



## “ICM +” as a resource for selective therapy in NICU



Neurosurgery Institute named after Burdenko,  
Moscow

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# Burdenko Neurosurgery Institute

Largest Neurosurgery  
Center in Russia

Above 7.000 (**8.725**)  
operation p/year

20 operation rooms

35-45 operation p/day





# NICU 38 bed: 12+ 26

Average 3 000 pts

More than 24 h ~ 500 pts

~ 100 pts MMM (ICP, CPP, PRx)

- TBI ~ 40 pts
- SAH, ICH ~ 30 pts
- other ~ 30 pts





# Our **practice** of using “**ICM+**”

We use “ICM +” from 2007

Using “ICM+” Version 7

We gather the data on notebooks from Philips monitors



# How we use the “ICM+”

1. To select the most effective methods for correcting intracranial hypertension
2. To select the optimal CPP





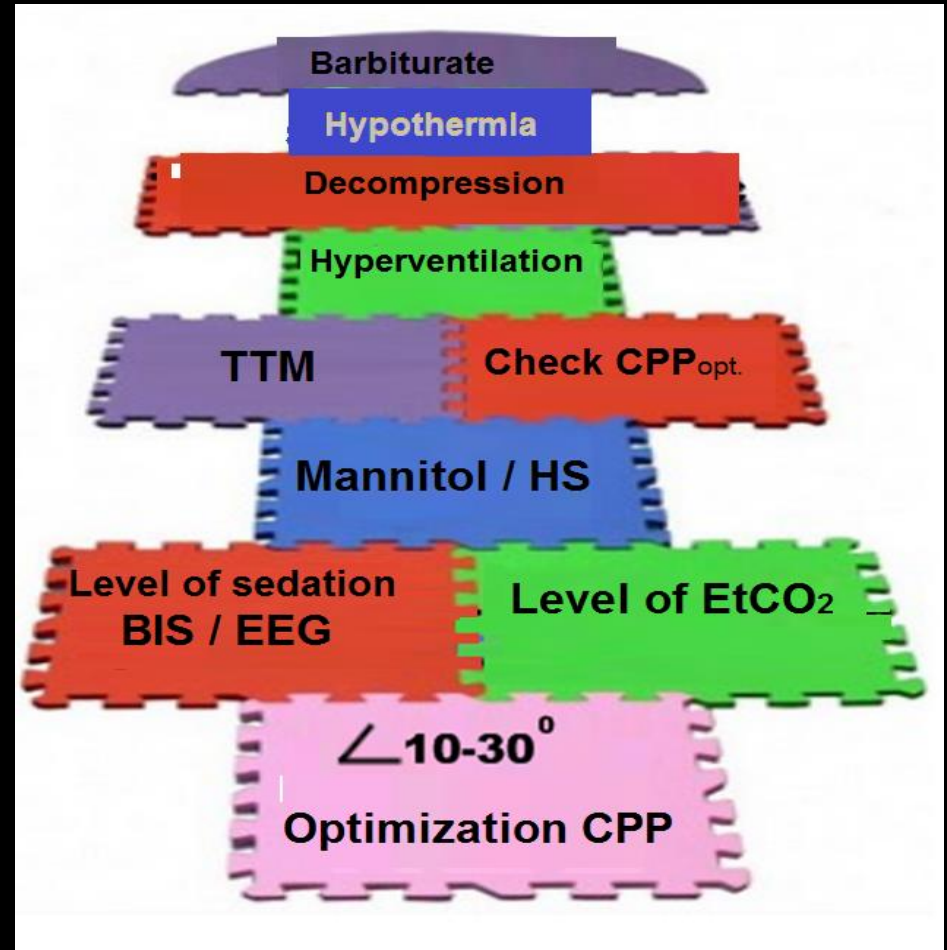
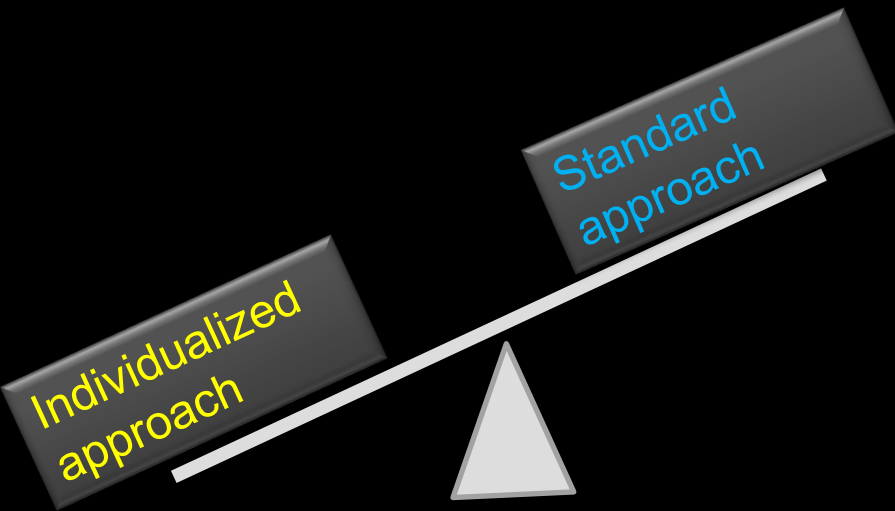
# Methods for correcting intracranial hypertension

Therapy Steps	Levels of Evidence	Treatment	Risk
8	Not reported	Decompressive craniectomy	Infection or delayed hematoma Subdural effusion Hydrocephalus and syndrome of the trephined
7	Level II	Metabolic suppression (barbiturates)	Hypotension and increased number of infections
6	Level III	Hypothermia	Fluid and electrolyte disturbances and infection
5	Level III	Induced hypocapnia	Excessive vasoconstriction and ischemia
4	Level II	Hyperosmolar therapy Mannitol or hypertonic saline	Negative fluid balance Hypernatremia Kidney failure
3	Not reported	Ventricular CSF drainage	Infection
2	Level III	Increased sedation	Hypotension
1	Not reported	Intubation Normocarbic ventilation	Coughing, ventilator asynchrony, ventilator-associated pneumonia

