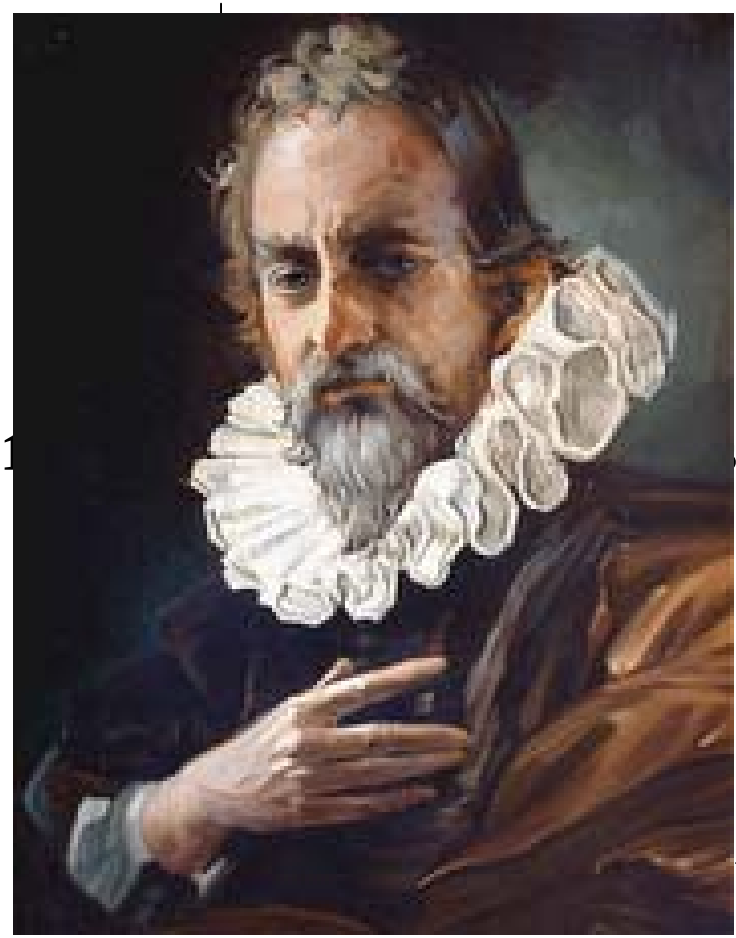
Geneve et l’Hypertension Pulmonaire d’effort

27 Octobre 1553



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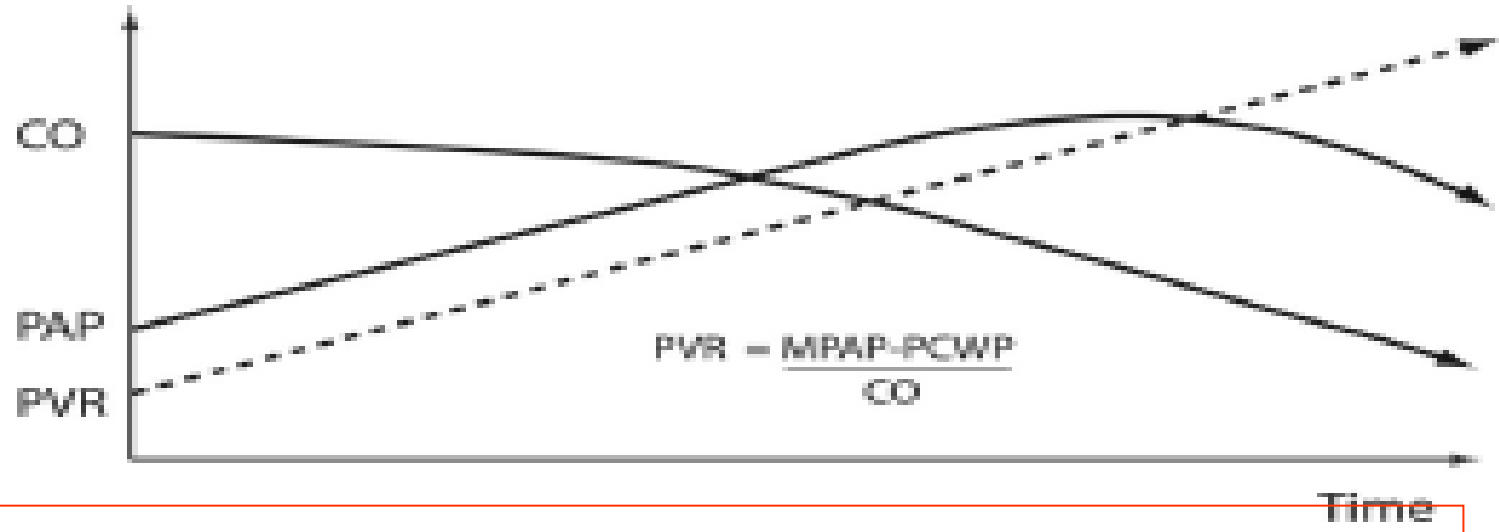
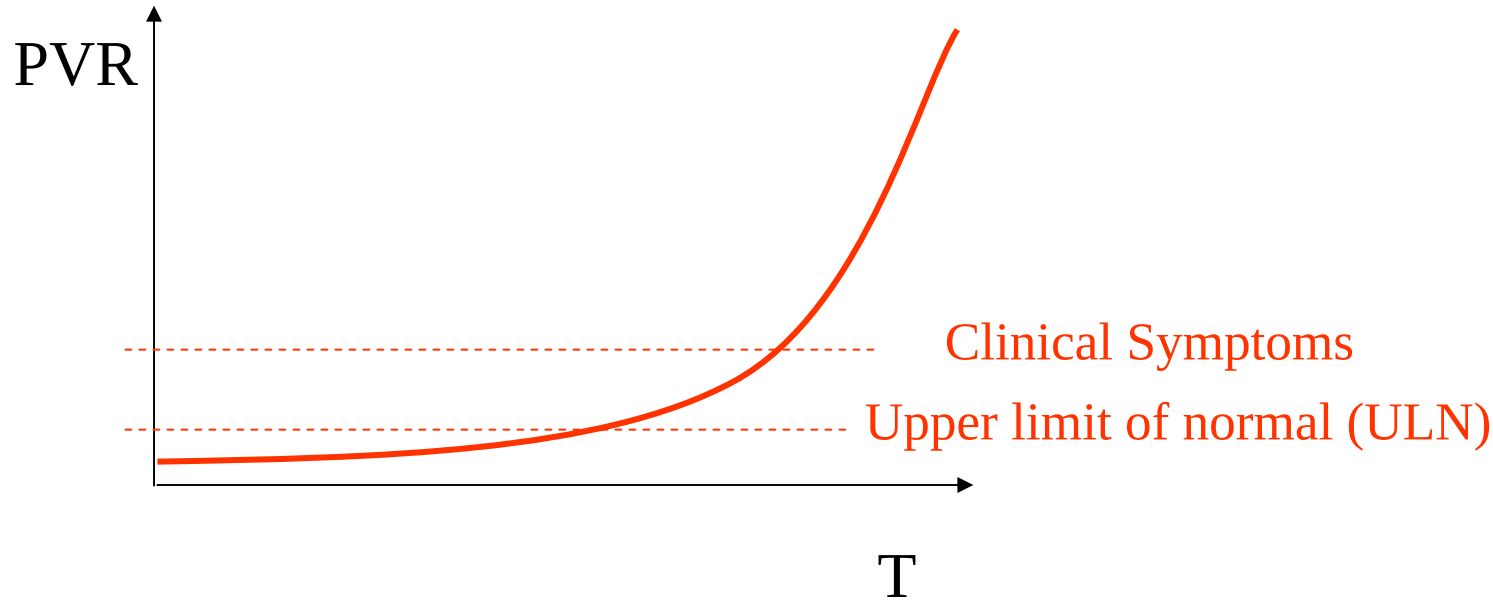


