken / Batter fried fish !
  - Milk fat – Desi Ghee, Butter, Cheese, Malai, Rabri, Khurchan, Doda, Ice Cream, full cream milk,
  - Hidden Fat like Bakery biscuits, Patties (!), Cakes, Pastries,



## **Rule #2 Exercise**

- Maintain a level of physical activity that keeps you fit and matches the calories you eat
  - Serves several functions in preventing and treating those at high risk
  - Reduces incidence of obesity
  - Increases HDL
  - Lowers LDL and total cholesterol
  - Helps control diabetes and hypertension
- 

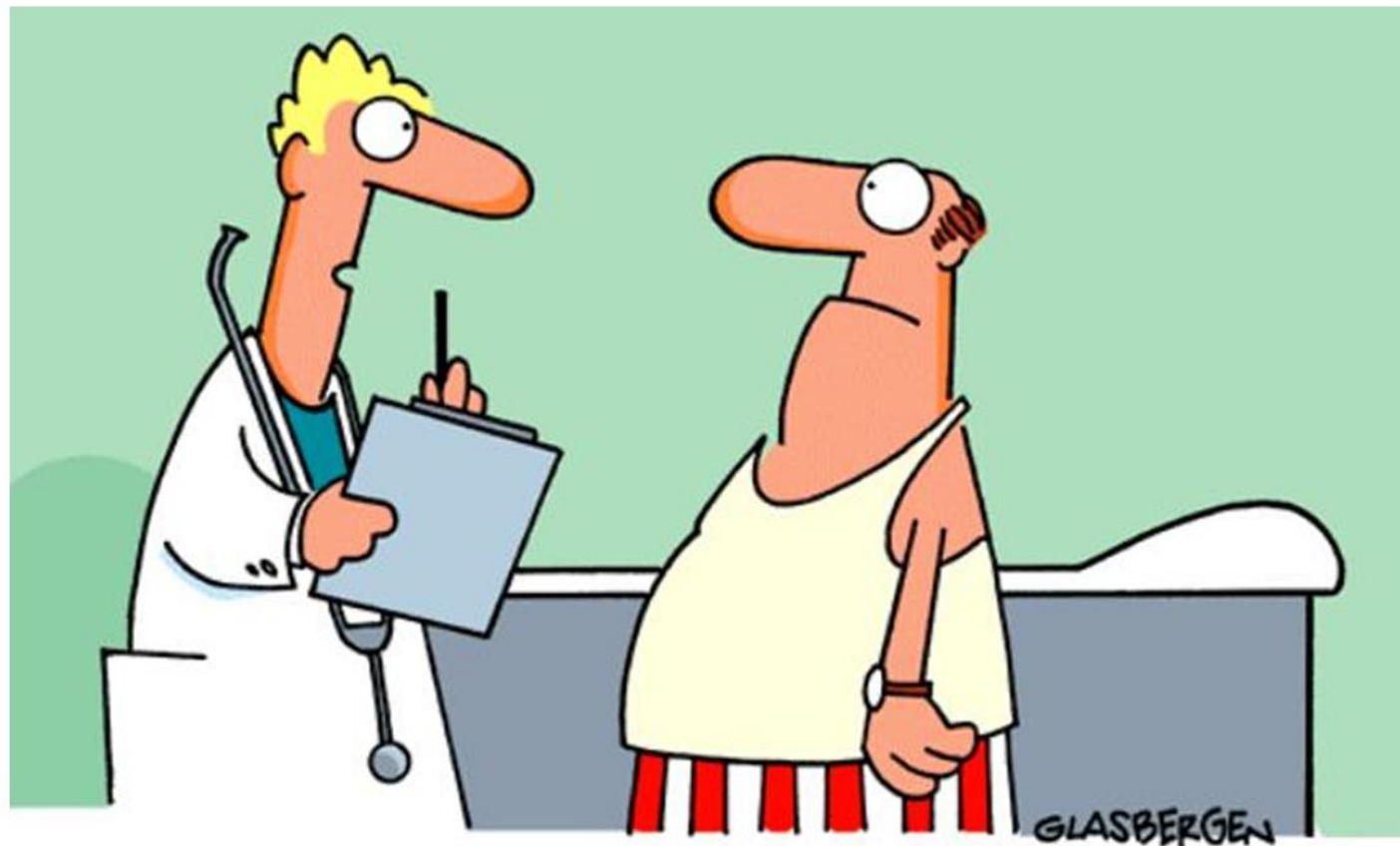
# Exercise, Exercise, Exercise

- Mortality is halved in retired men who walk more than two miles every day
- Regular exercise can halve the risk of heart disease, particularly in men who walk briskly
- Someone who is inactive has as great a risk of having heart disease as someone who smokes, has high blood pressure or has high cholesterol
- Exercise significantly reduces the chances of diabetes and stroke
- With regular exercise, blood pressure in those with hypertension is reduced by as much as 20mms Hg



# Exercise and Heart Disease

**Moderate to intense physical activity for 30-45 minutes on most days of the week is recommended**



**“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”**

# Walking for a healthy heart

- Complicated exercise machines or sweating it out in the gym not essential

**JUST WALK!**



# Rule # 3 Stop Smoking NOW!

- The risk of heart attack starts decreasing within 24 hours of quitting smoking, within 1 year of quitting, CHD risk decreases significantly, within 2 years it reaches the level of a nonsmoker
- Smell and taste improve within days
- Within three months of quitting, the smokers' cough disappears in most people



# Rule # 3 Stop Smoking NOW!




**“I’m prescribing a patch to help you quit smoking. Wear it over your mouth.”**

# Rule # 4 Know your Number!

*And that's not your Mobile Number!*

## **Desirable numbers**

- Total cholesterol < 200;
  - LDL < 100
  - HDL > 40
  - triglycerides < 200
- 
- *Get the levels tested routinely and keep them under control*
  - *The only thing worse than finding out that you have one of these conditions is.....NOT finding out that you have it!!*