Nino Stocchitti et al, 2014

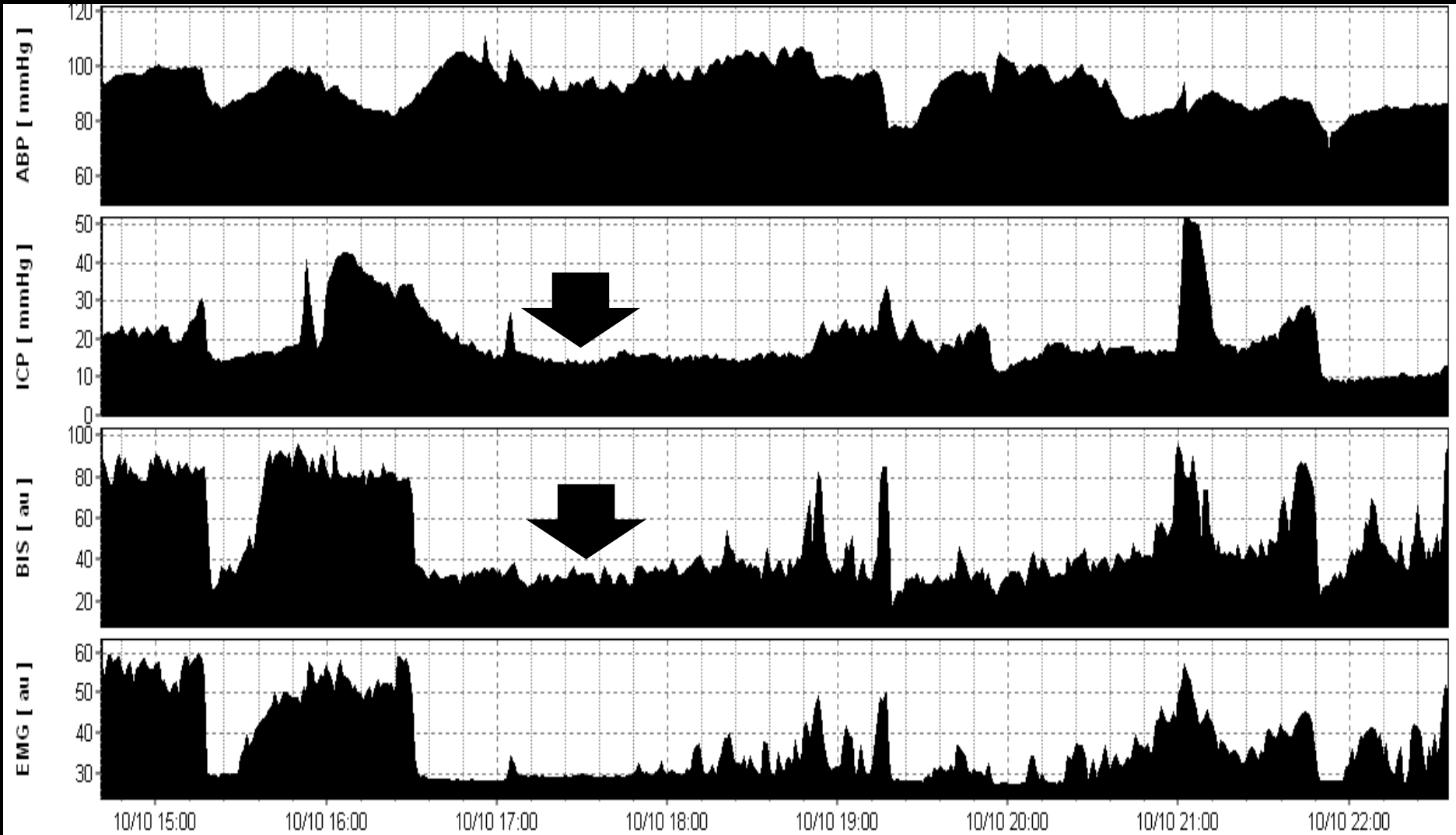


# “One size doesn't fit all”





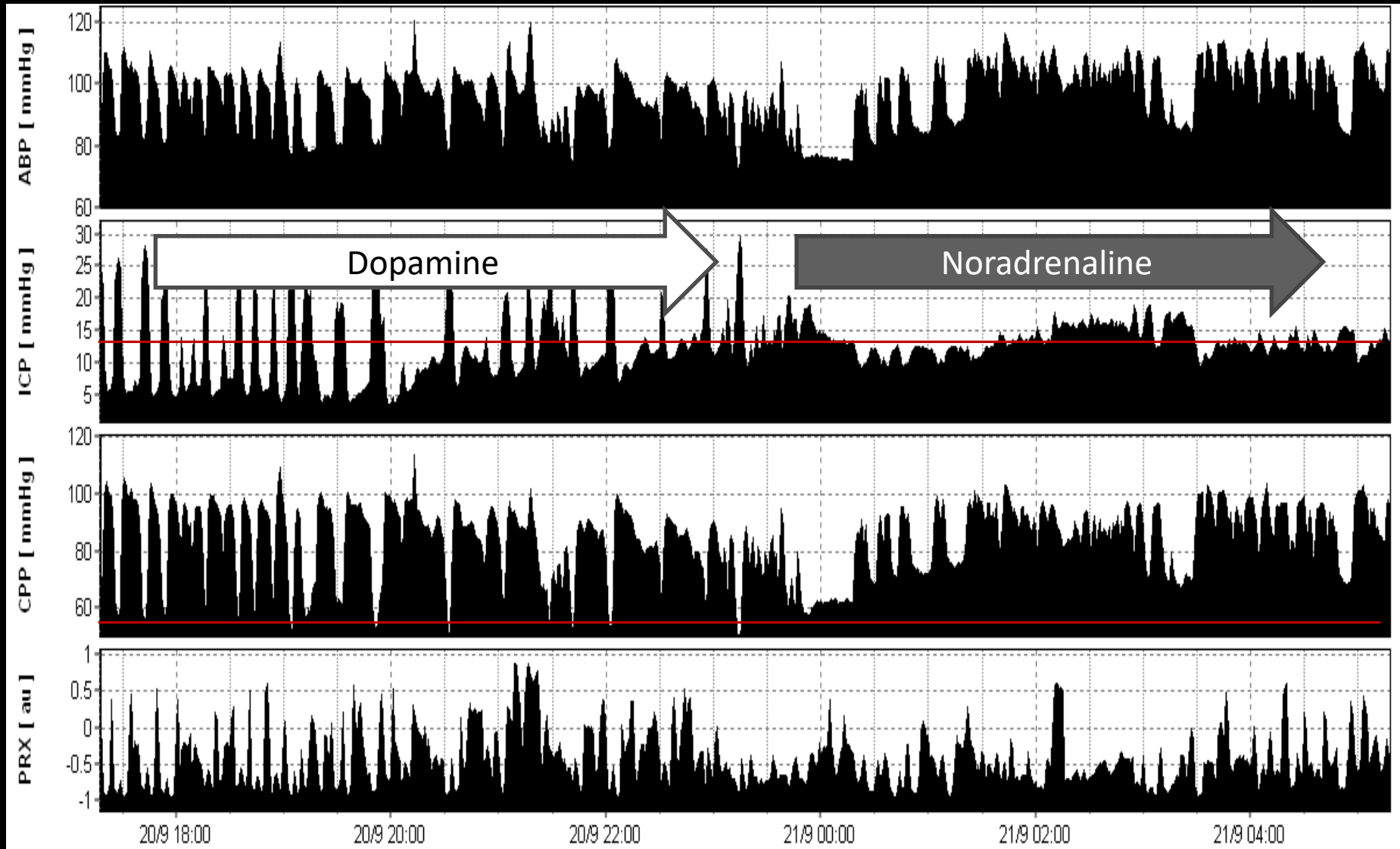
# Selection Level of sedation





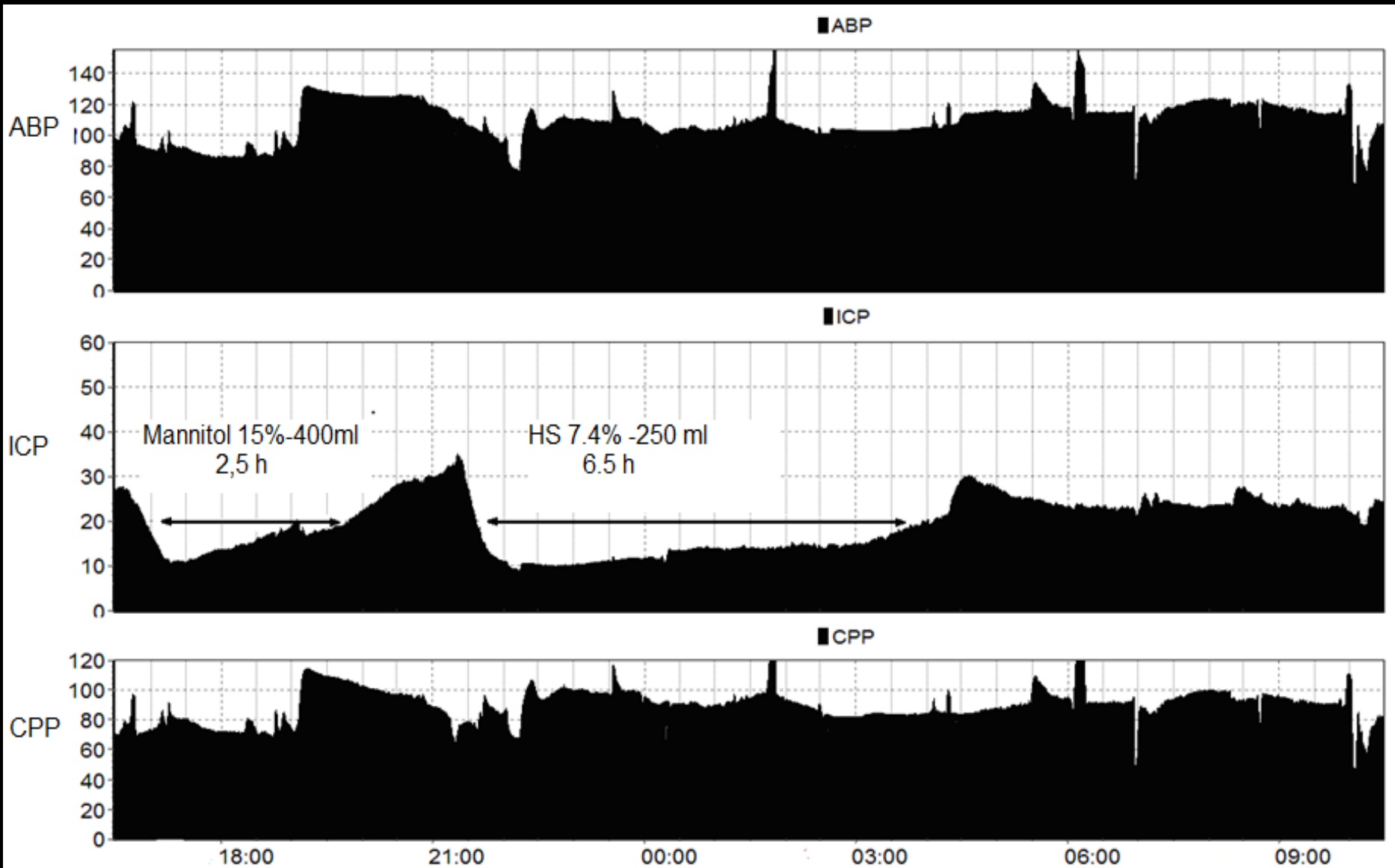


# Selection catecholamine's





# Selection hyperosmolar solution



Admission to  
NICU pts with  
Severe TBI

ABP  
ICP  
CPP  
+ "ICM Plus"  
(Prx)

Neurosurgical operation :  
remove hematoma,  
craniotomy, decompression,  
EVD and other

Monitoring Autoregulation 4-8 h

Autoregulation  
was preserved  
Prx (-1; 0)

ICP < 20

CPP 50-70

ICP > 20

CPP 50-90

Autoregulation  
was partially  
failed  
Prx (0; 0,2)

ICP < 20

CPP 50-70

ICP > 20

CPP 70-90

Autoregulation  
was completely  
failed  
Prx (0,2; 1)