PVR = PAP – PAOP/ CO = 8.l.η/π.r^4 (Poiseuille Law)



PREVALENCE OF EXERCISE INDUCED PH

-At risk population:

Scleroderma 20 to 50%,
HIV 0,45%
Familial: exercise, 10% of control / 30% of relatives/50%BMPR2
Drepanocytose: 30%

-Population générale 10%!!!!!

« Hypertension pulmonaire d’effort »

-Pulmonary Circulation in Exercise

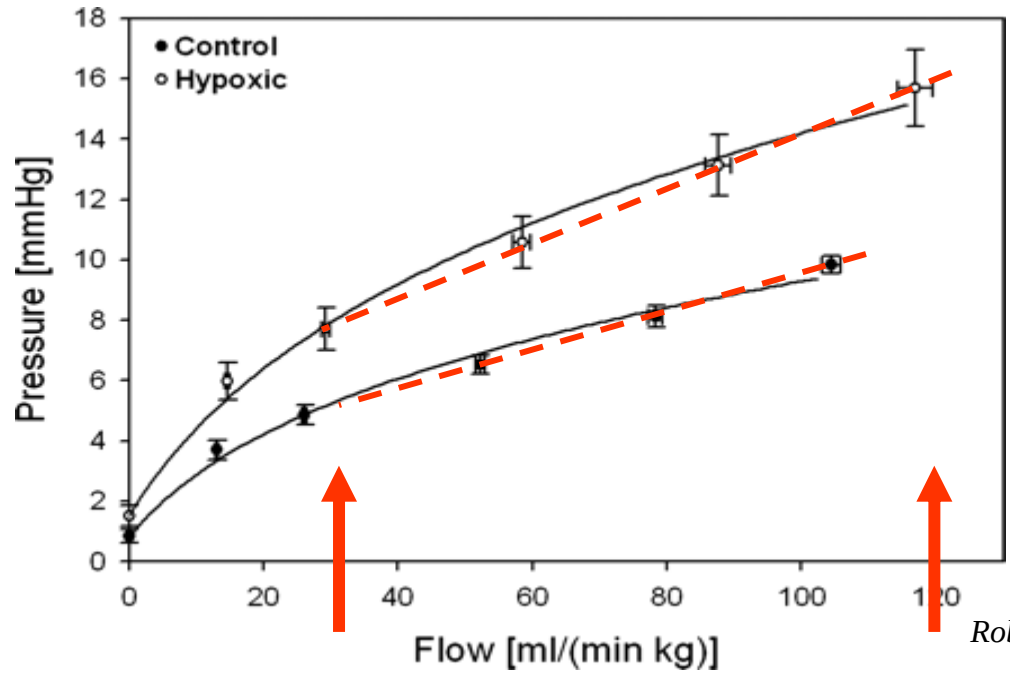
-Exercice induced Pulmonary Hypertension

-Pulmonary hypertension in Exercise

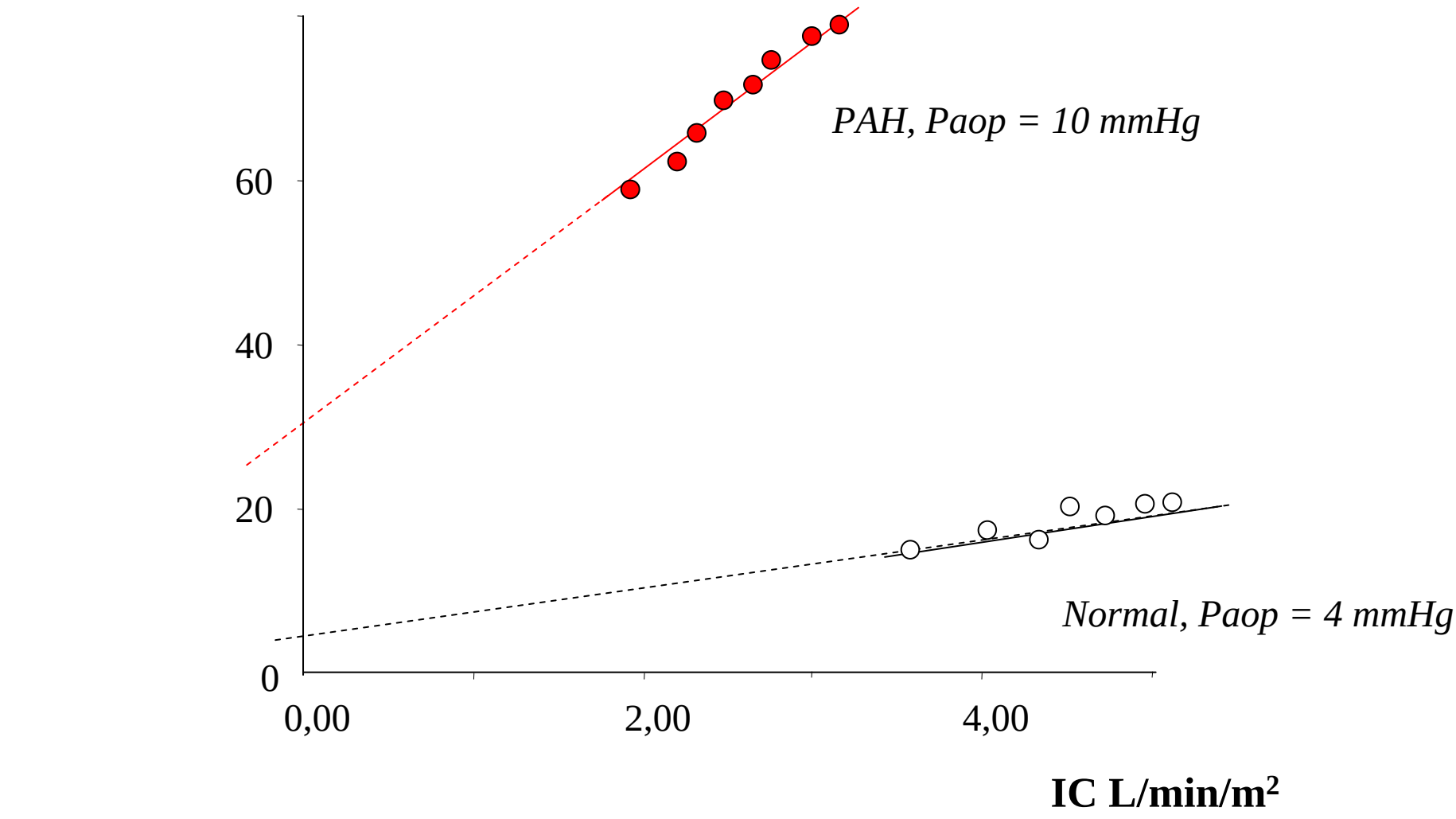
ISOLATED RAT LUNGS

AIR

CHRONIC HYPOXIA



Robert: J Appl Physiol 97: 2372–2384, 2004.

