Prognostic evaluation by ^{99m}T-MIBI washout rate in ischemic heart disease with decrease of cardiac diastolic function

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Introduction

The cardiac failure begins from decrease of diastolic ventricular function. (Fig.1)

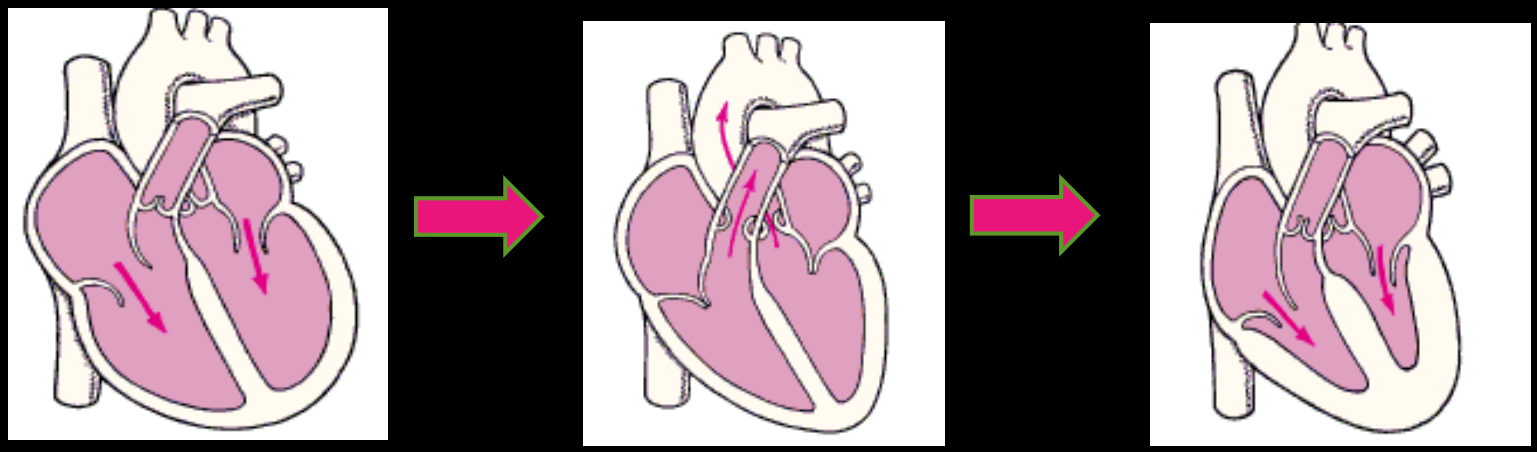


Fig.1

Even if diastolic ventricular function decreased in ischemic heart disease, when mitochondrial activity is high, cardiac function would be improved. However, when mitochondrial activity is low, cardiac function would be not improved .

Introduction

A mitochondria synthesize ATP which is myocardial energy. (Fig.2)

Myocardial perfusion tracer ^{99m}Tc-MIBI is held at the membrane of the mitochondria within a myocardial cells.