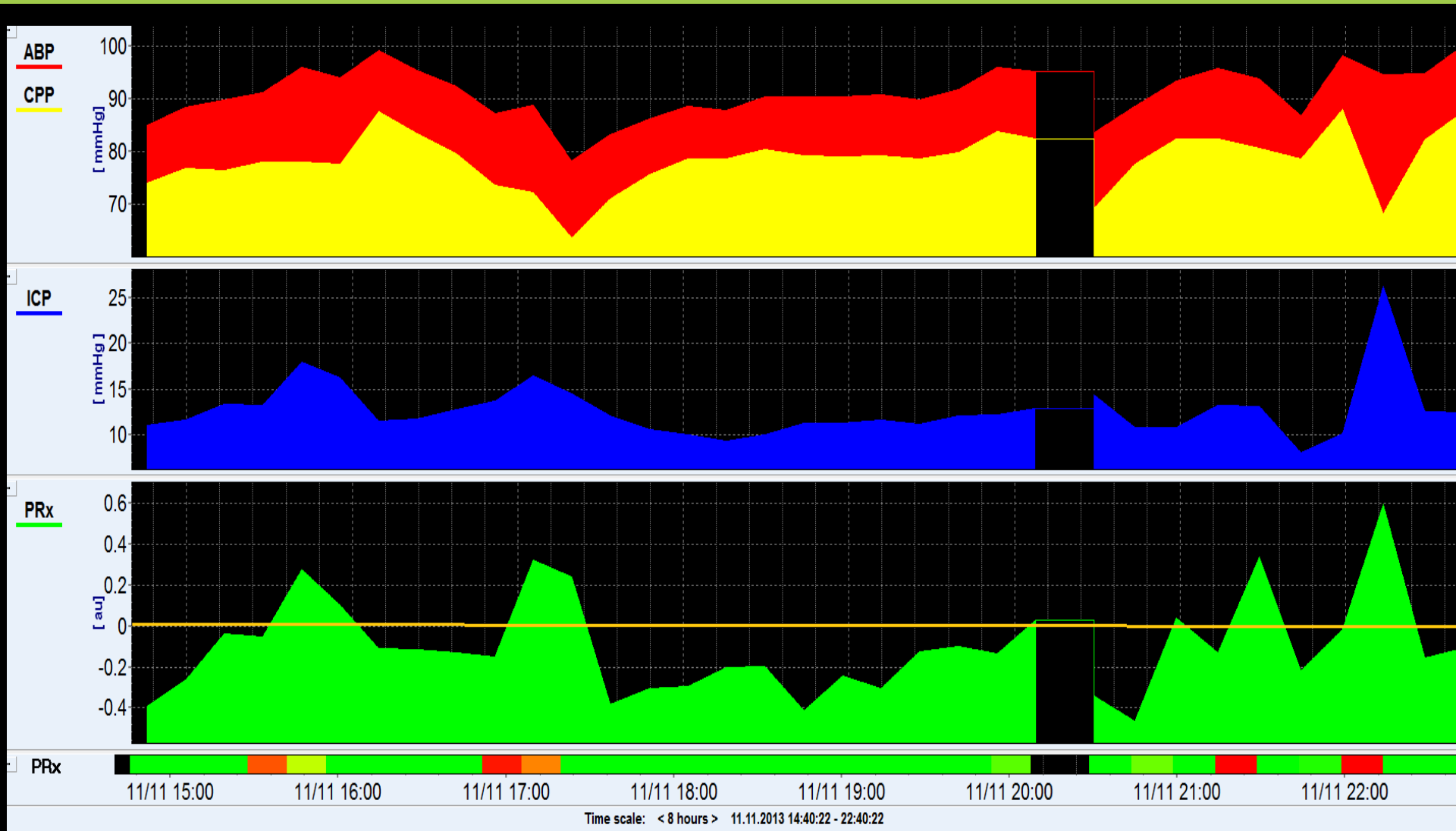
ICP < 20

CPP 50-70

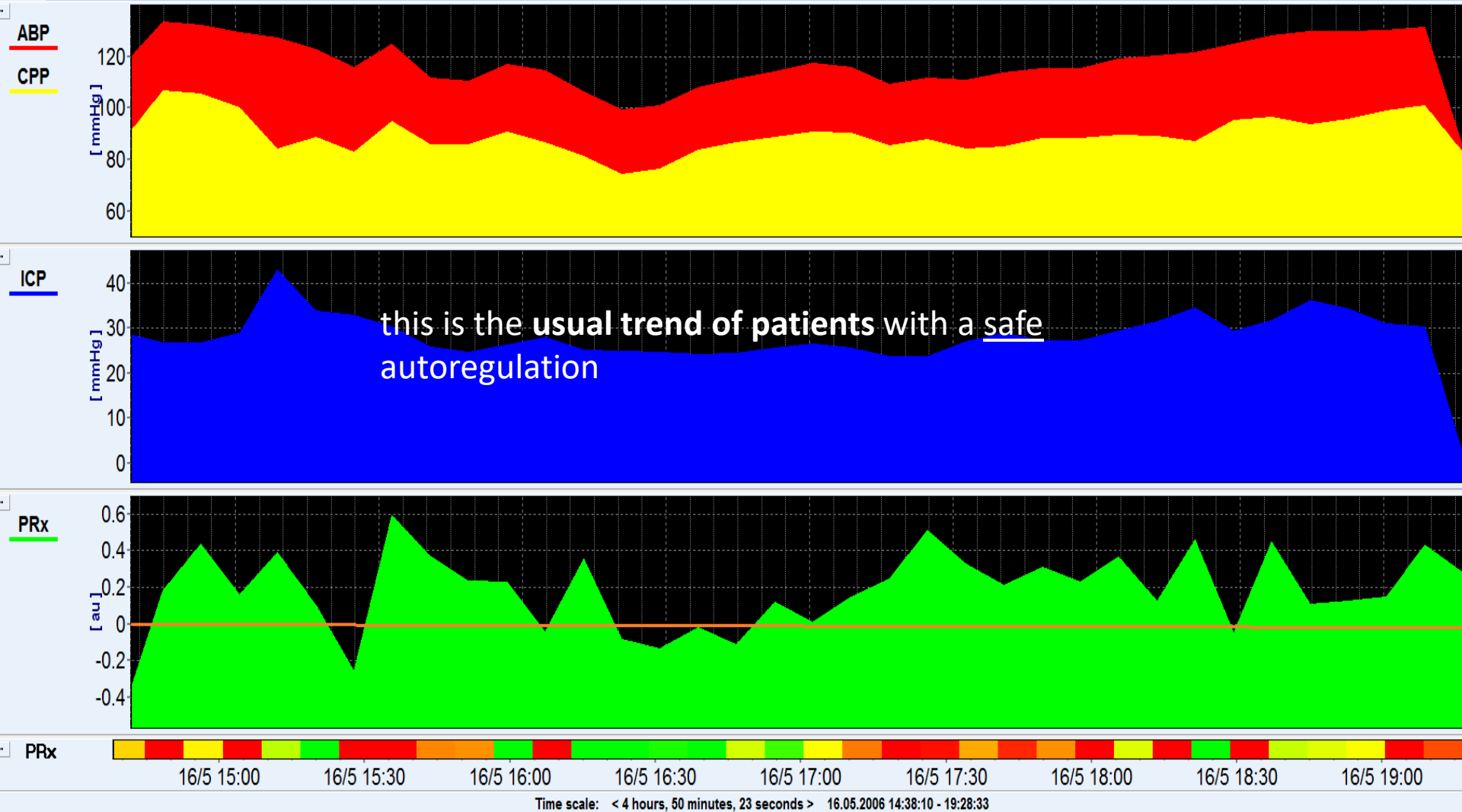