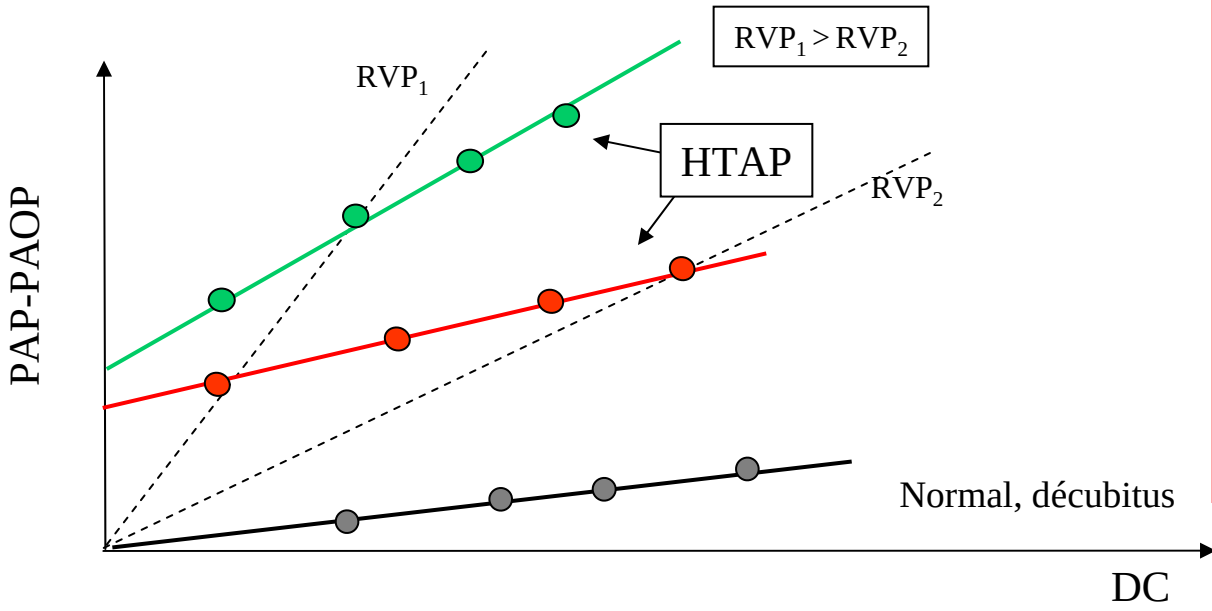

Mean PAP mmHg
PAH, Paop = 10 mmHg
Normal, Paop = 4 mmHg
60
40
20
0
0,00
2,00
4,00
IC L/min/m2

PVR = *(PAP-PAOP) / Q*

Relation P/Q est linéaire dans la zone des débits physiologiques (normal ou pathologique). La droite P/Q coupe les axes à leurs origines seulement chez les sujets normaux en décubitus. Dans toutes les autres conditions l'intercept est positif.

RVP n'est plus une constante indépendante du Q et le calcul de RVP est trompeur
Une augmentation passive de PAP par augmentation de Q est associé à une diminution de RVP.
Une vasoconstriction active peut être associée à une valeur de RVP inchangée

Variabilité spontanée de RVP de repos de ± 20%



Etat fonctionnel circulation pulmonaire

Construction de la droite P/Q à plusieurs niveaux de débit

Caractéristiques de la droite P/Q
régression linéaire: pente
RVP de repos ou intercept: position

1973: first World Symposium on Pulmonary Hypertension

Definition of PAH

1. ***mean PAP > 25 mmHg at rest***
2. ***or mean PAP >30 mmHg during exercise***
3. ***in the presence of a PAOP < 15 mmHg.***

Recommendations Dana Point:

- **Exercise, PVR, PAOP criteria eliminated.**
- **Resting PAP of 8 to 20 mm Hg is normal**
- **New definition of PH: resting PAP ≥25 mm Hg.**
- **Further studies the natural history PAP 21 to 24 mm Hg**

Recommendations ERS and ECS:

Dana Point +

Pre-capillary and post-capillary PH, PAOP <15 or >15 mmHg

2008: 4th World Symposium on PH Dana Point California

PAH definition was challenged, based on meta analysis of Kovacs
(Eur Respir J 2009) 1,187 individuals in 47 studies:

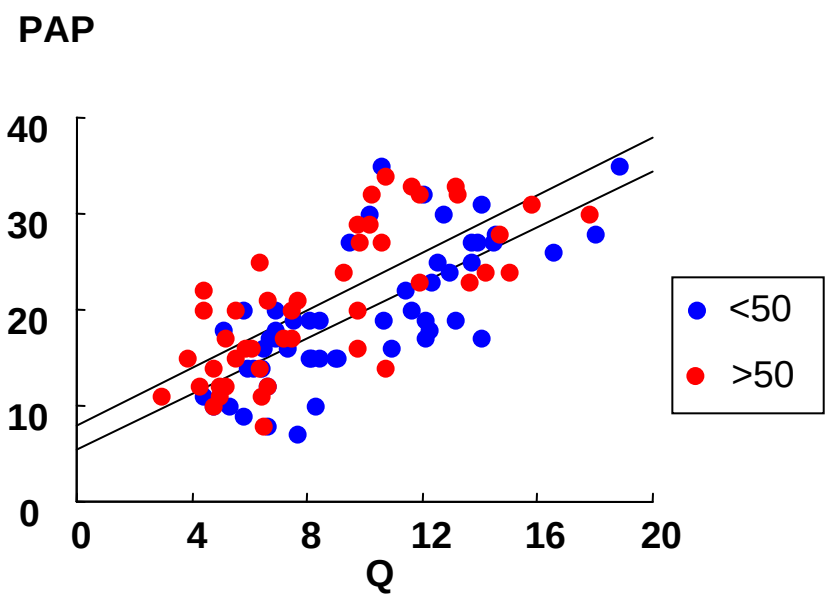
- Rest normal PAP = 14.3±3.3 mmHg (age independent)
ULN: mean + 2 SD = 20.6 mmHg → grey zone 21-24

