

International Conference on
i2010

Perspectives for Central and South-East Europe

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ICT usage and opportunities in the health sector

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The Roles of ICT in Health Care

I. Information Carriers in medicine

- Texts
- Curves
- Pictures

II. Data transporters in medicine

- Electronic Patient Record
- Intranet transfer of data and informations
- Internet communication of pts's info-s

III. Processing of data

- from mass screening
- for modelling

I.

Information Carriers in medicine

- **Texts** (alfa-num. data mat.-stat. analysis, probability..)
- **Curves** (spectral analysis, FFT, autocorrelation...)
- **Pictures** (digitalization, 3-D reconstructions...)

Information carriers

Data primaria

A/D conversio

Processio

Reconstructio multidimensionalis

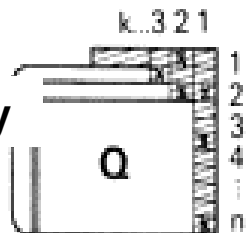
Conclusio

Σ

History

(Δt)

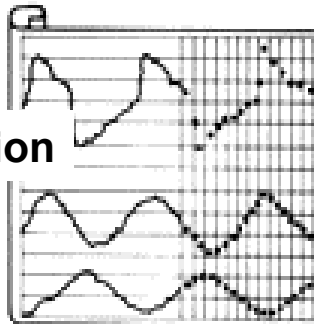
(G)



Function

(Δi)

(E)



Structure

(Δe)

(D)



S

O

F

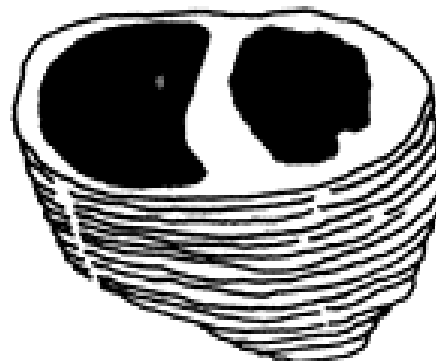
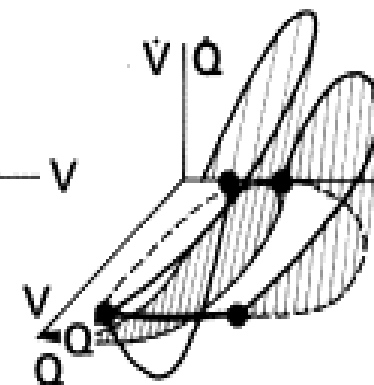
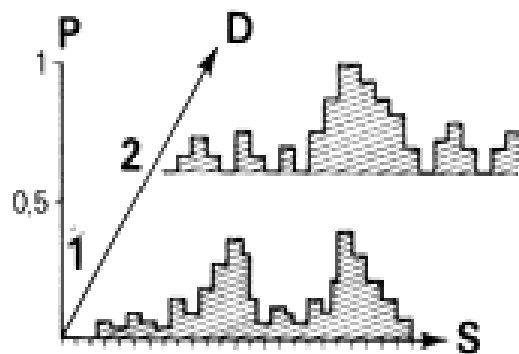
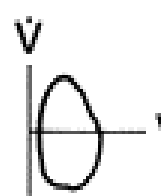
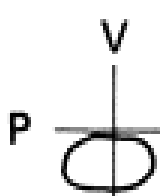
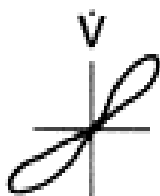
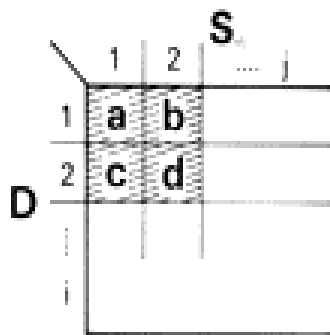
O

C

L

E

S_{NA}

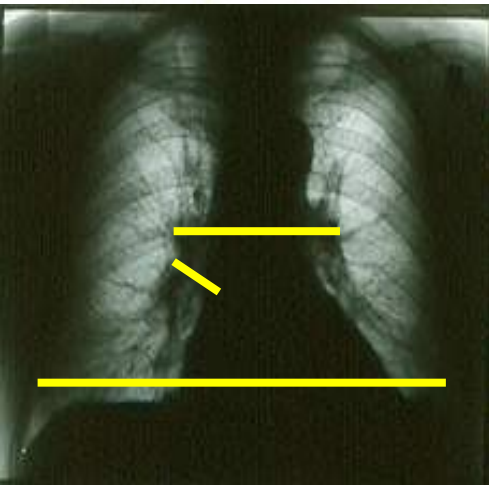


Status

Adaptivity

Outcome

Computation of Multivariant Regression Equation for Diagnostic Purposes Pulmonary arterial hypertension



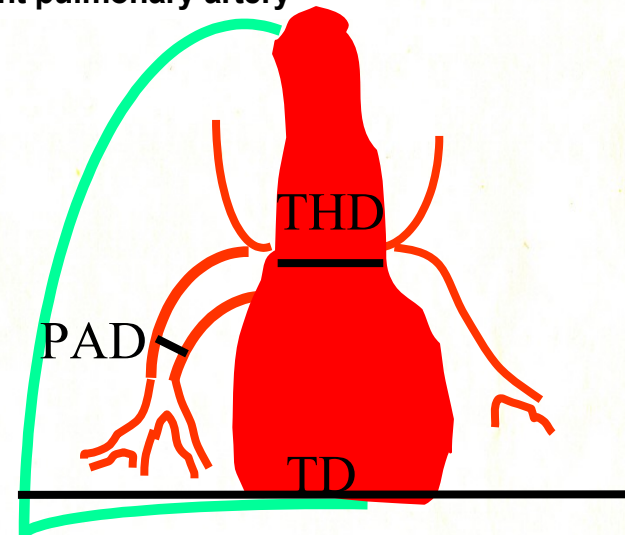
PAD = Diameter of interned. branch of right pulmonary artery