ICP > 20

CPP 50-70

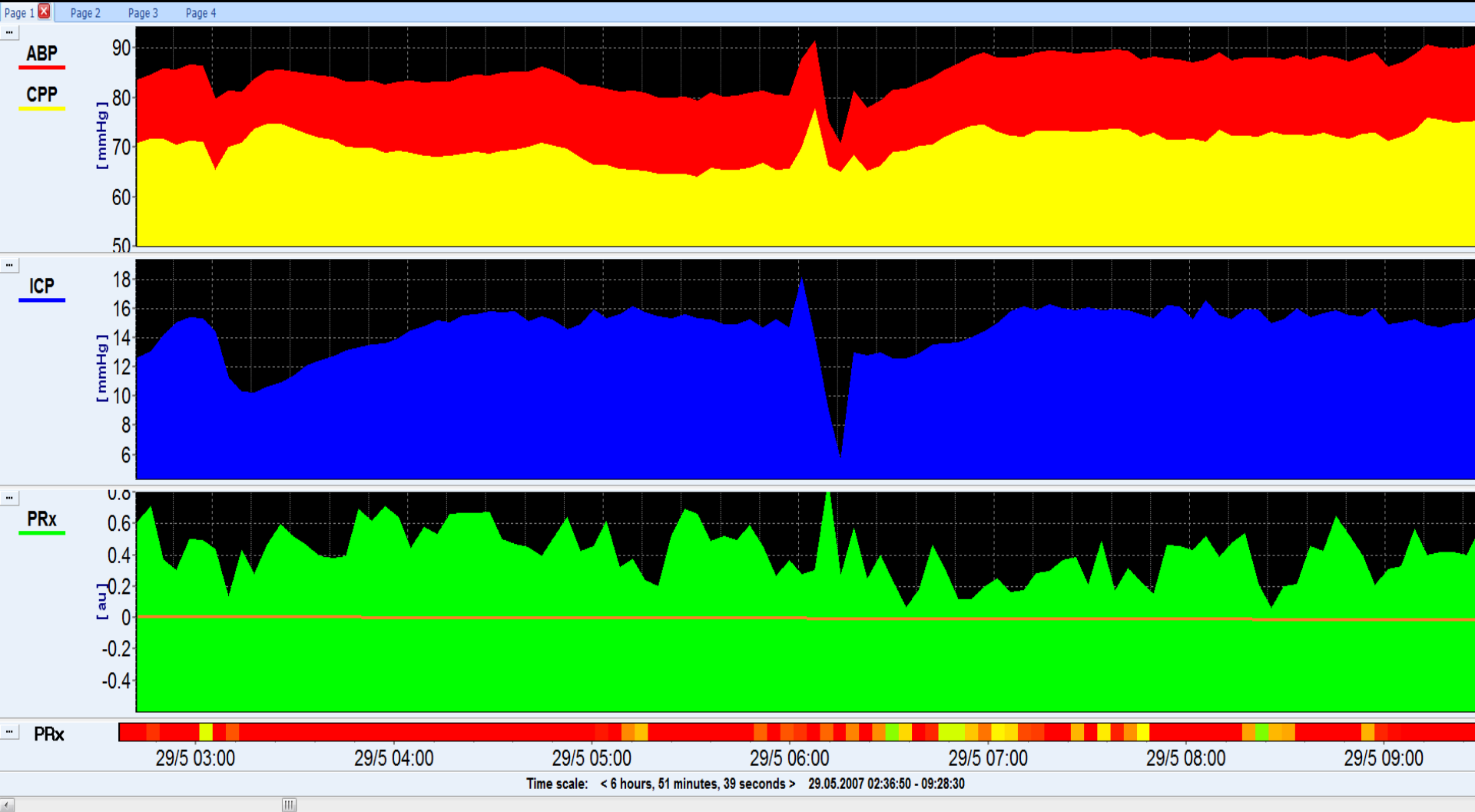
# 1) Autoregulation was preserved Prx (-1; 0)