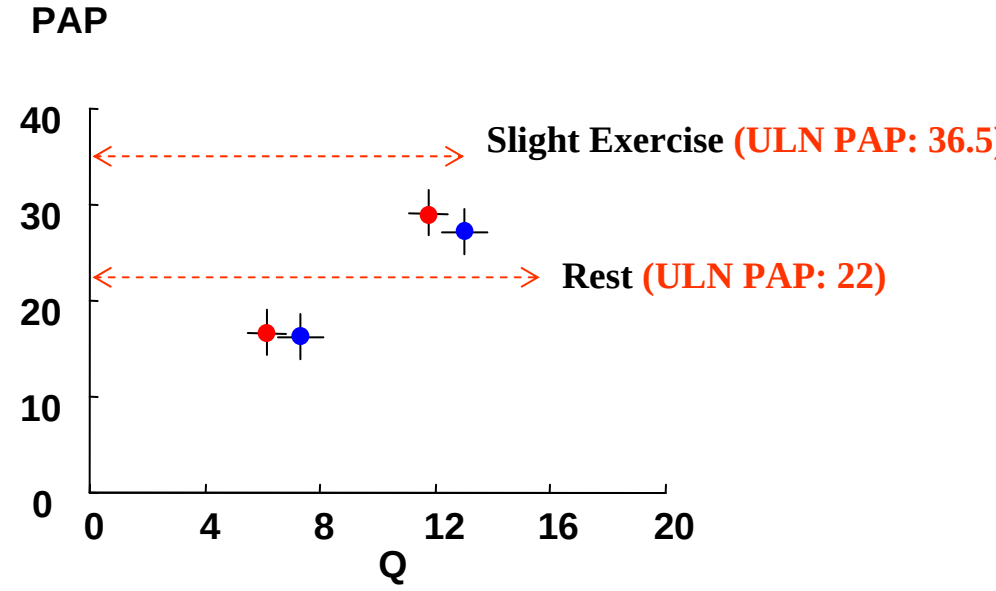
-Slight exercise ULN: 32 mmHg; 30 mmHg <50 years, 46 mmHg ≥ 50 years

We have tested these ULN in 99 consecutive pts in Clamart:

-In ≥ 50yrs, 79% with PAPrest 21-24mmHg and 98% with mPAPrest <21mmHg did not reach ULN (classic ULN:85%)
- In <50 yrs, 91% with mPAPrest 21-24mmHg and (63%) with mPAPrest <21mmHg exceeded the ULN on slight exercise.

N = 50 « Normal » Subjects, slight exercise 60 w (Clamart 2006-2009)



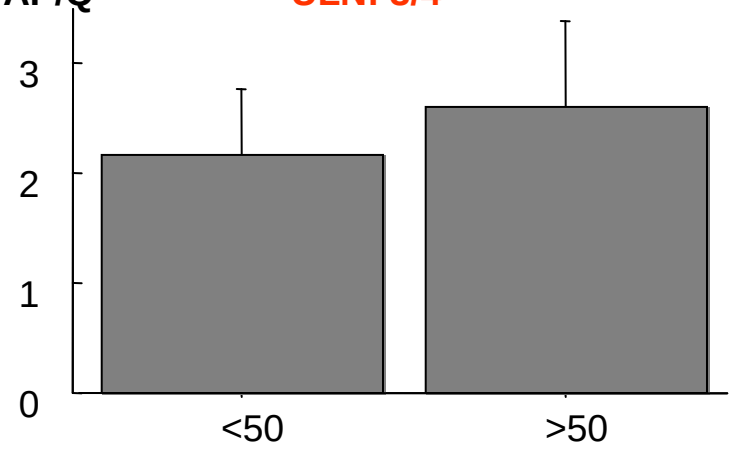


N = 50 « Normal » Subjects (Clamart 2006-2009)