TD = Transthoracic diameter

THD = Transhilar diameter

pO_{2R} = pO_2 in rest

pCO_{2R} = pCO_2 in rest



ECG signs

Variables

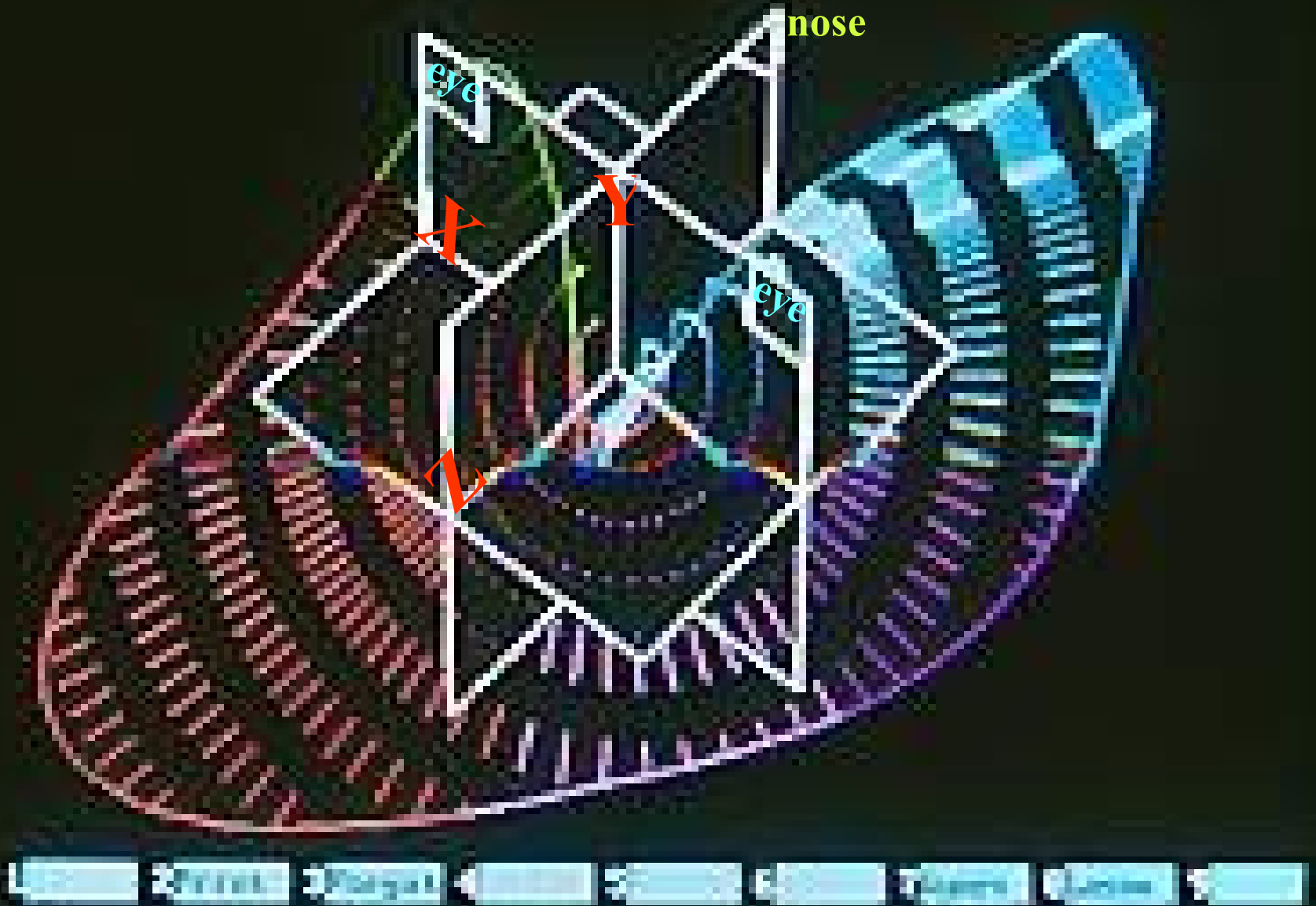
S_{V5}

S_{D1}

ID_{V1} = intrinsicoid deflection a V_1 -ben

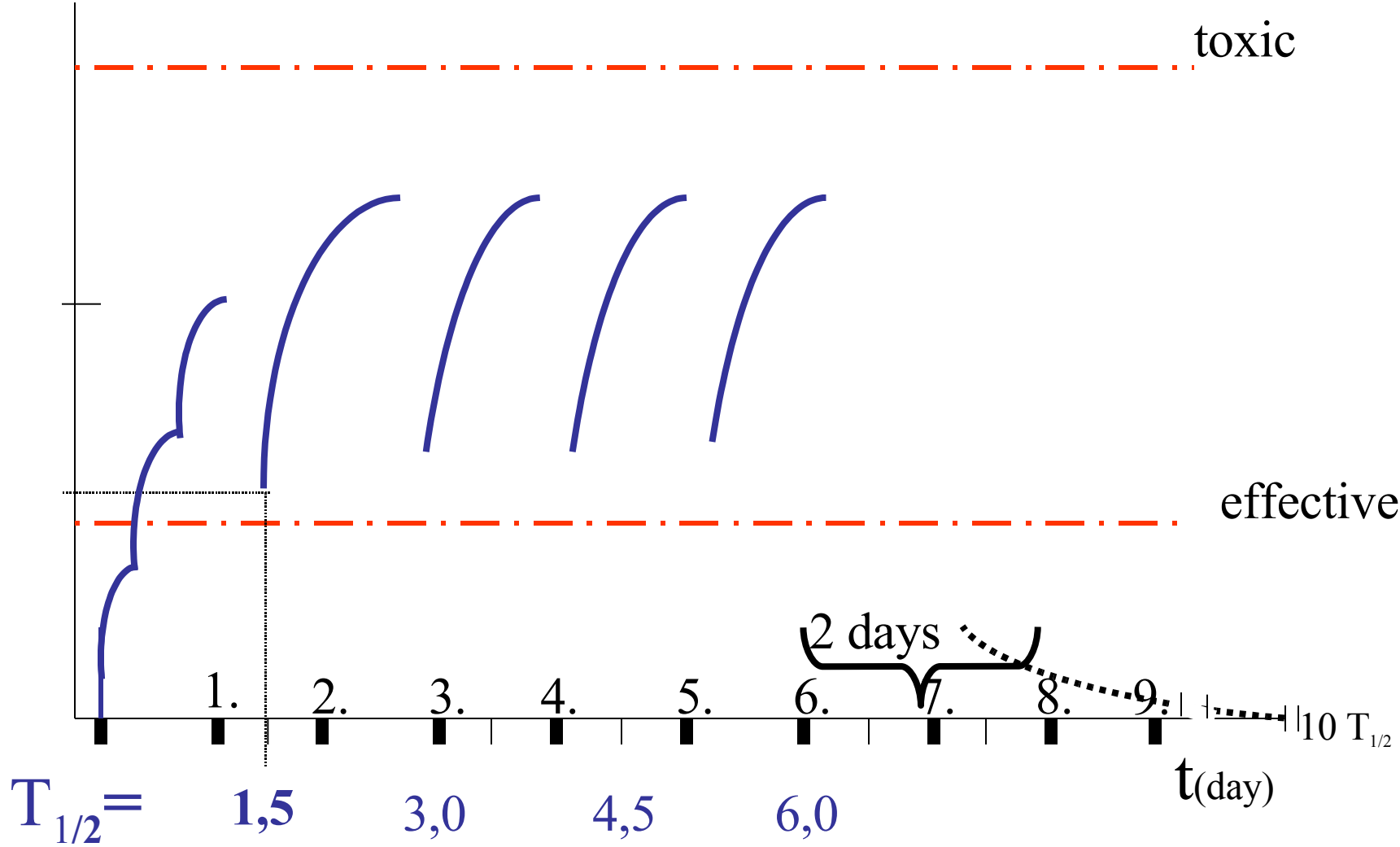
$$\overline{PAP} = 21.3 * \left[\frac{PAD}{TD} \right] + 1.08 * \left[\frac{THD}{TD} \right] - 0.133 * \left[pO_{2R} \right] + 0.1 * \left[pCO_{2R} \right] + 0.028 * \left[S_{V5} \right] + 0.15 * \left[S_{D1} \right] + 0.0074 * \left[ID_{V1} \right] - 0.00022 * \left[FEV_1 \right] + 1.883$$