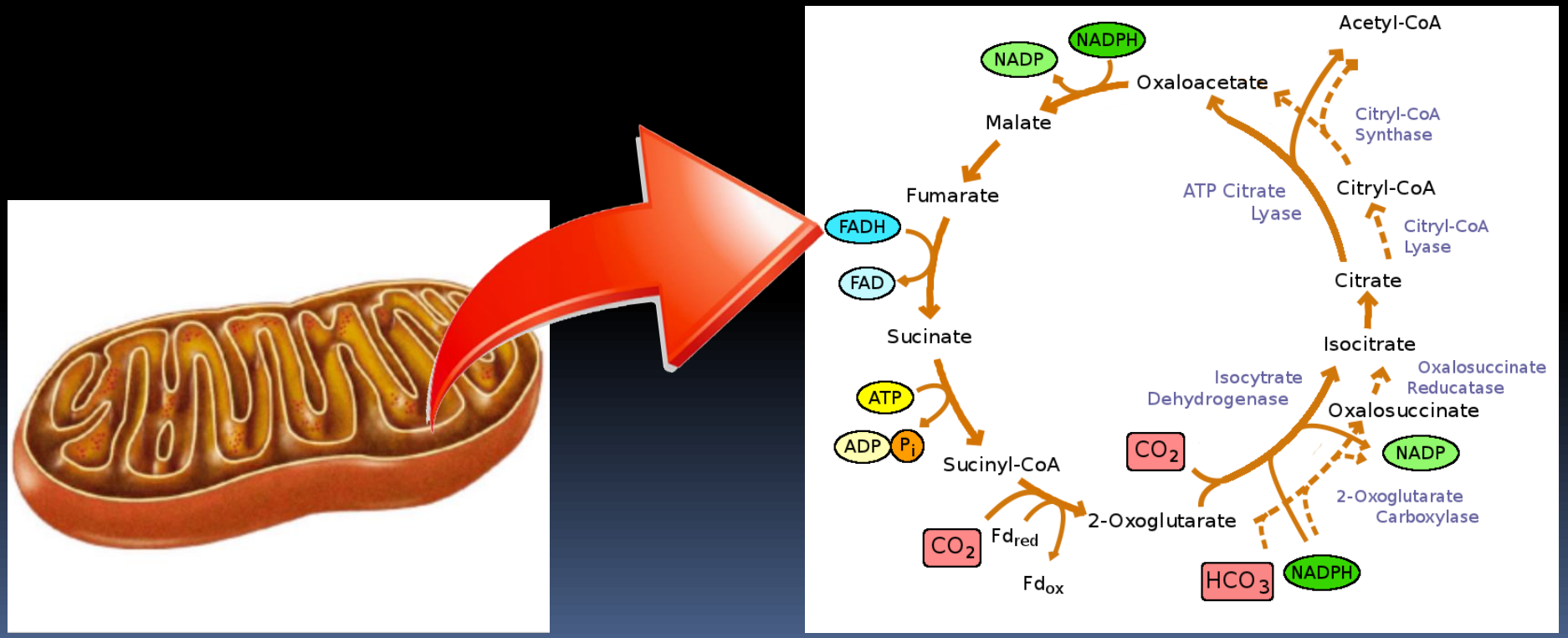


Fig.2

Introduction

MIBI washout as reverse redistribution of ^{99m}Tc-sestamibi is frequently observed after direct PTCA in AMI [1] and coronary spastic angina [2] and severe three-vessel coronary artery disease [3] .

The mitochondrial activity are evaluated quantitatively by washout rate of ^{99m}Tc-MIBI.

1) Yasuchika Takeishi et al: Reverse Redistribution of Technetium-99m-Sestamibi Following Direct PTCA in Acute Myocardial Infraction *J Nucl Med 1996;37: 1289-94*.

2) Souichi Ono et al: Enhanced regional washout of Technetium-99m-Sestamibi in patients with coronary spastic angina. ANM Vol.17,No5,393-398,2003

3) Bulin Du et al: Myocardial washout rate of resting 99mTc-Sestamibi(MIBI) uptake to differentiate between normal perfusion and severe three-vessl coronary artery disease documented with invasive coronary angiography. ANM Vo.28,No3,285-292,2014

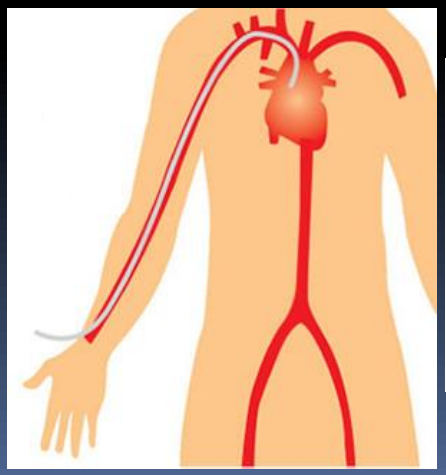
Introduction

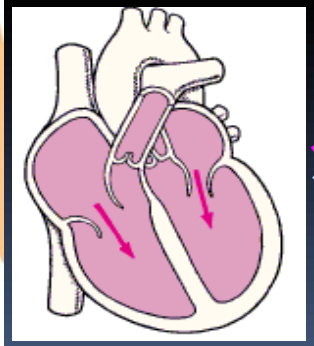
In Ischemic Heart Disease with decrease of diastolic ventricular function.

Comparison of ^{99m}Tc-MIBI washout rate between

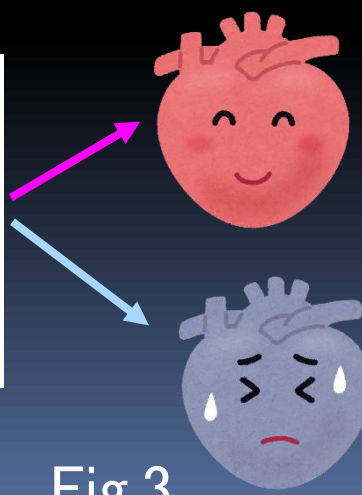
Group A (cardiac function : keep or / and improve after PCI) and

Group B (cardiac function : decrease after PCI) .