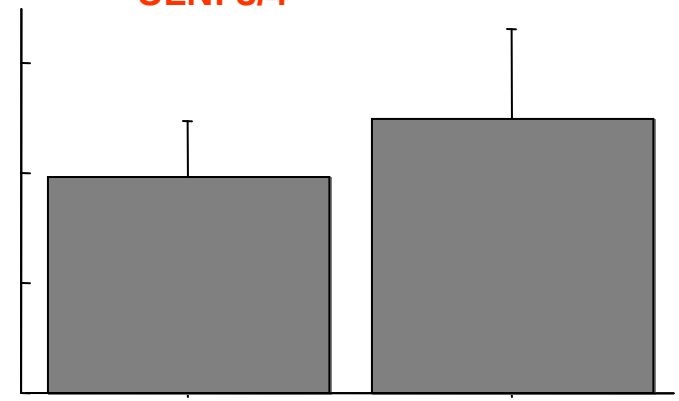
Rest

Slight Exercise

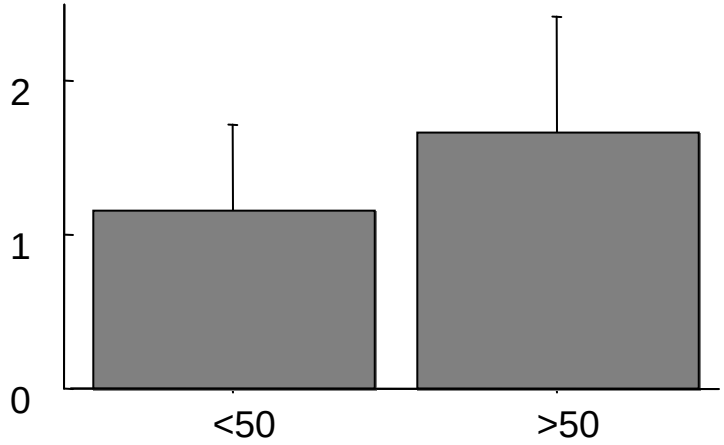
TPR =PAP/Q **ULN: 3/4**



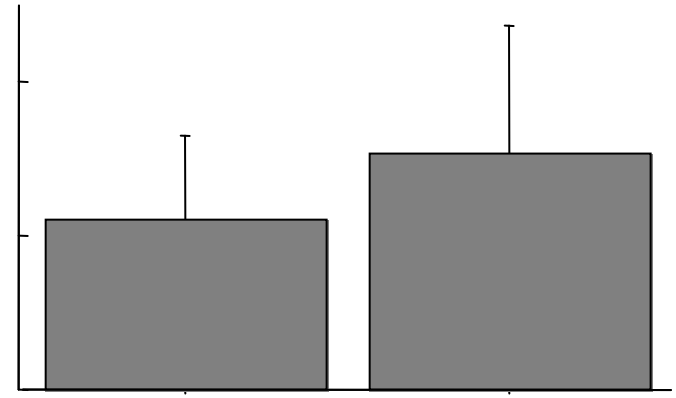
ULN: 3/4



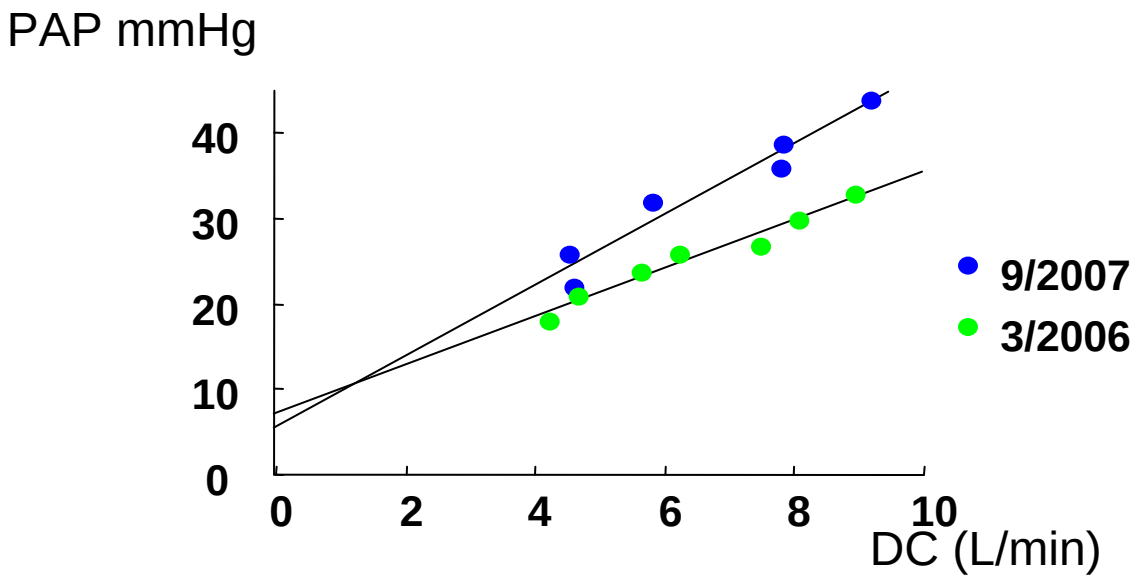
PVR =(PAP-PAOP)/Q **ULN: 2/3**



ULN: 2/3



Mme V.. CPC PE OPERE POST OP 03/2006 : (repos) PAP 18 mmHg, RAP 3 UI
AGGRAVATION CLINIQUE 09/2007 : (repos) PAP 22 mmHg, RAP 3 UI



Pap = 5,635 + 4,145 * dc; R^2 = ,945 (APRES)
Pap = 7,178 + 2,839 * dc; R^2 = ,965 (BASELINE)

ANOVA Table for Pap

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
dc	1	455,958	455,958	169,368	<,0001	169,368	1,000
TEMPS	1	,484	,484	,180	,6814	,180	,066
dc * TEMPS	1	15,947	15,947	5,924	,0377	5,924	,581
Residual	9	24,229	2,692				

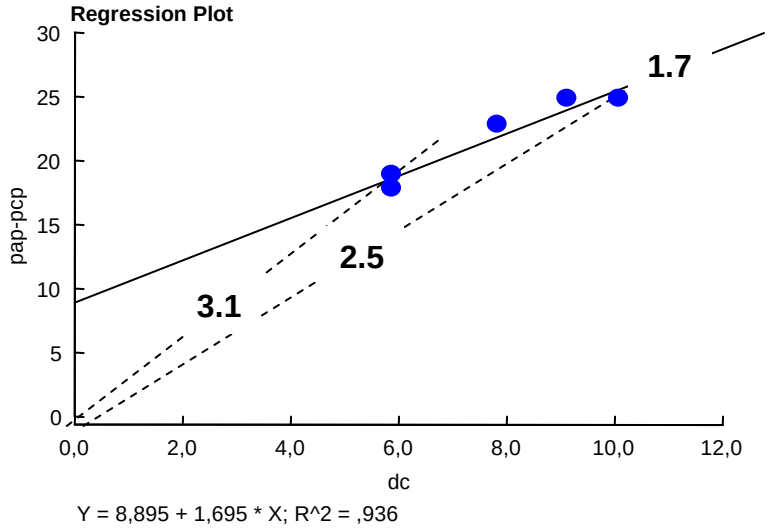
PAP REPOS 24 PAOP 7

PVR REPOS 3.07
PVR EFFORT 2.5

PENTE 1.7
INTERCEPT 8.8

Regression Coefficients
pap-pcp vs. dc

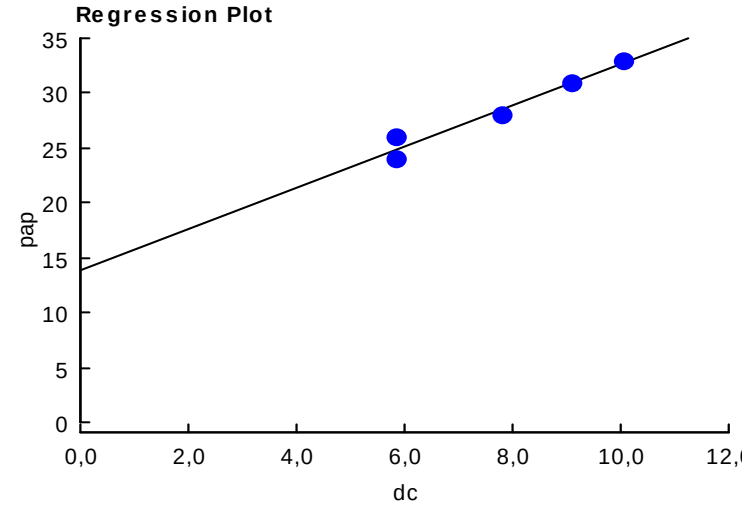
	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Intercept	8,895	2,020	8,895	4,403	,0217
dc	1,695	,255	,968	6,641	,0070