Stereo-vectorcardiogram

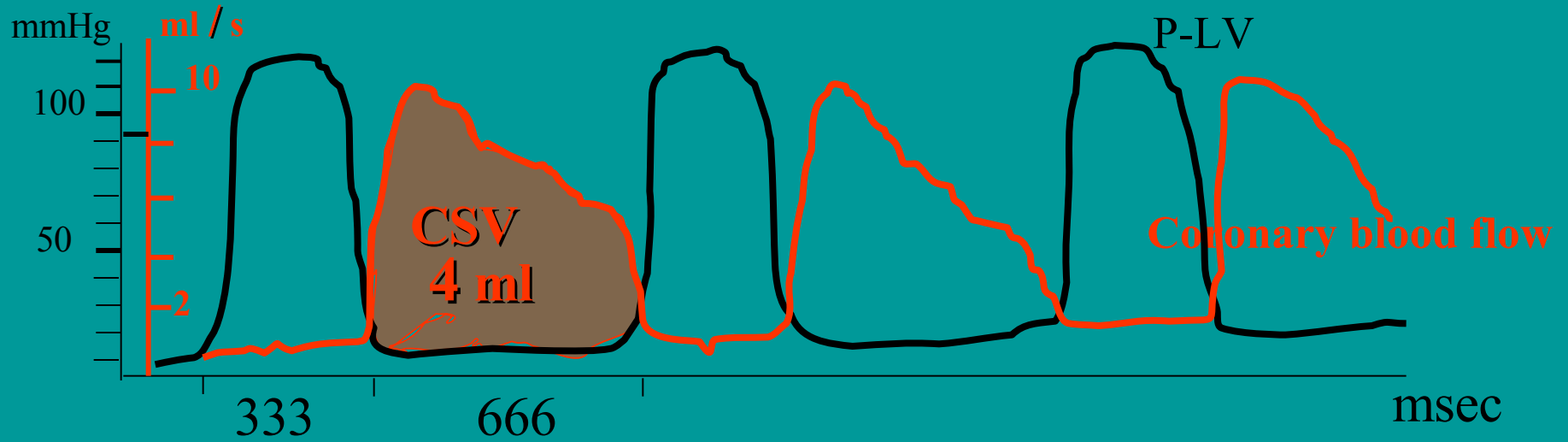


Dosage optimization of Drugs Based on Pharmacokinetics Computation

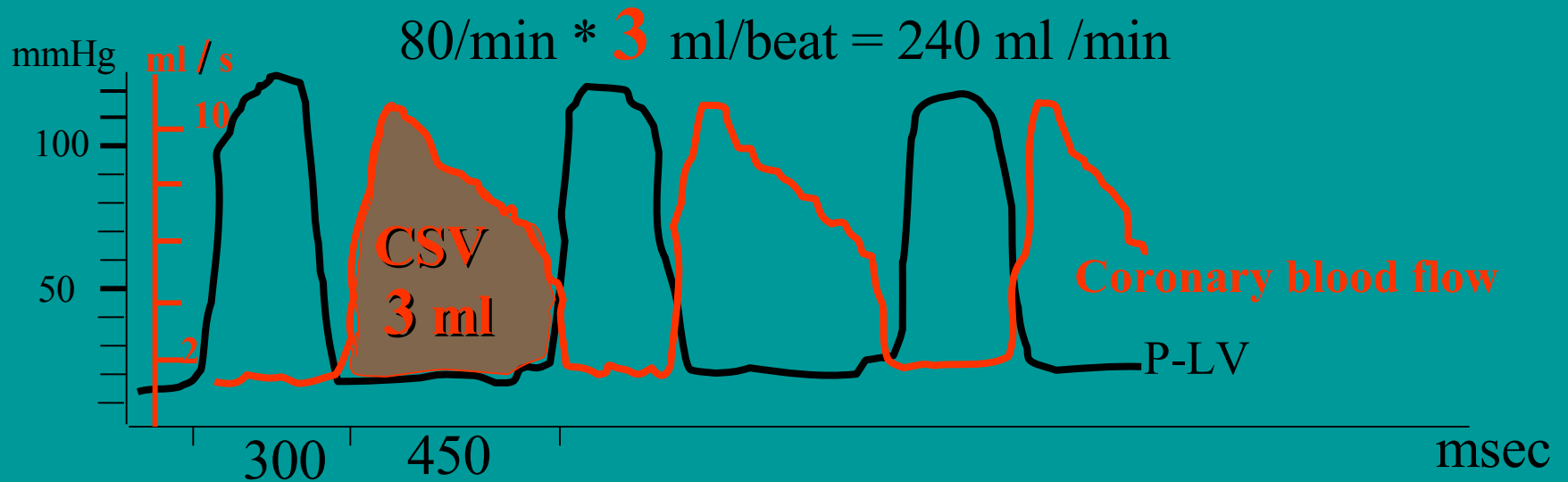
Conc.



The time organization of the coronary circulation



$$60/\text{min} * 4 \text{ ml/beat} = 240 \text{ ml /min}$$



$$80/\text{min} * 3 \text{ ml/beat} = 240 \text{ ml /min}$$

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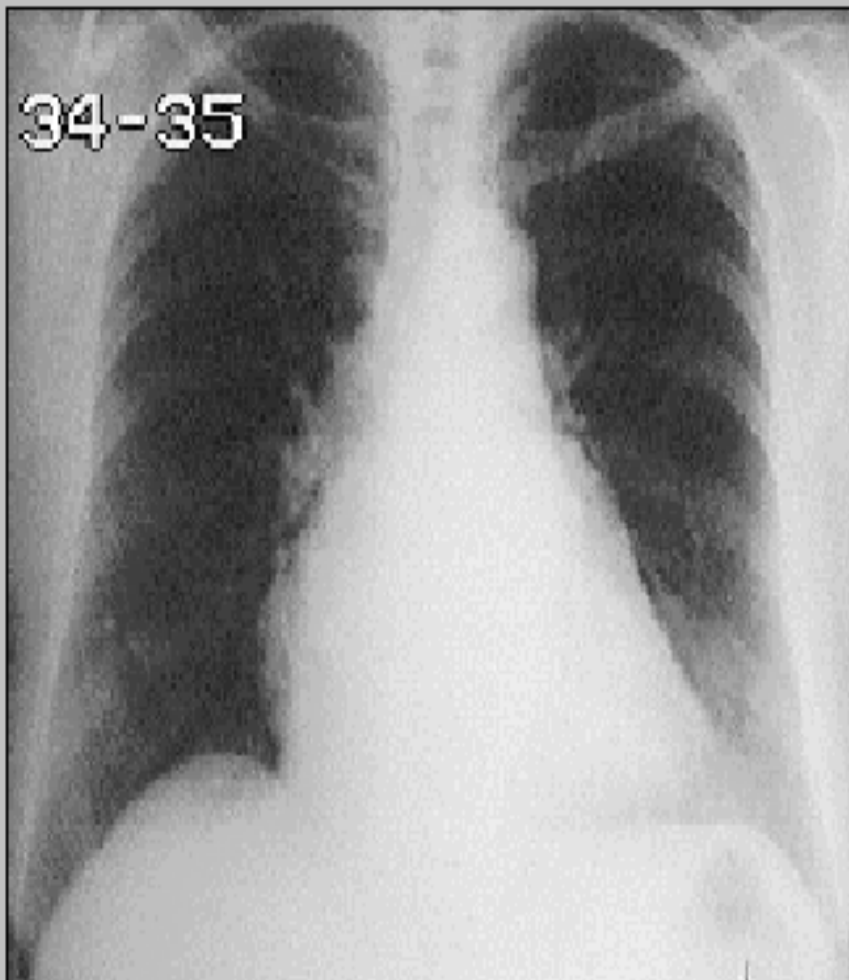
Path. lab

Pharmacy

Picture

Link

Credit



.lab

Pharmacy

Picture

Link

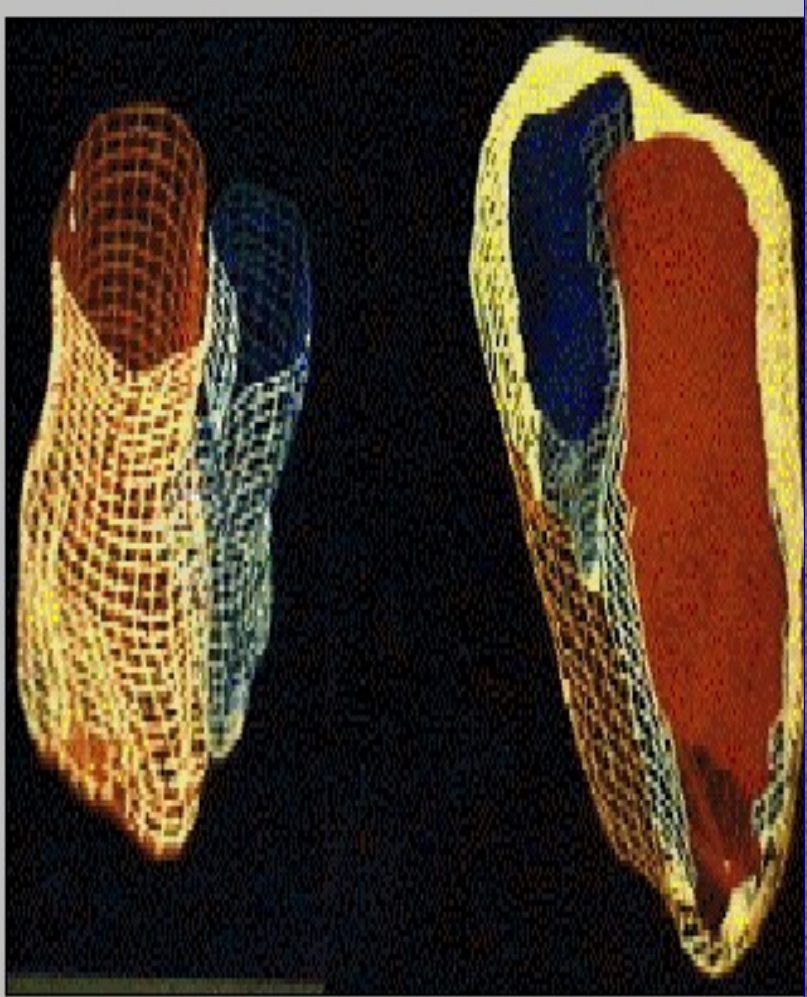
C





Pseudo-color representation of chest X-ray picture

3-D reconstruction of the Heart



- 3DECH
- 3DECHO**
- 3DM
- 821207
- 850403
- 900515
- 920528
- BNFEJ
- CHEST
- CORON
- CORON2
- CTG
- ECG1
- ECHOBN
- ECHOBN1



from ultrasound pictures

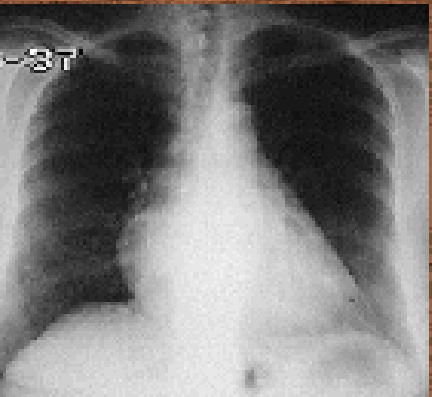
II.