## 2) Autoregulation was partially failure Prx (0; 0,2)

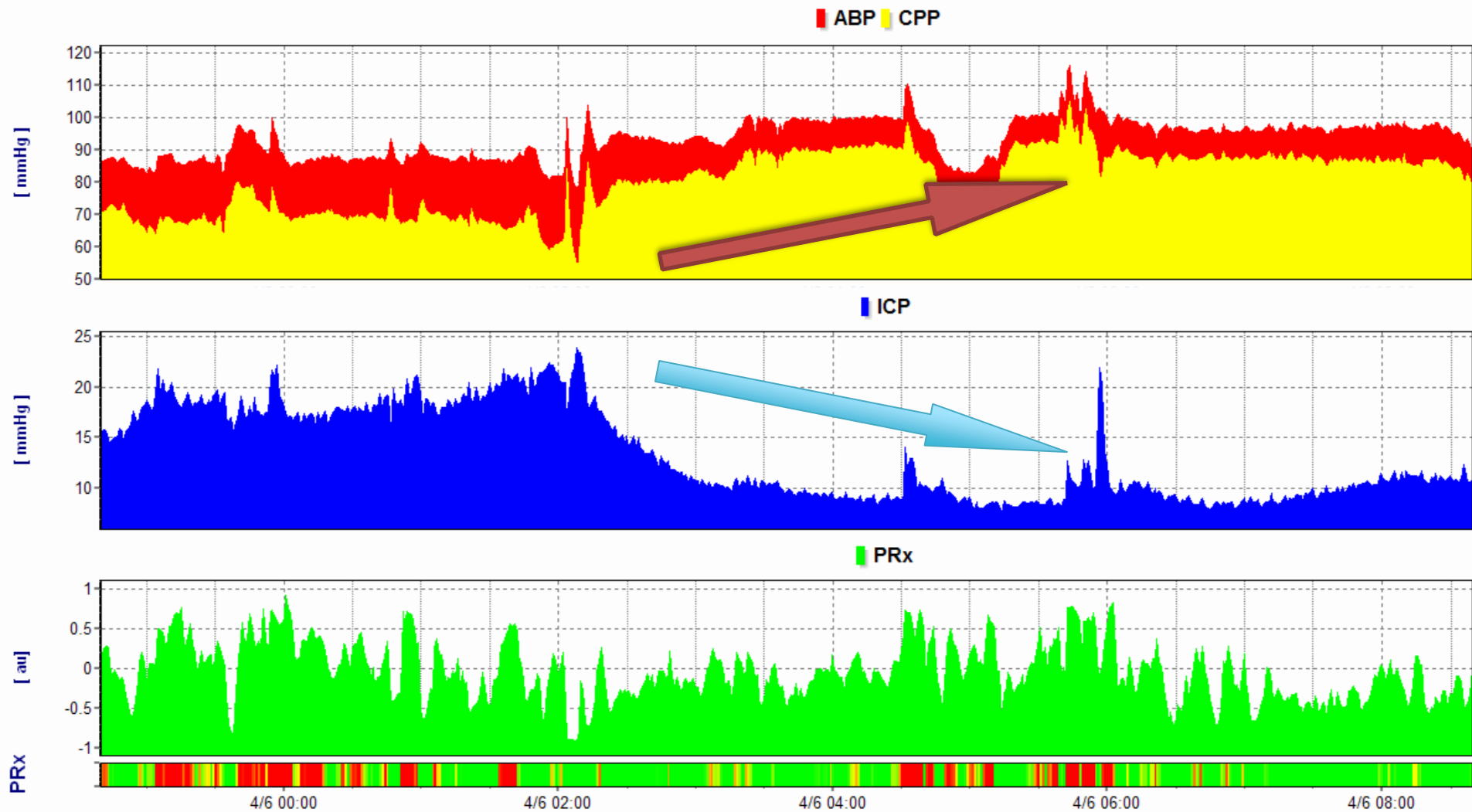


# 3) Autoregulation was completely failure Prx (0,2; 1)

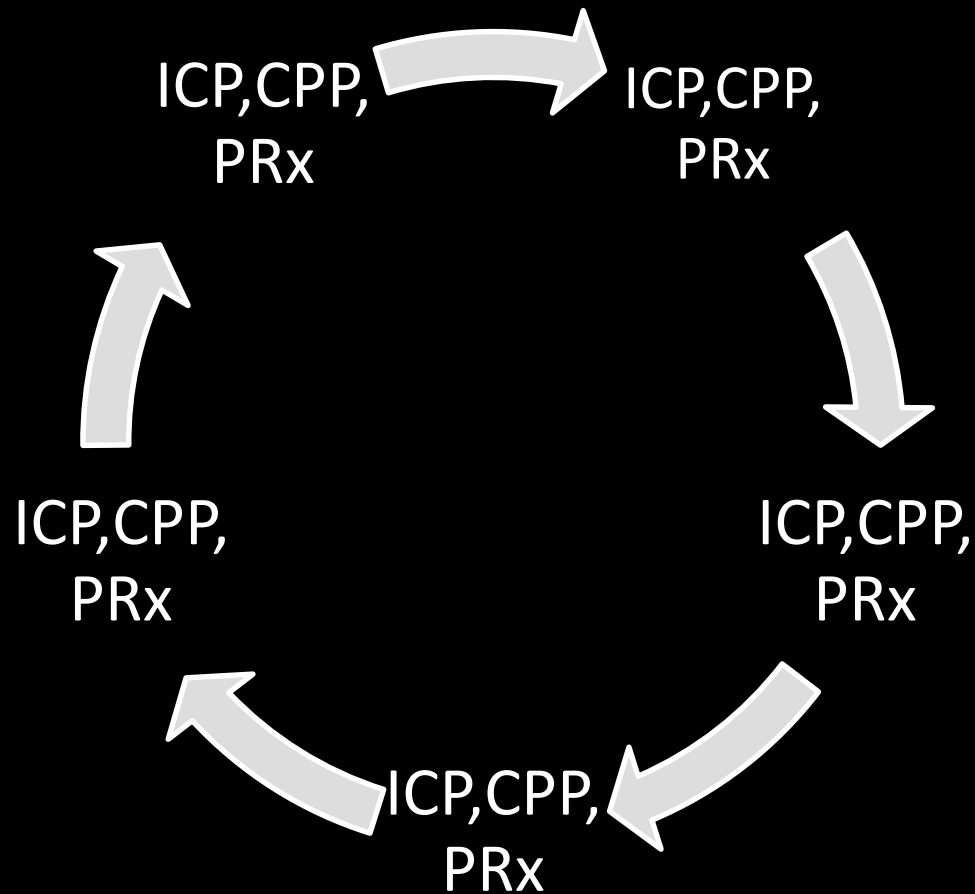