Y = 8,895 + 1,695 * X; R^2 = ,936

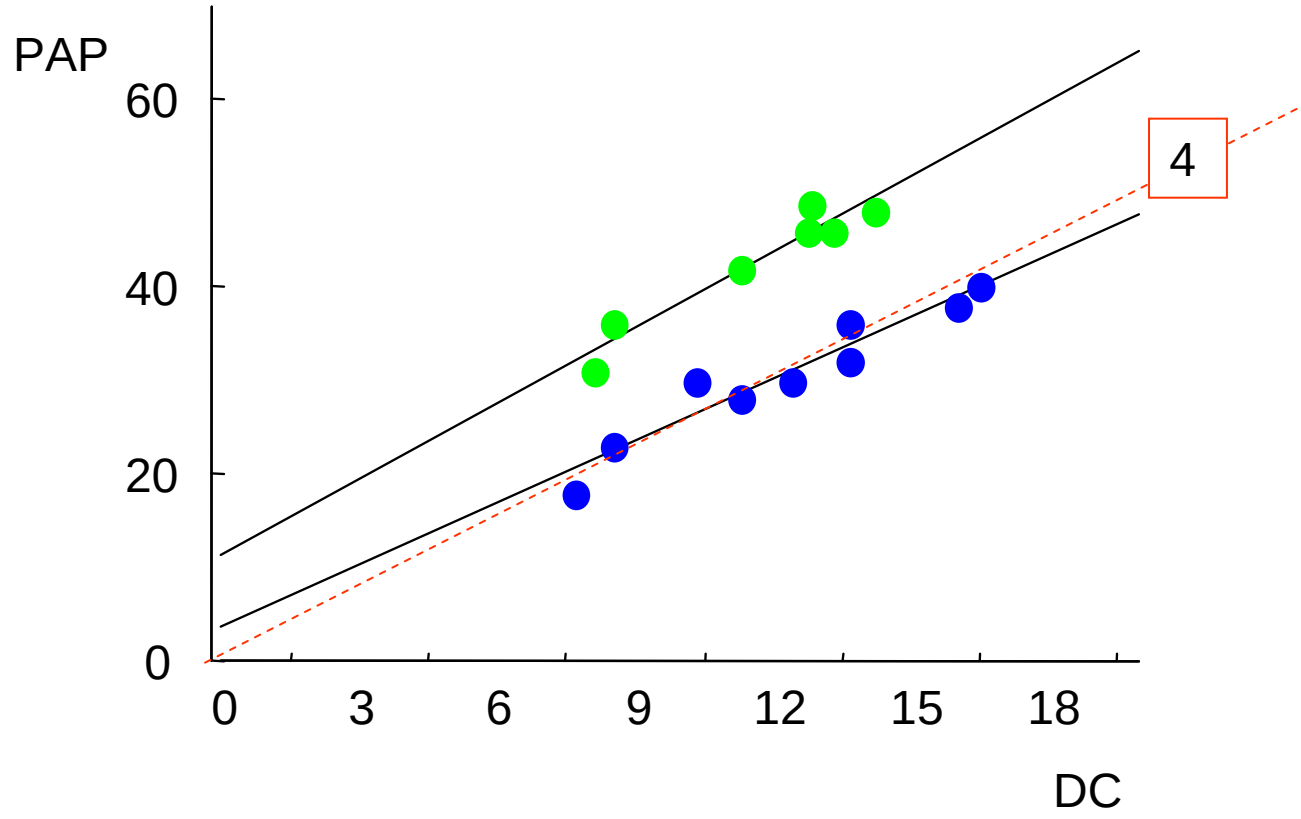
Regression Coefficients
pap vs. dc

	Coefficient	Std. Error	Std. Coeff.	t-Value	P-Value
Intercept	13,844	1,860	13,844	7,442	,0050
dc	1,883	,235	,977	8,011	,0041



Y = 13,844 + 1,883 * X; R^2 = ,955

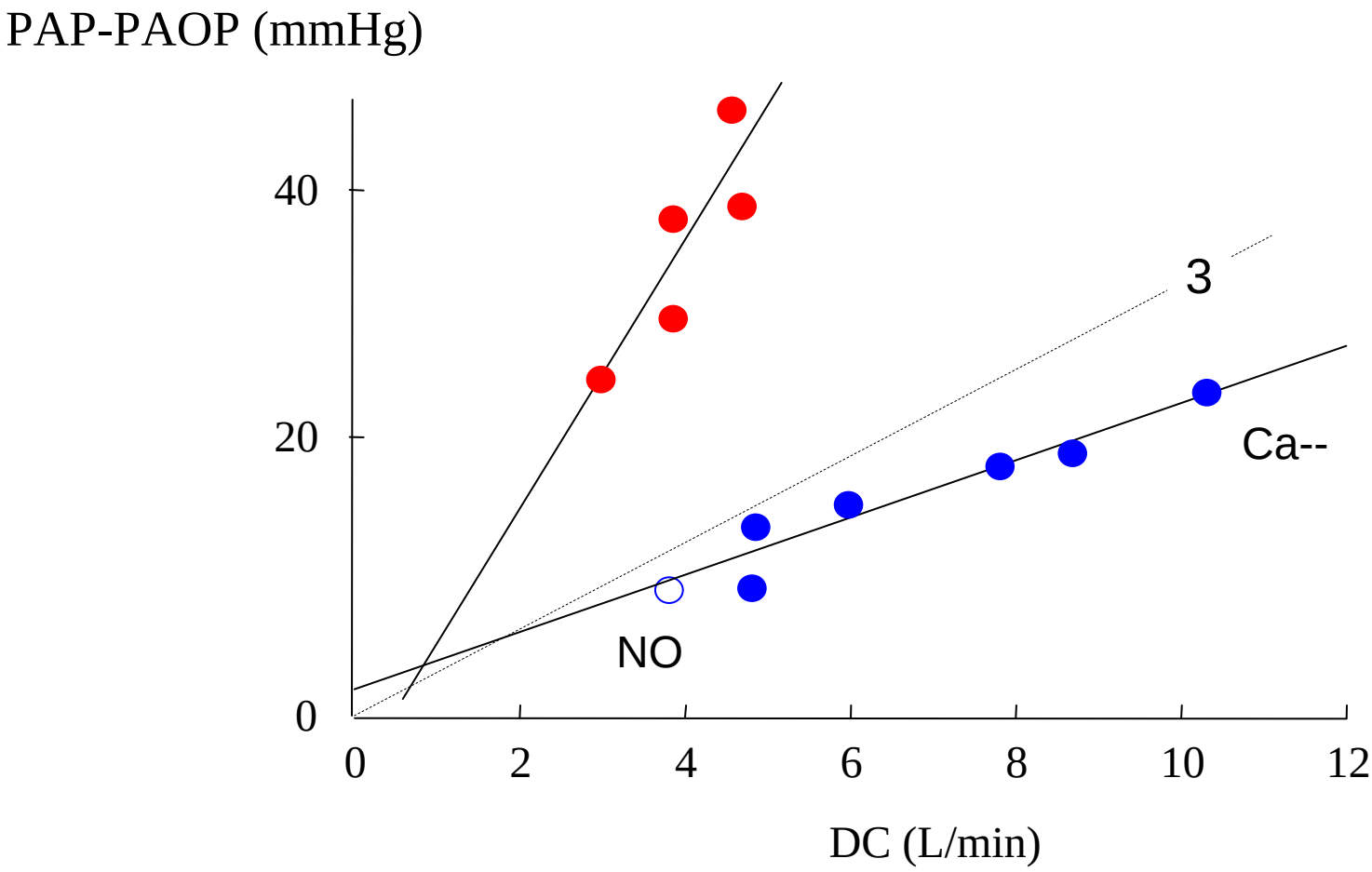
Mr F. 60 ANS, MVO: PAP 30 Baseline, PAP Tracleer 18