Data transporters in medicine

--Electronic Patient Record

--Intranet transfer of data and informations

--Internet communication of pts's info-s



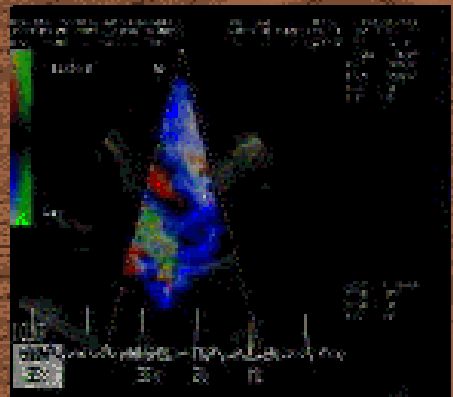
LaserCard Systems
c o r p o r a t i o n
&

InterPC Networking Ltd Hungary

Presents

CHIPDOKI System

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Language selection

 English	 French	 Spanish	 German	 Hungarian
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OK

Complete Electronic Health Record on chipcard

E.Sz.E.M.:Eü.Személyes Elektronikus Memoria

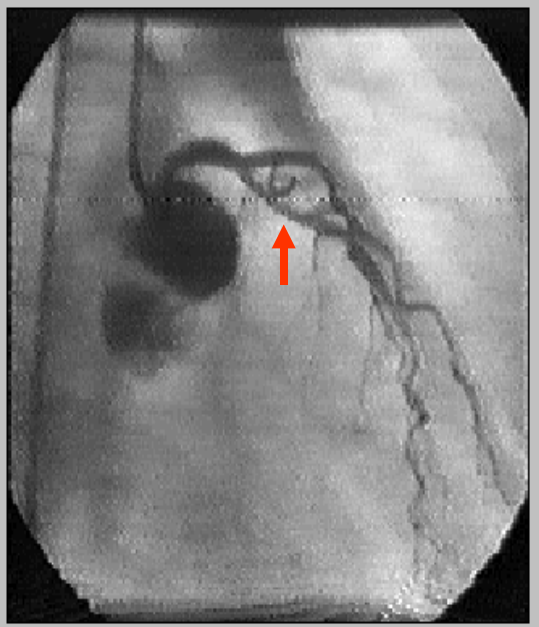
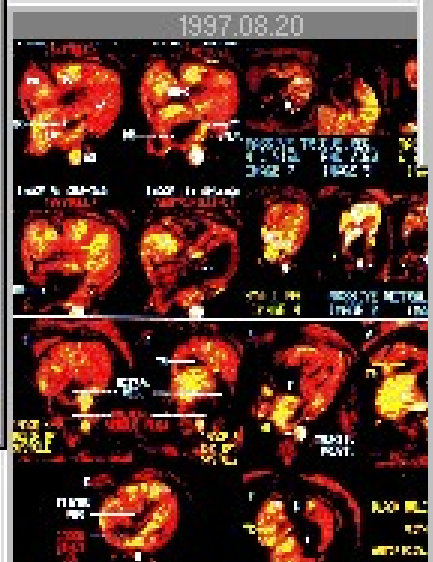
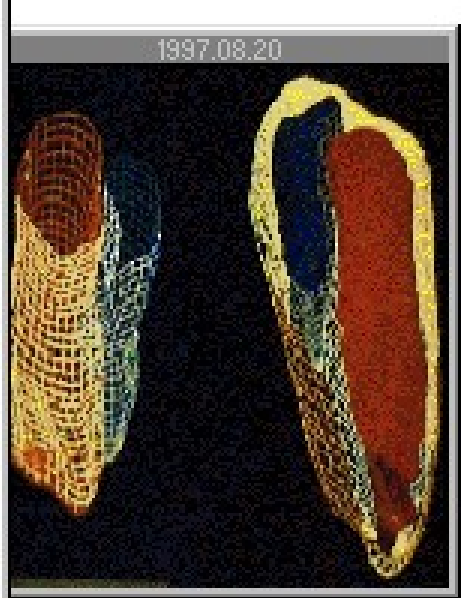
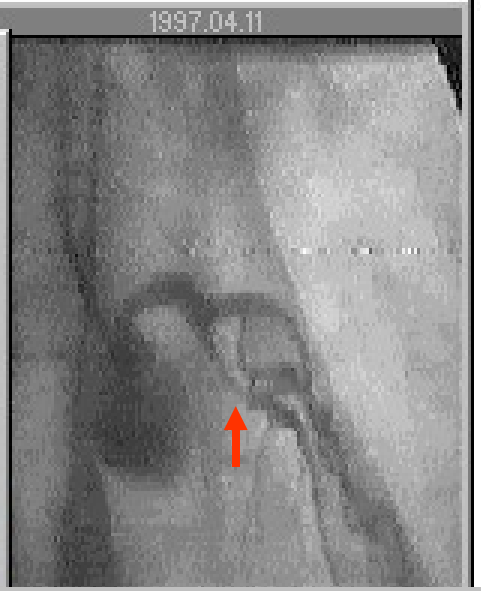
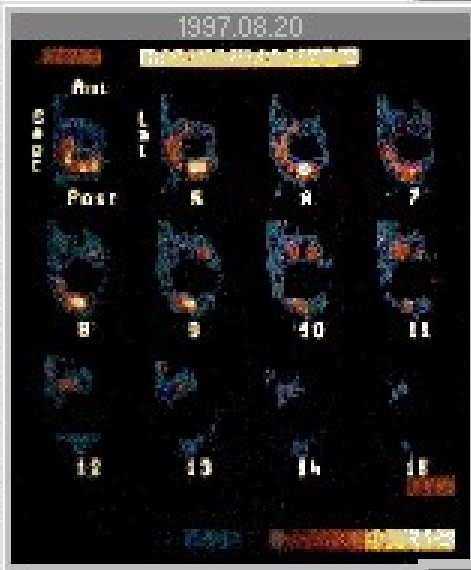
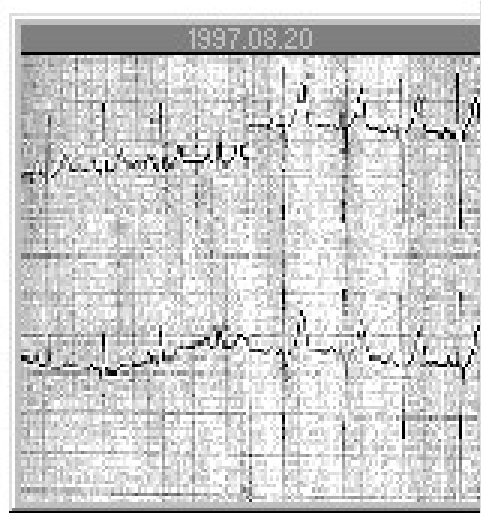
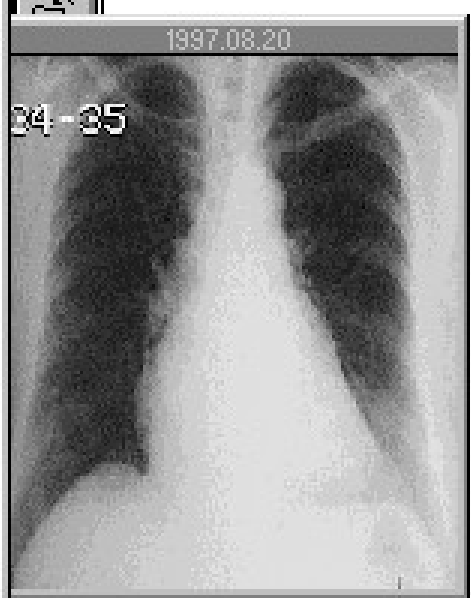
DOCTOR-CHIP

Paciens **Emergency** Anamnezis Status Labor Pharmacy Pictures

TAJ	333 333 333
Neve	Butch Try
Anyja neve	Butch Mother
Szüil. idő	1950.01.02
Neme	Nő
Irsz Város	3881 ABAÚJSZÁNTÓ
Utca	Trying street 123
Utolsó megt.	1999.05.13
Felv. dátuma	1997.01.01

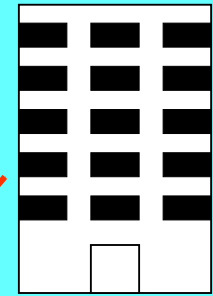
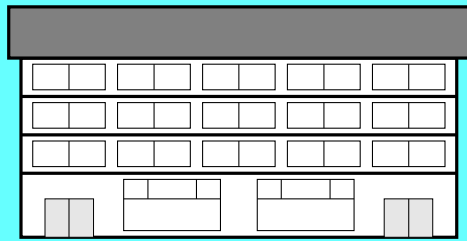
Portrait