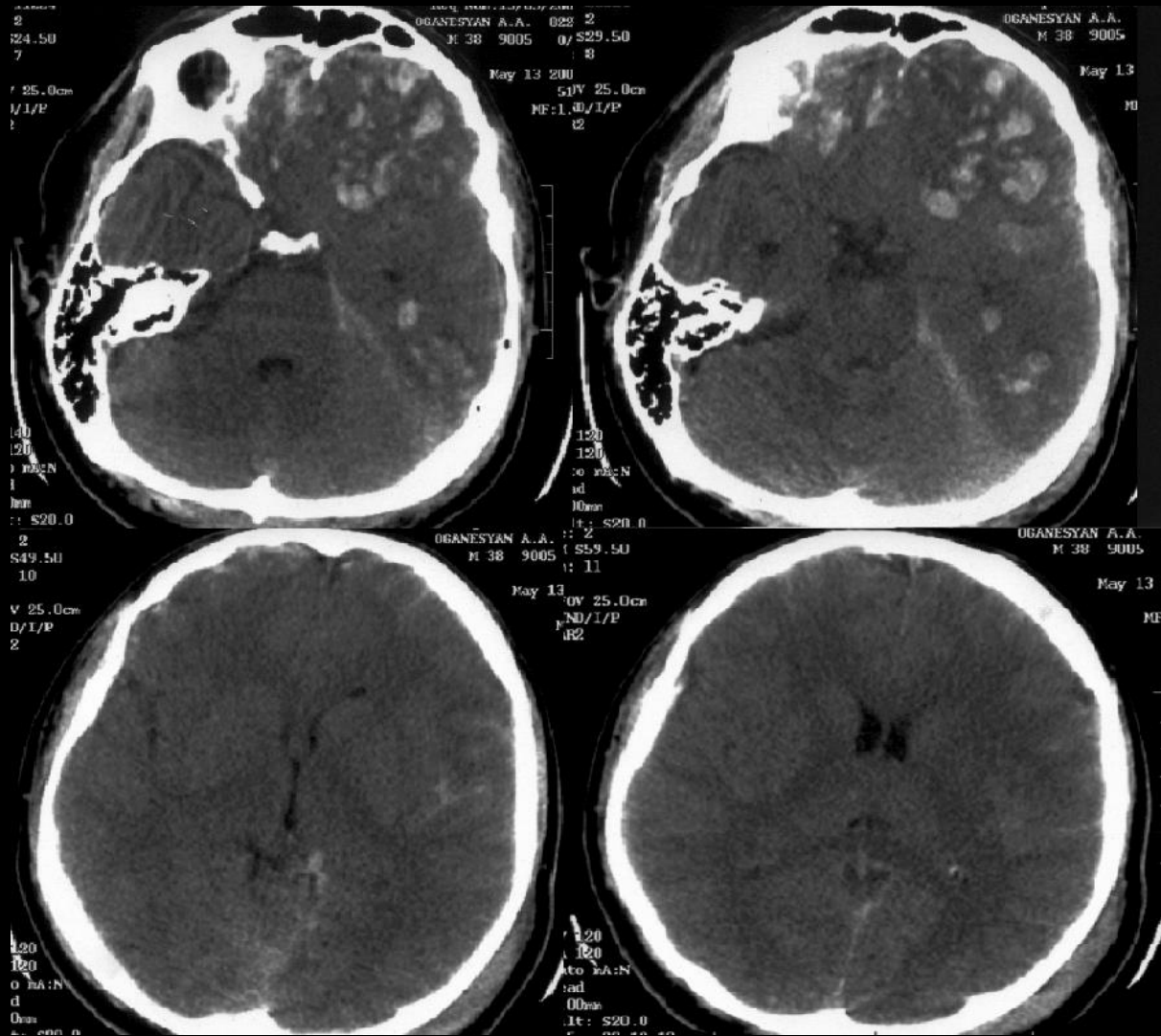
# Manipulating by ABP-reduce ICP



Every 4-8 hours we recheck:  
ICP, CPP, PRx (trends, statistics, graphics)