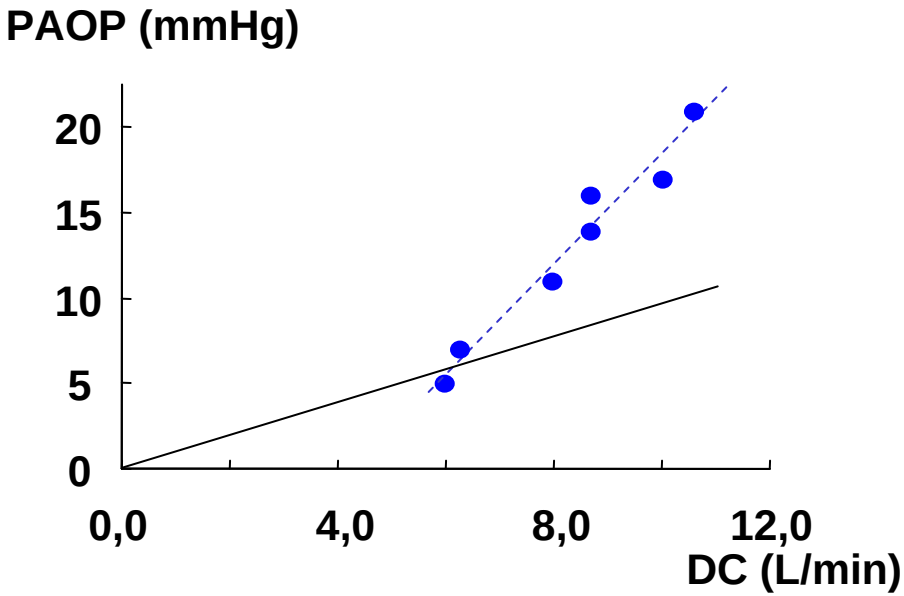
PAP = 11,312 + 2,695 * DC; R^2 = ,92 Baseline

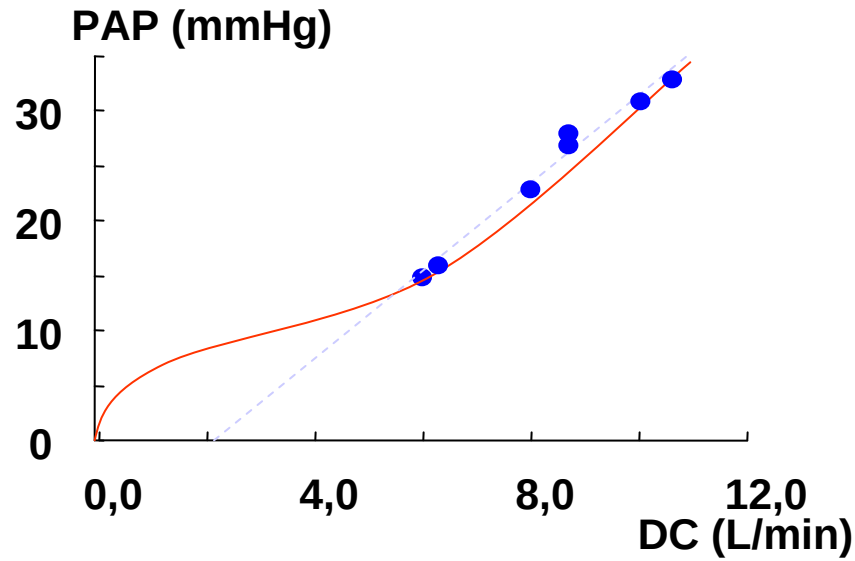
PAP = 3,496 + 2,209 * DC; R^2 = ,92 Tracleer

Mme F.. HTAP idiopathique PAP 35



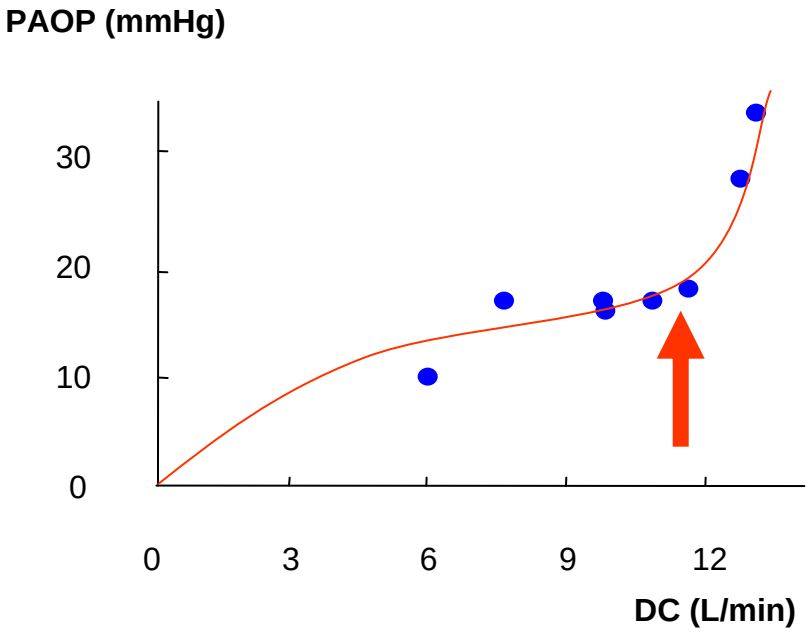
Mme B. 58 ans, sclerodermie systemique dyspnée stade III
Écho cardiaque non contributive car tachycardie sinusale à 100 n(sic)
PAP rest13 mmHg