Icons: File, Save, Edit, CRD, CRD, Print, Copy



Health provider

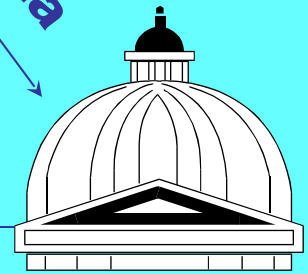
Insurance Co



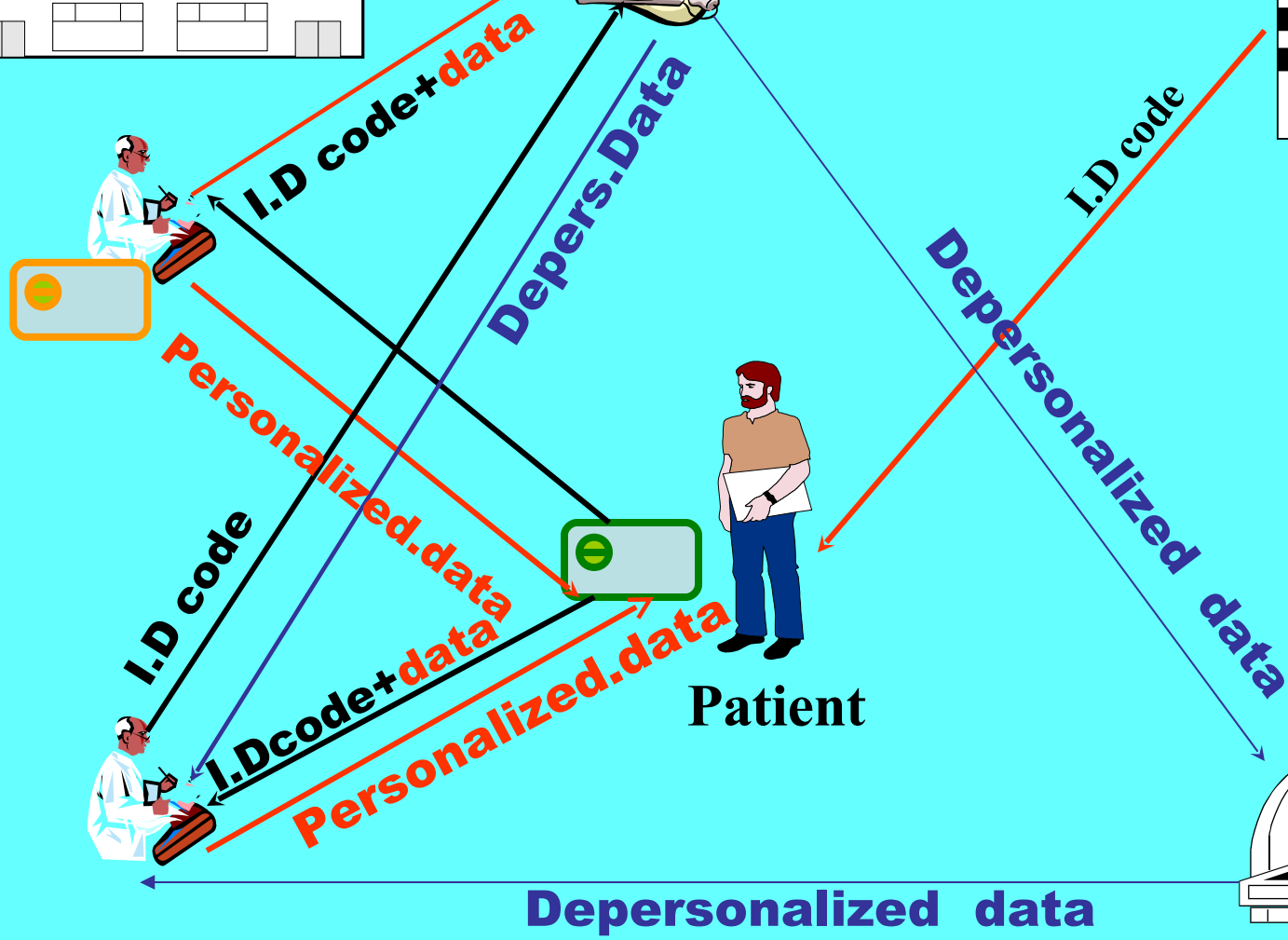
Archive



Patient



Research Ctr.