Low PFR



Group A

MIBI washout rate ?

Group B

Fig.3

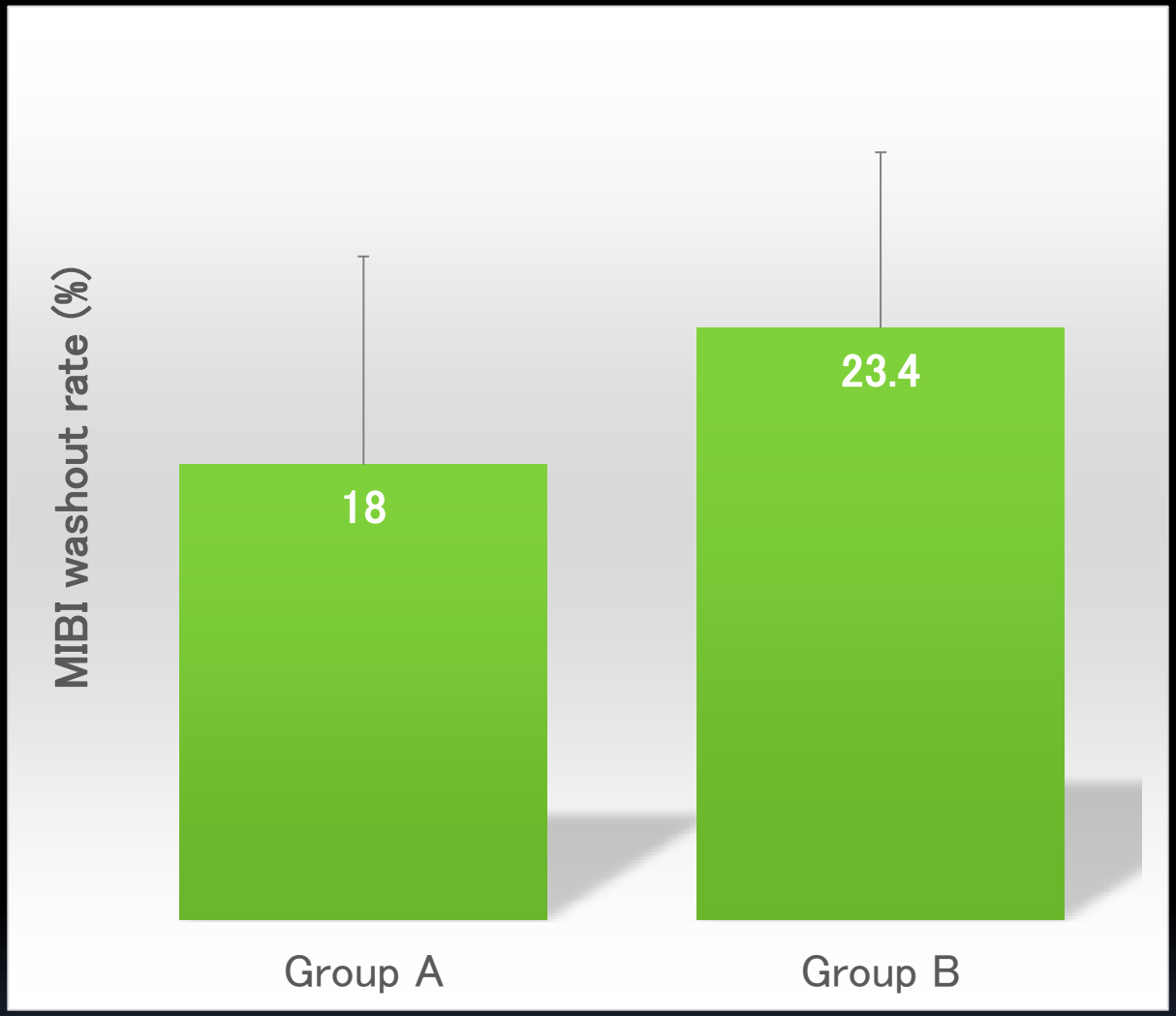


Fig.11 Comparison of MIBI washout rate between Group A and Group B.