- 

# **Benefits of reducing cholesterol**

**10% reduction of blood cholesterol produces 20-30% decline in CHD deaths**

**All Adults >20 yrs must get tested- if normal test again after 5 years, if elevated, work towards normalizing the levels with lifestyle modification and drugs as needed**

# Controlling Blood Pressure

- Adults should have their blood pressure checked at least once every two years, as there are no symptoms to tell if you have high blood pressure
- Optimal levels : 120 /80 mm Hg
- If high
  - Modify your lifestyle – Diet, Weight, Exercise, Salt restriction
  - Adhere to the prescribed medication without fail, to decrease chances of getting heart disease – *Do not stop your medicines without consulting your doctor, even if the blood pressure becomes normal*



# Controlling Blood Sugar

- All adults should have their blood sugar checked regularly, as there are no early symptoms of diabetes
- Normal blood sugar:
- Fasting < 100; post meals <140
- If high
  - Modify your lifestyle – Diet, Weight, Exercise
  - Adhere to the prescribed medication without fail, to decrease chances of getting heart disease – *Do not stop your medicines without consulting your doctor, even if the blood sugar becomes normal*



# If you or someone in your family already diagnosed with heart disease

- Don't get disheartened – science has made significant progress
- Just monitor risk factors much more aggressively
  - Eat healthy
  - Walk regularly
  - Watch your weight
  - Quit smoking immediately
  - Keep your weight under control
  - *In addition to improving your heart – health these measures are sure to enhance your appearance !!*
- Adhere to you **medicines** & listen to your doctor



**Don't wait for a heart failure to take  
an action !**

**Don't wait for a second life we  
are not cats!**



**Following a heart-healthy lifestyle doesn't have to be complicated, and it doesn't mean you need to live a life of self-deprivation. Instead, find ways to incorporate heart-healthy habits into your lifestyle — and you may well enjoy a healthier life for years to come.**