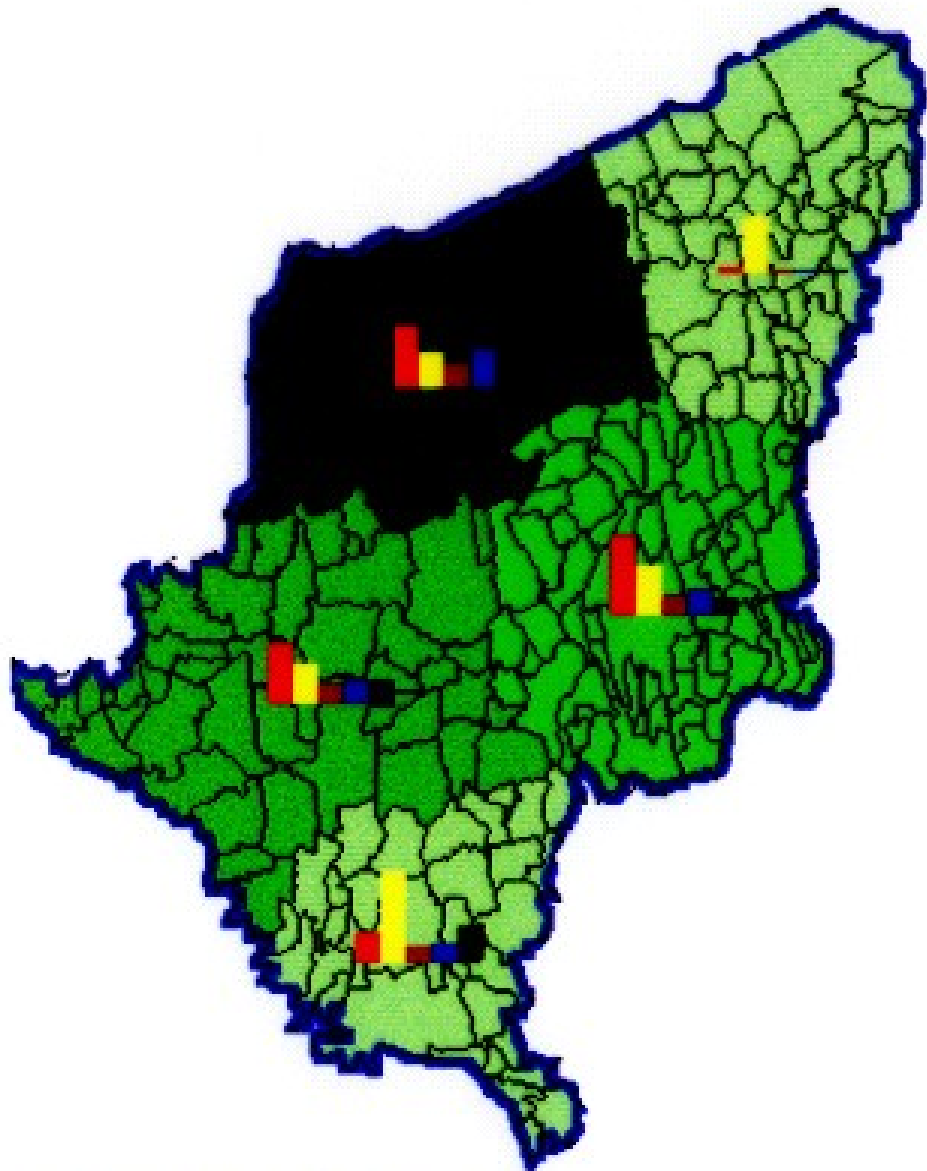


III. Processing of data

---from population mass **screening**

---for **modelling** of clinical physiology

Distribution of Average of Complaint



County of Somogy



Budapest

CV R G-I Sk-M N-Psy

■ ■ ■ ■ ■

No of Pts

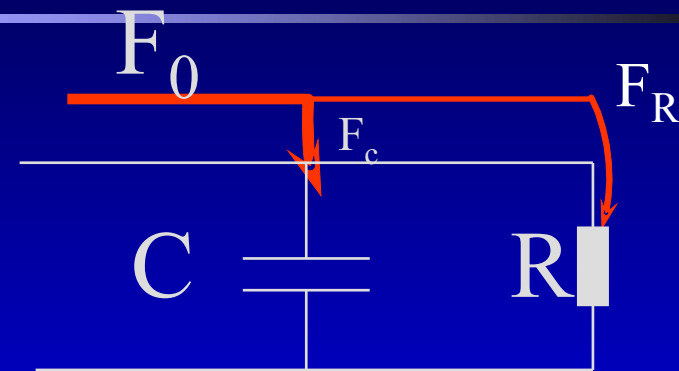
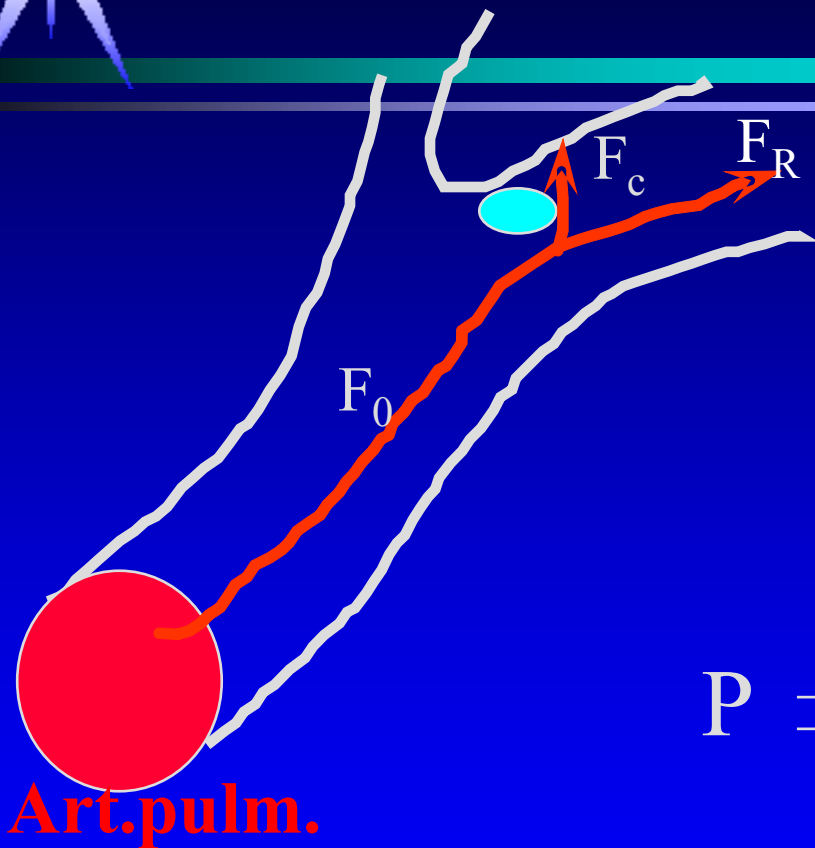
■ 0- 300