Group A: decreased PFR and keep or improvement E.F after PCI

Group B:low PFR and depressed E.F after PCI

Low PFR : case ≦60 yeas old ,PFR<1.73 and case >60 years old ,PFR<1.38

$p<0.01$

Results

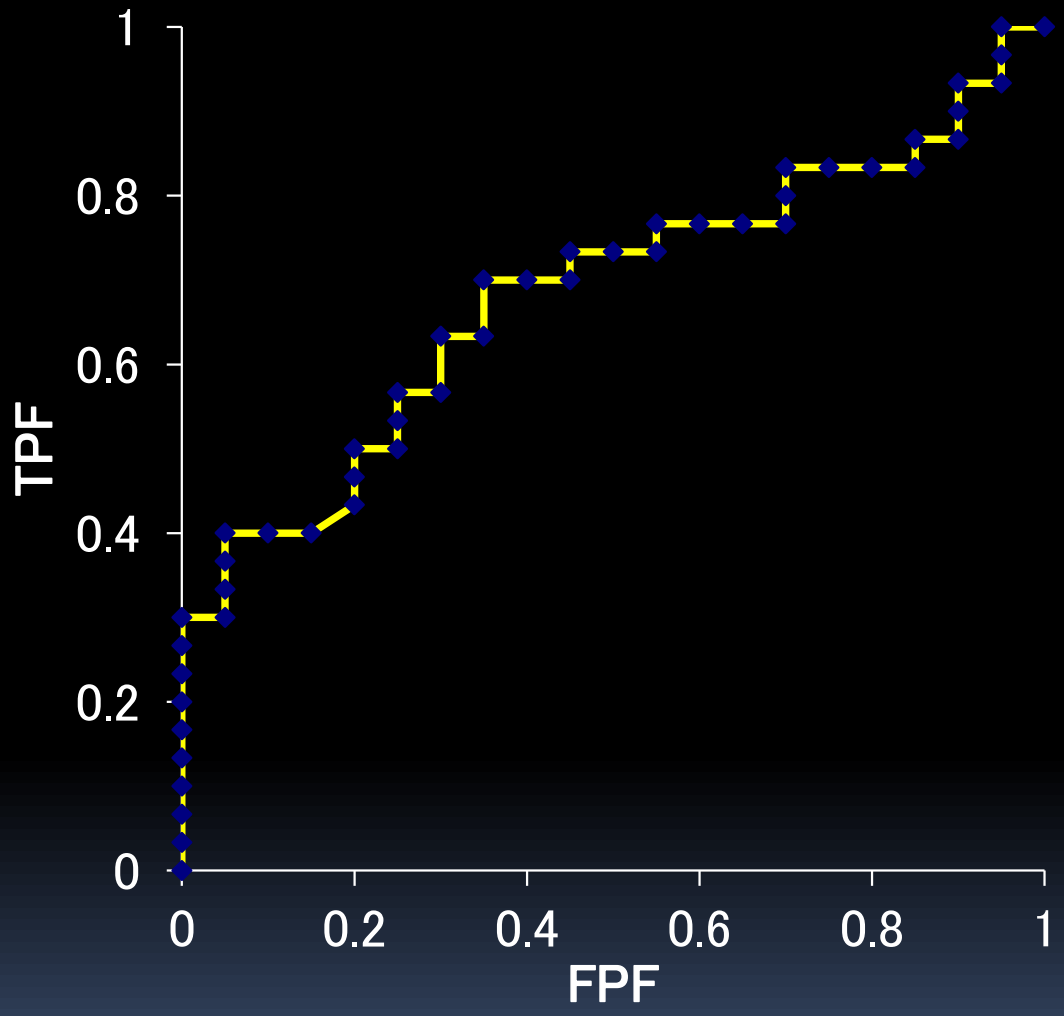


Fig.12　ROC　Receiver Operating Characteristic Analysis.

Cut off =20.2 TPF=0.700 FPF=0.350 Odds Ratio=4.333

Discussion

It was suggested that MIBI washout rate evaluates the cardiac function.

It is considered , in case of cardiac diastolic function decreased, mitochondria responsible for ATP production that become activated in order to improve or keep of cardiac function.

It appears that decrease of PFR do not cause the immediately cardiac failure.

Conclusion

Even though diastolic cardiac function is decreased, when MIBI washout rate is decline, there is a high possibility that cardiac function is keeping and/or can be improve.