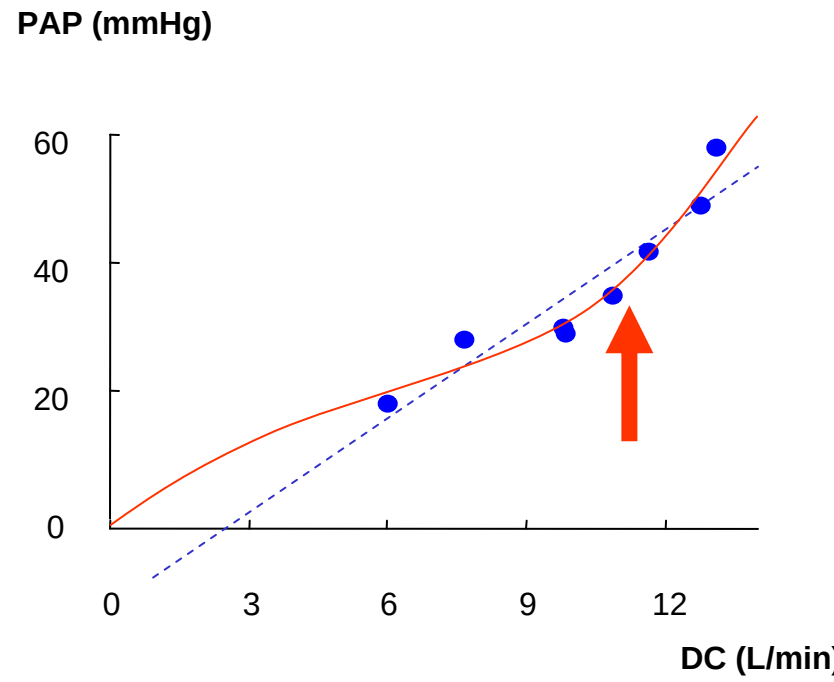




Y = -8,491 + 4,003 * X; R^2 = ,98

Mr B. 62 ans: Dyspnée stade II résiduelle 6 mois après TEP

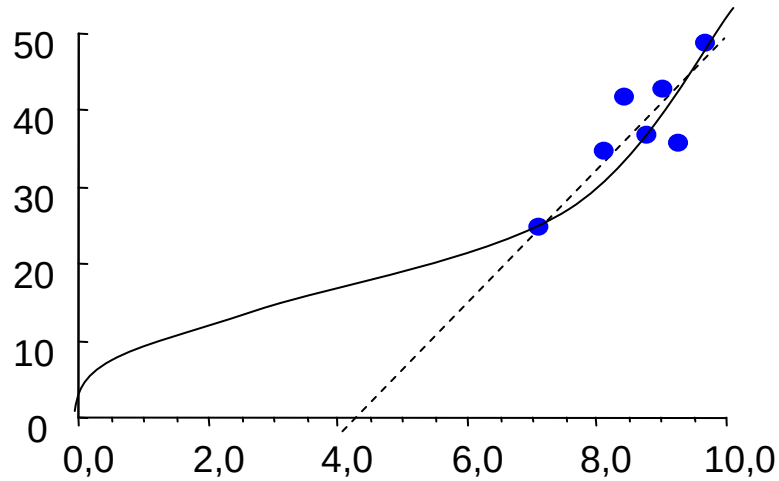




Y = -14,135 + 4,933 * X; R^2 = ,875

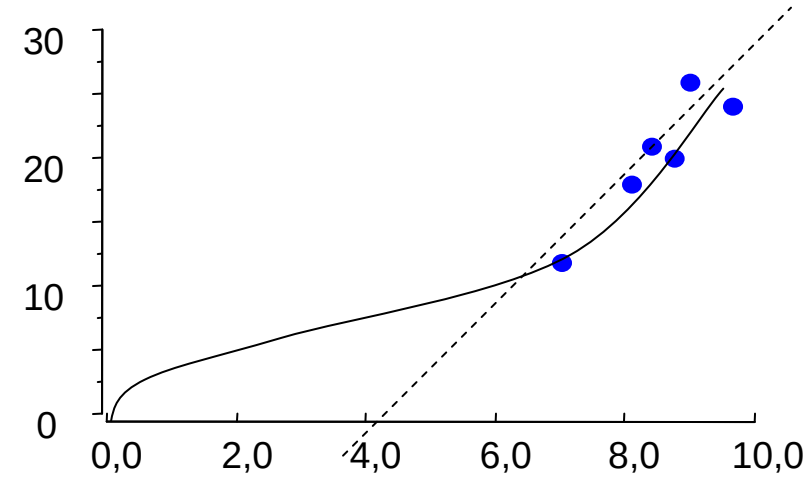
Mme G. 60 ans, PAP rest 22 mmHg

PAP (mmHg)



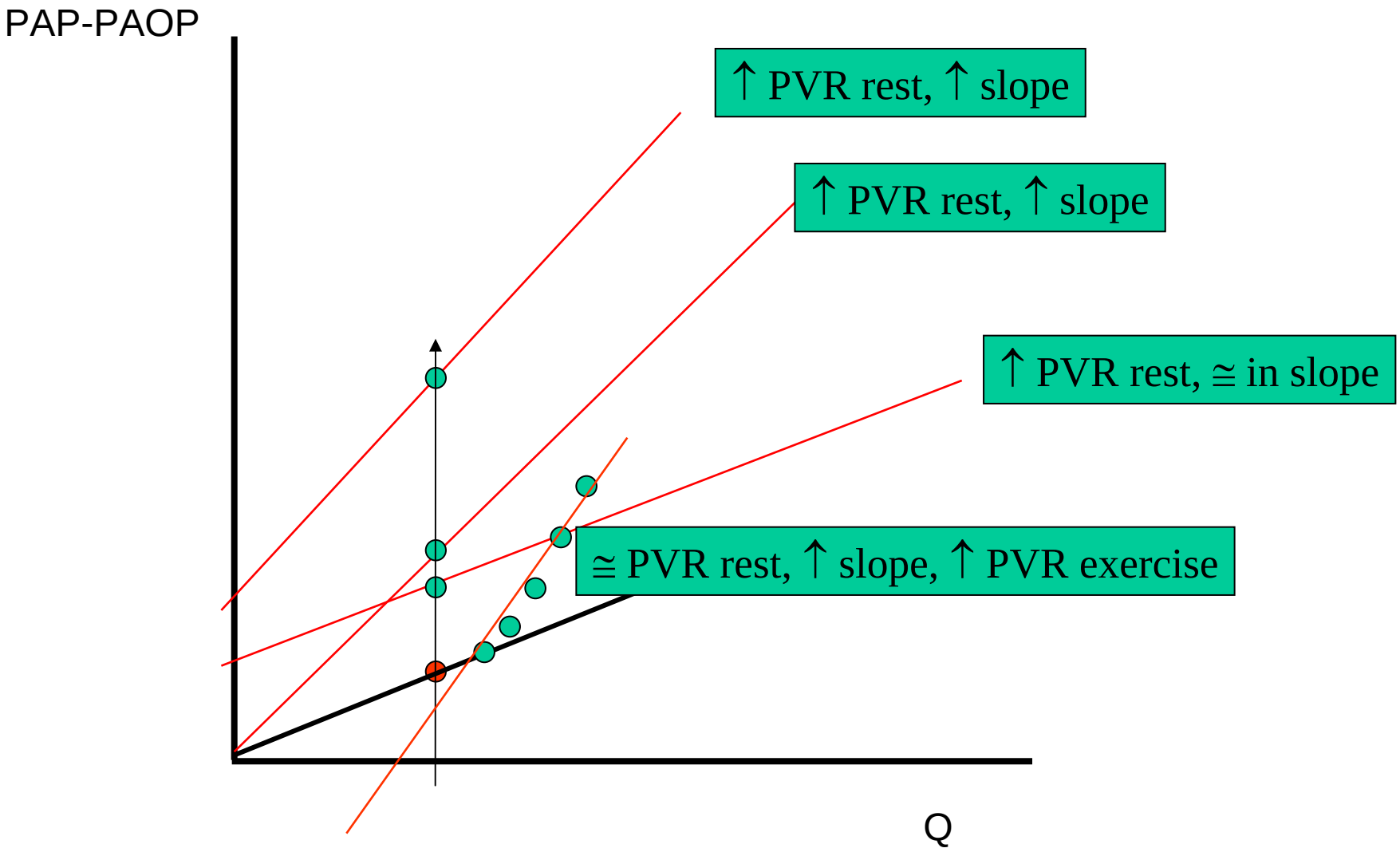
Y = -27,301 + 7,603 * X; R^2 = ,712

PAOP (mmHg)



Y = -27,185 + 5,551 * X; R^2 = ,841

Different hémodynamic phenotypes of exercise induced PH

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