■ 301- 500

■ 501-1000

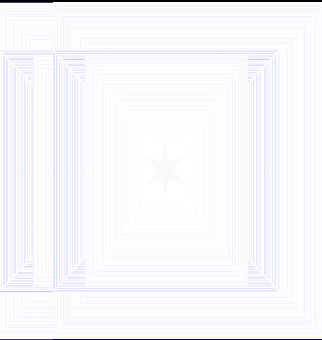
■ 1001-

Functional Analysis of Vascular-receptors

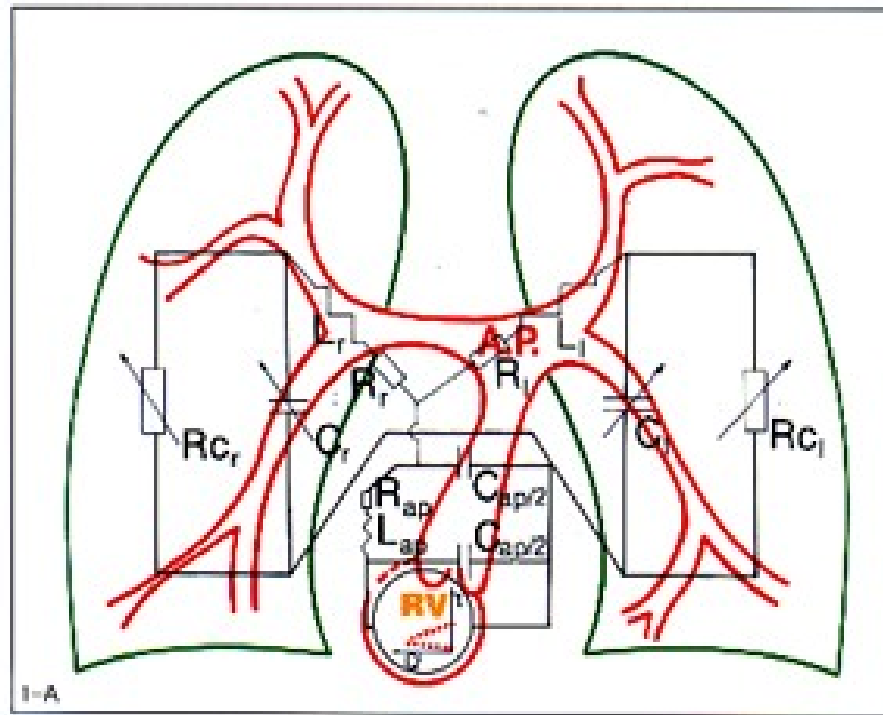


$$P = \frac{1}{C} \int^{T_{sy}} F_c dt \quad (\text{Kirchoff- equ.})$$

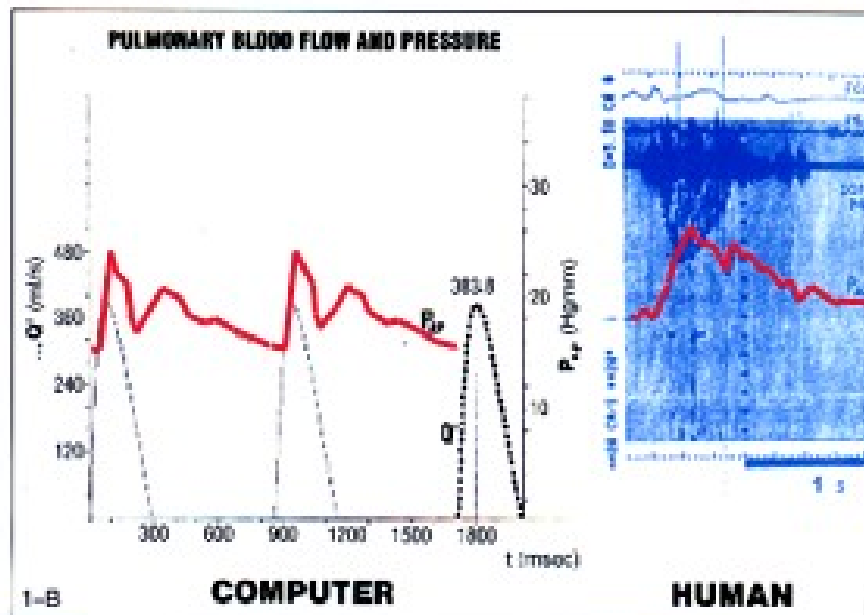
$$C \frac{dP}{dt} = F_c$$



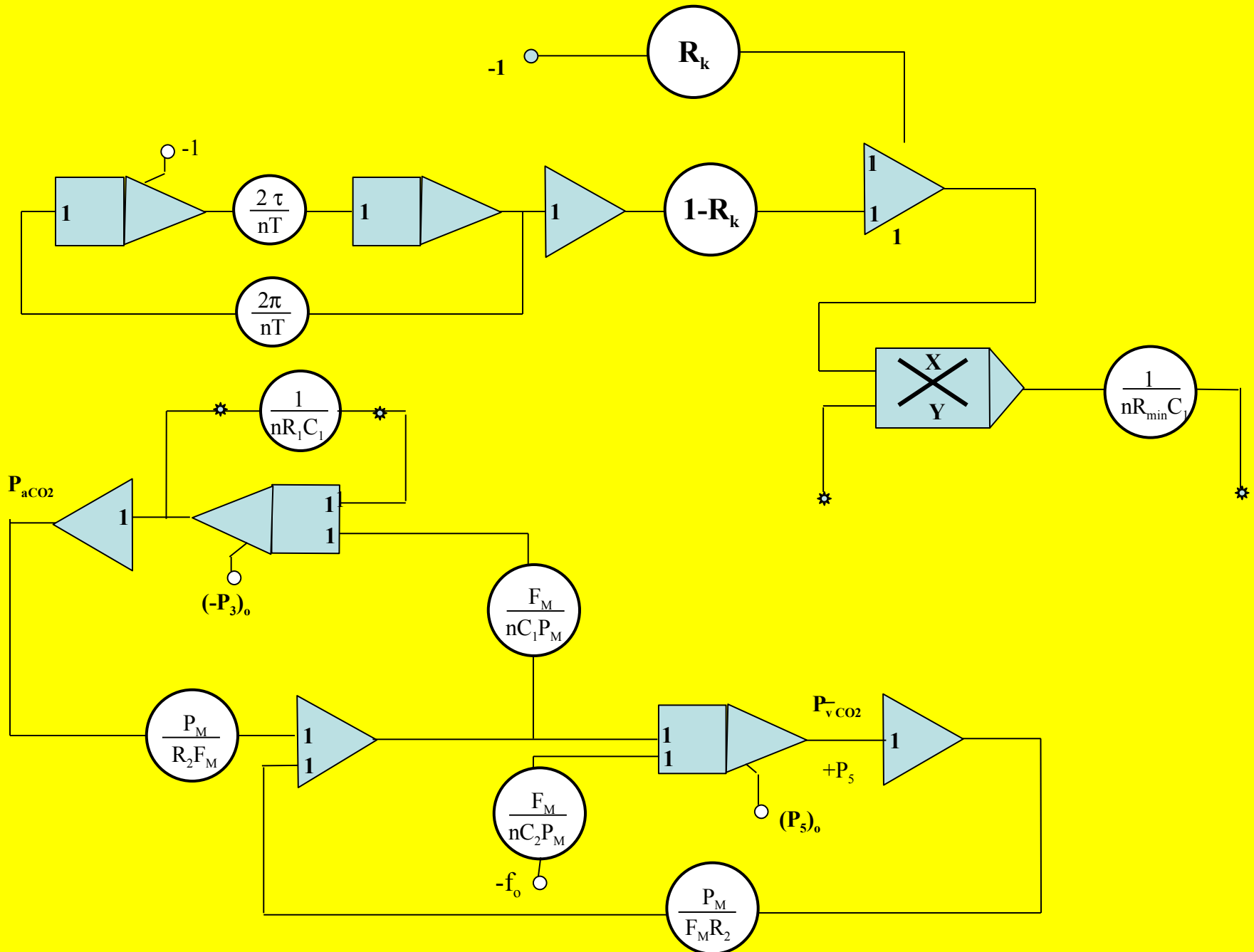
CARDIO- COMPUTER



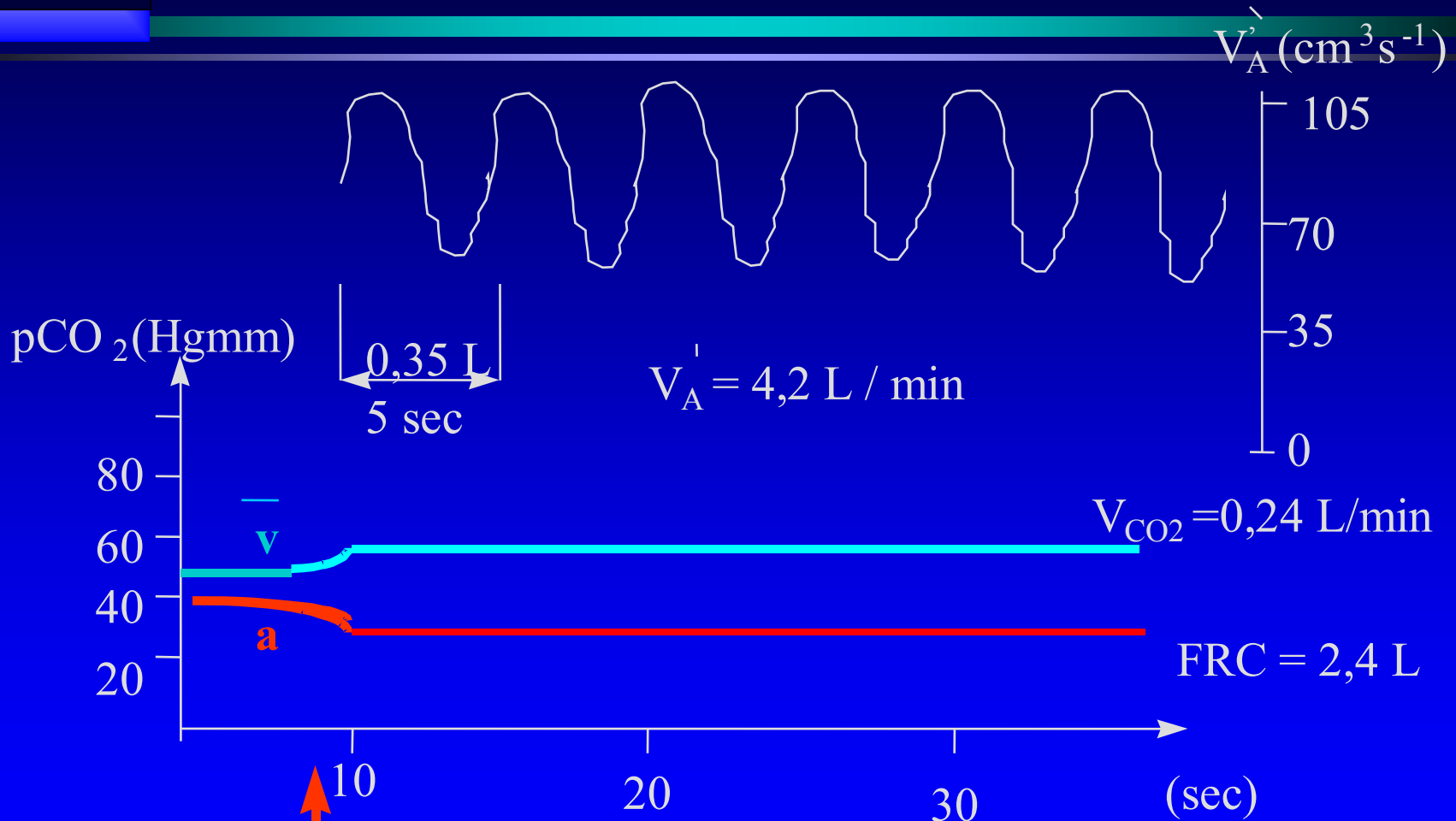
PULMONARY MODEL



Analogue Computer Program for Blood PCO₂ Calculation

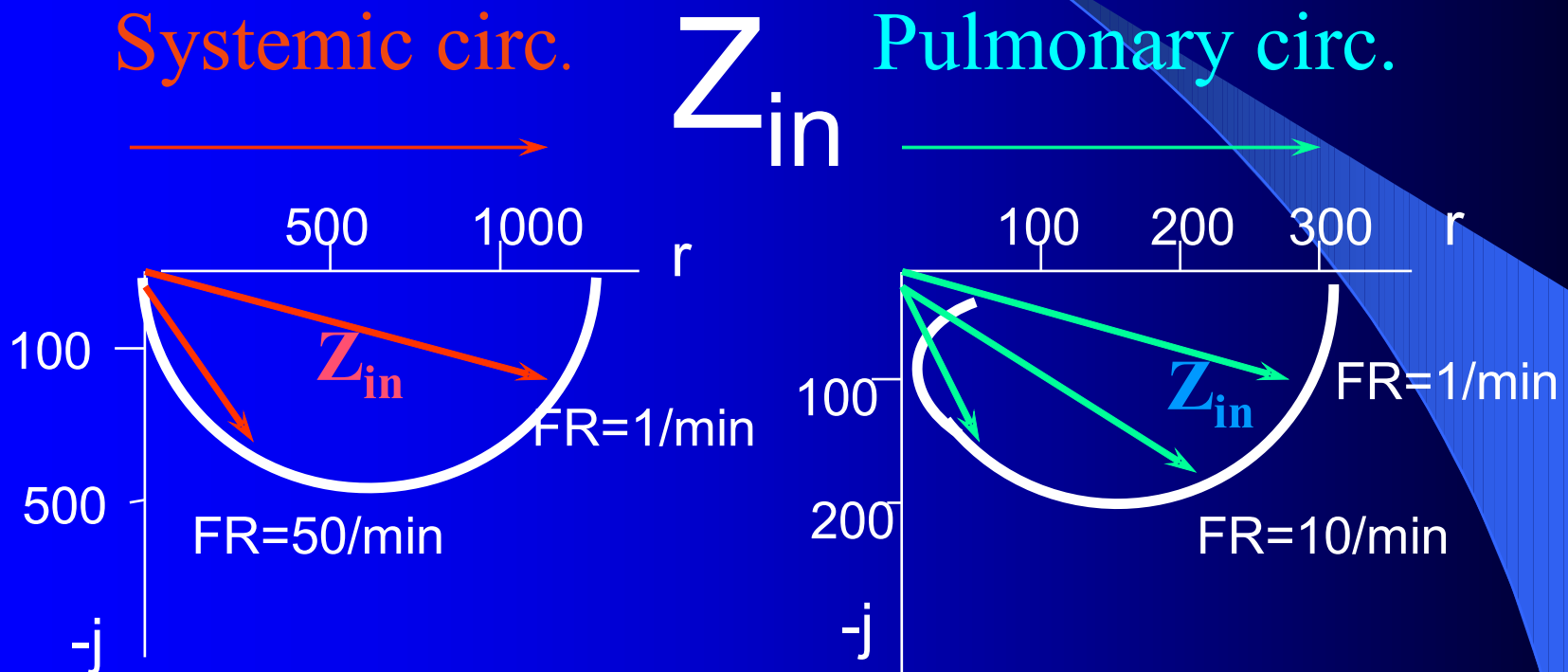


Kardio-pulmonalis Computer Model



$Q' = 6,0 \text{ L/min}$ \uparrow $Q' = 3,0 \text{ L/min}$

Input impedance of the great arteries



$$Z_{in} = R \frac{1}{1 + j\omega R C}$$

Regularity in Heart Rate of Mammals

$$\frac{f_1}{f_2} = \sqrt[3]{\frac{G_2}{G_1}}$$

$$f_1 = f_2 \underbrace{G_2^{1/3}}_k * G_1^{-1/3} \quad (G_1^{-1/3} = \frac{1}{L})$$