# TBI, male 30 y, GCS 8



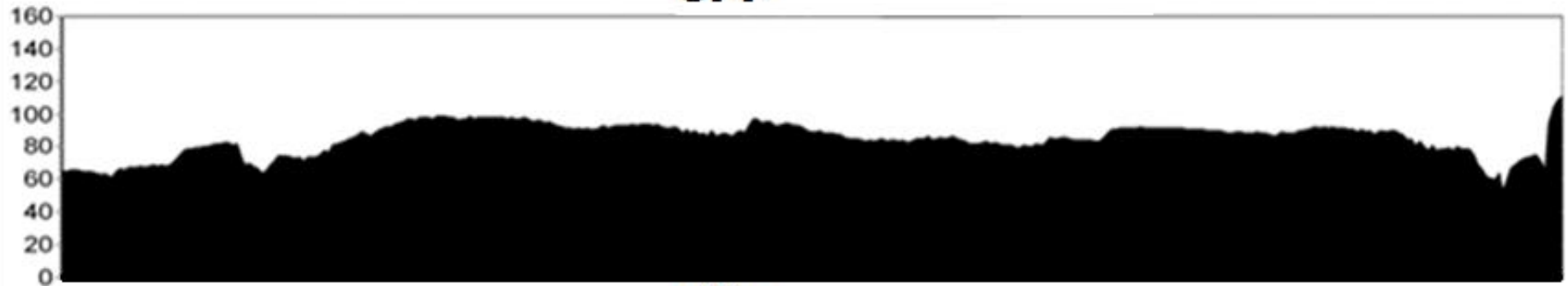


# 2 day

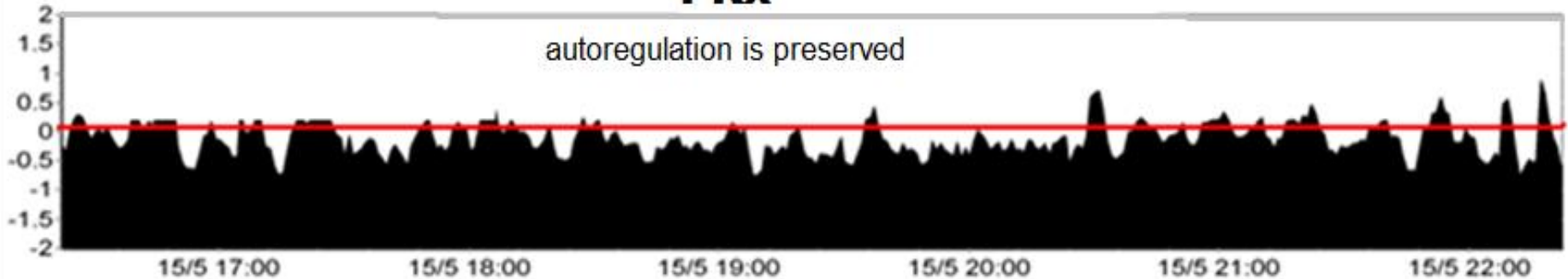
## ICP



## CPP



## PRx



15/5 17:00

15/5 18:00

15/5 19:00

15/5 20:00

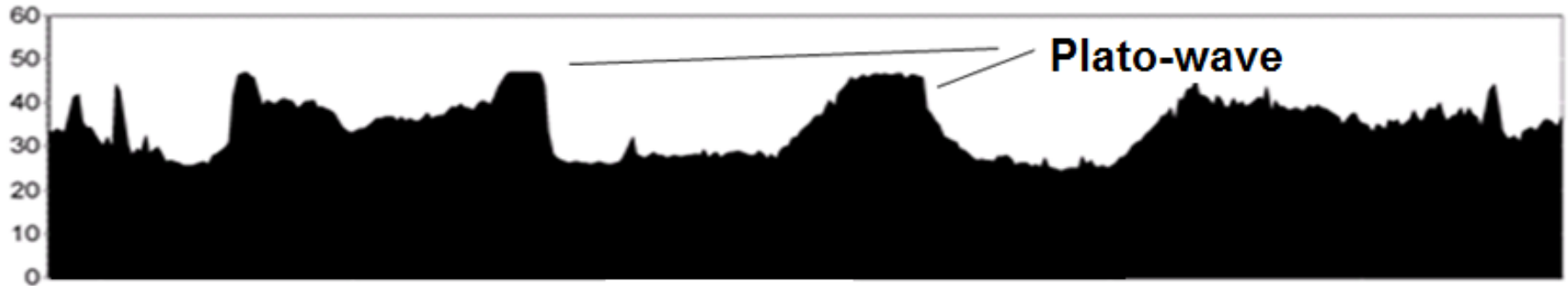
15/5 21:00

15/5 22:00



3 day

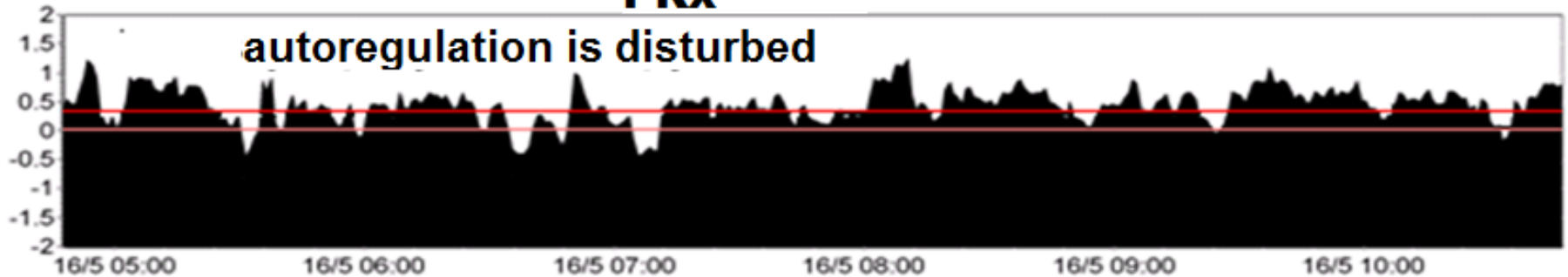
**ICP**



**CPP**

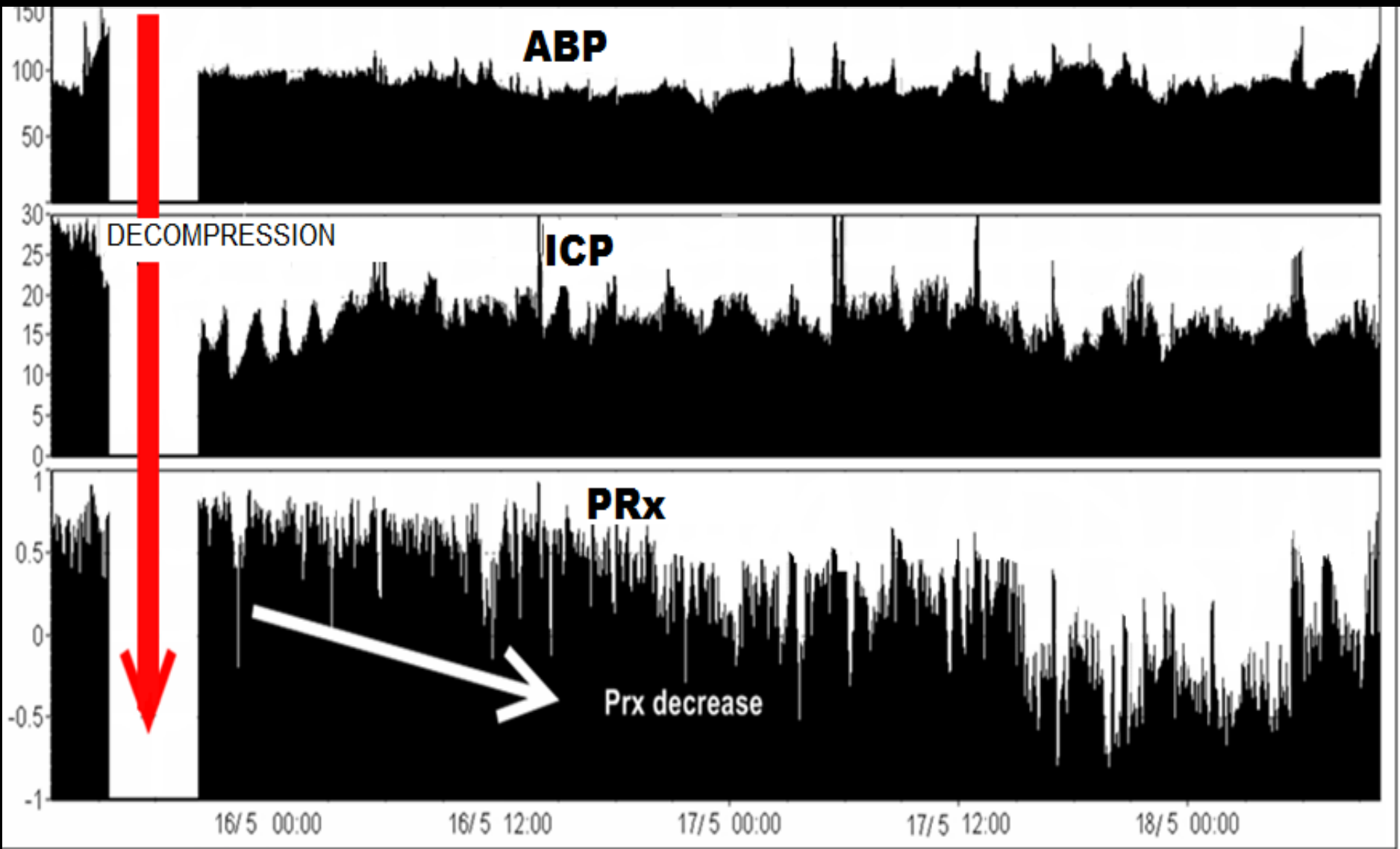


**PRx**





# After DC







# Conclusion

The “ICM +” is a very useful tool for NICU:

which allows to apply a patient-oriented therapy

to choose the most effective methods of correction of intracranial hypertension

improves the quality of monitoring and therapy



# Thank you



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