$$f_1 = k \left(\frac{1}{L} \right)$$

$$k = 300$$

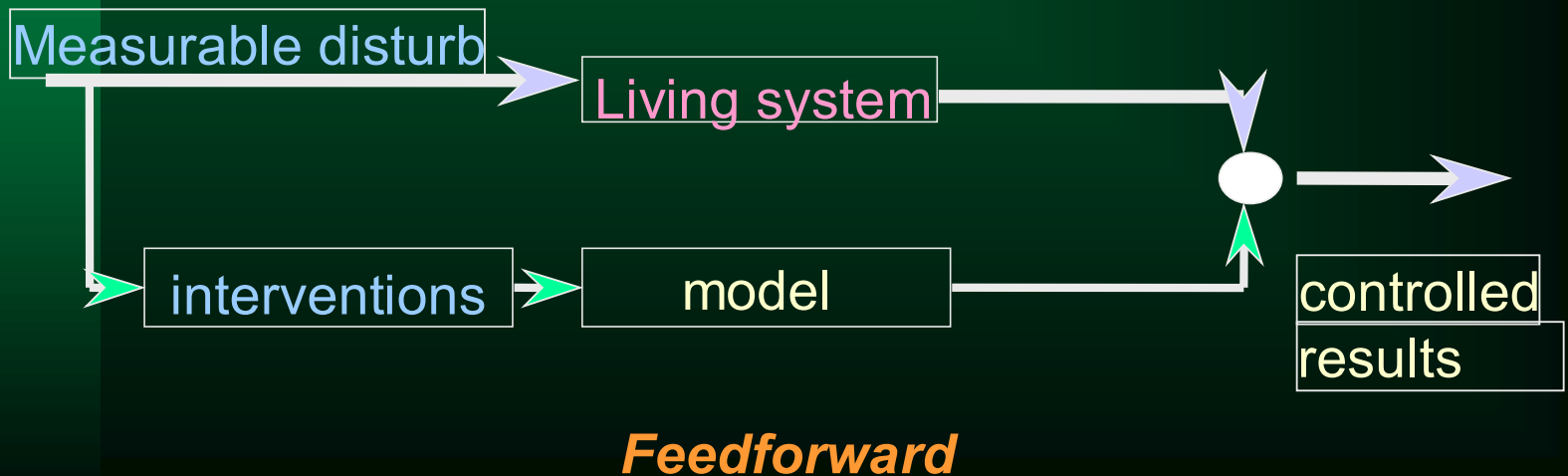
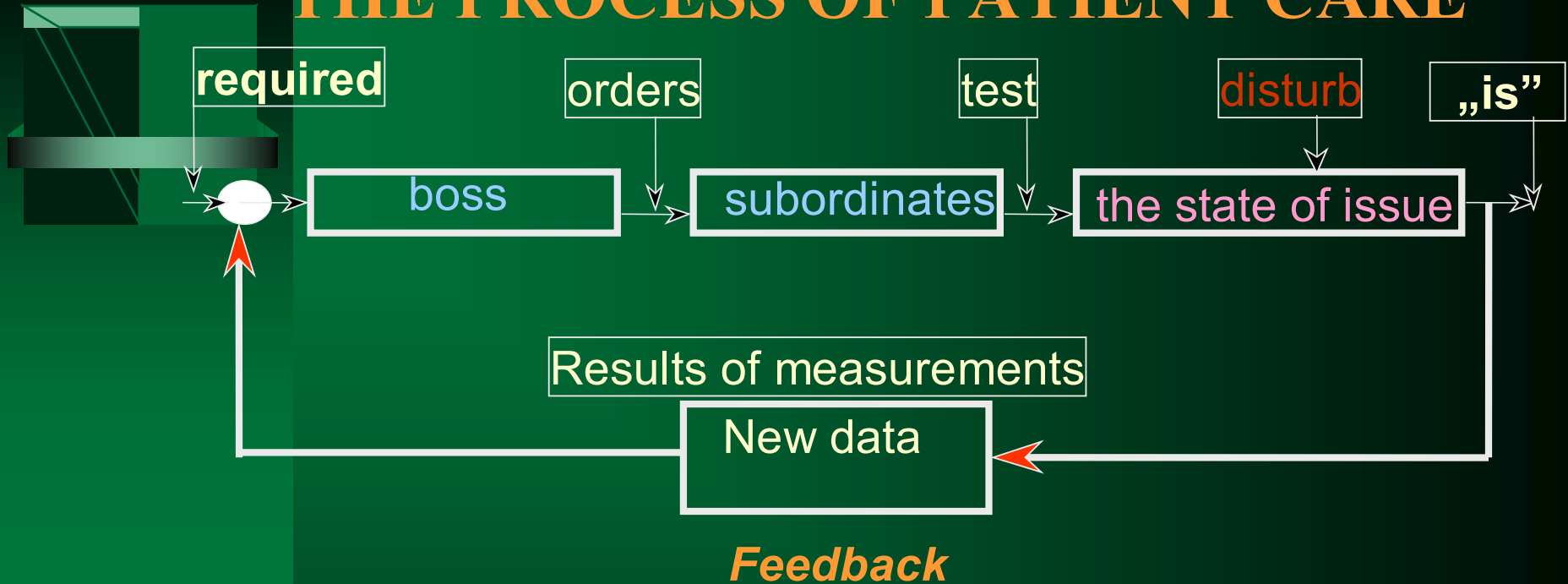
$$f_1 L = k$$

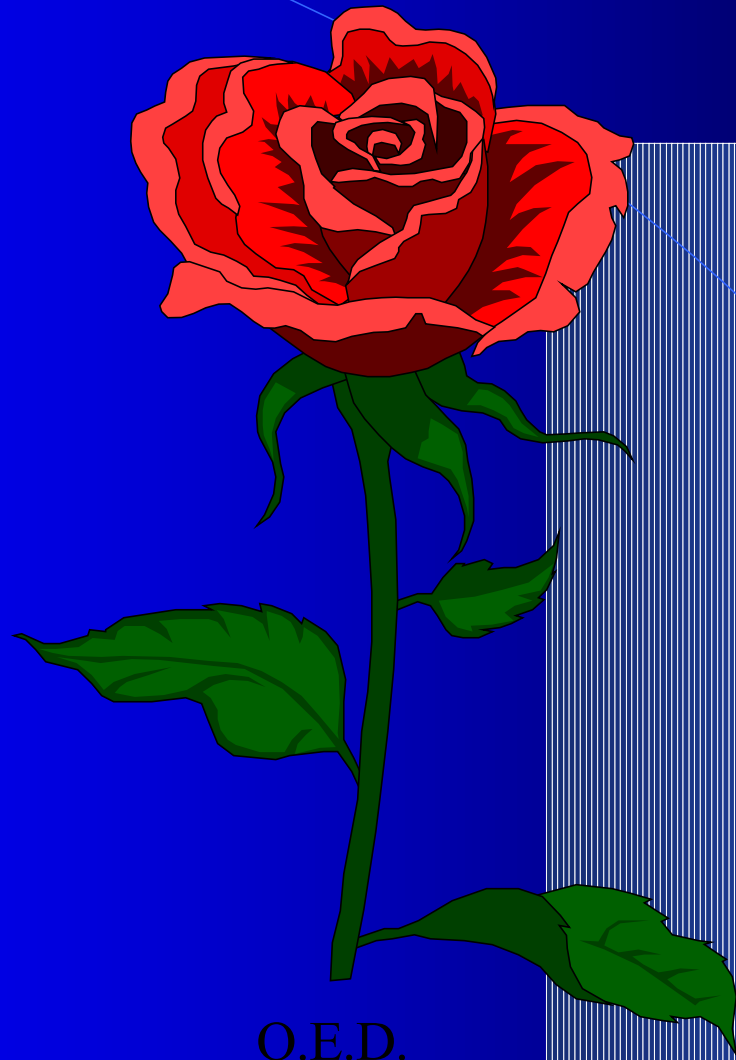
E.g. :27 kg : HR=100/min;
Dog or child

64kg : HR=75/min;
man

125kg : HR=60/min
pig or man

THE PROCESS OF PATIENT CARE





Q.E.D.

THANKS FOR YOUR ATTENTION