

**Urine flow rate
a new vital sign?**

Current record of hourly urine output

- **Up to 30% inaccuracy**
- **Nursing work load**
- **No option for electronic data record**



URINFOTM
2000

Digital Urine Monitoring System

Continuous automatic fluid monitoring is critical in providing superior renal and fluid management. Early indication

Technical features

- Optical dynamic flow detector.
- 3 - 5 year battery life
- Presents alarms and alerts



Pathophysiology of hypovolemia

- **Hemodynamics – HR, BP, CVP, CO, PAWP**
- **Global hypoperfusion – Bx, lactate**
- **Regional hypoperfusion – gastric mucosal Ph, NIRS**
- **UFR?**

The dilemma of fluid resuscitation

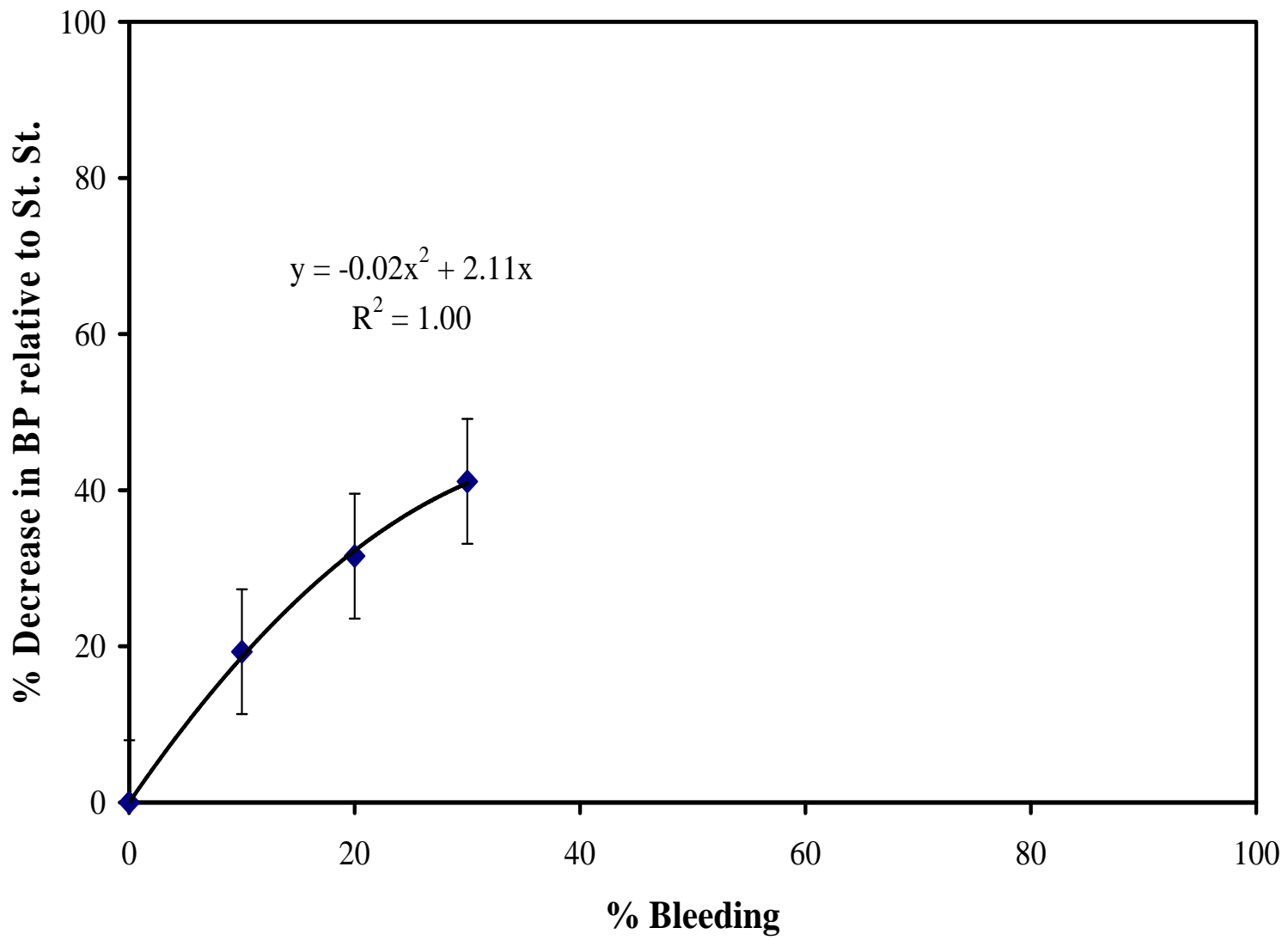
- **Minimize fluid administration: overload, increased bleeding, immunomodulation**
- **Minimize hypoperfusion: MODS, mortality**

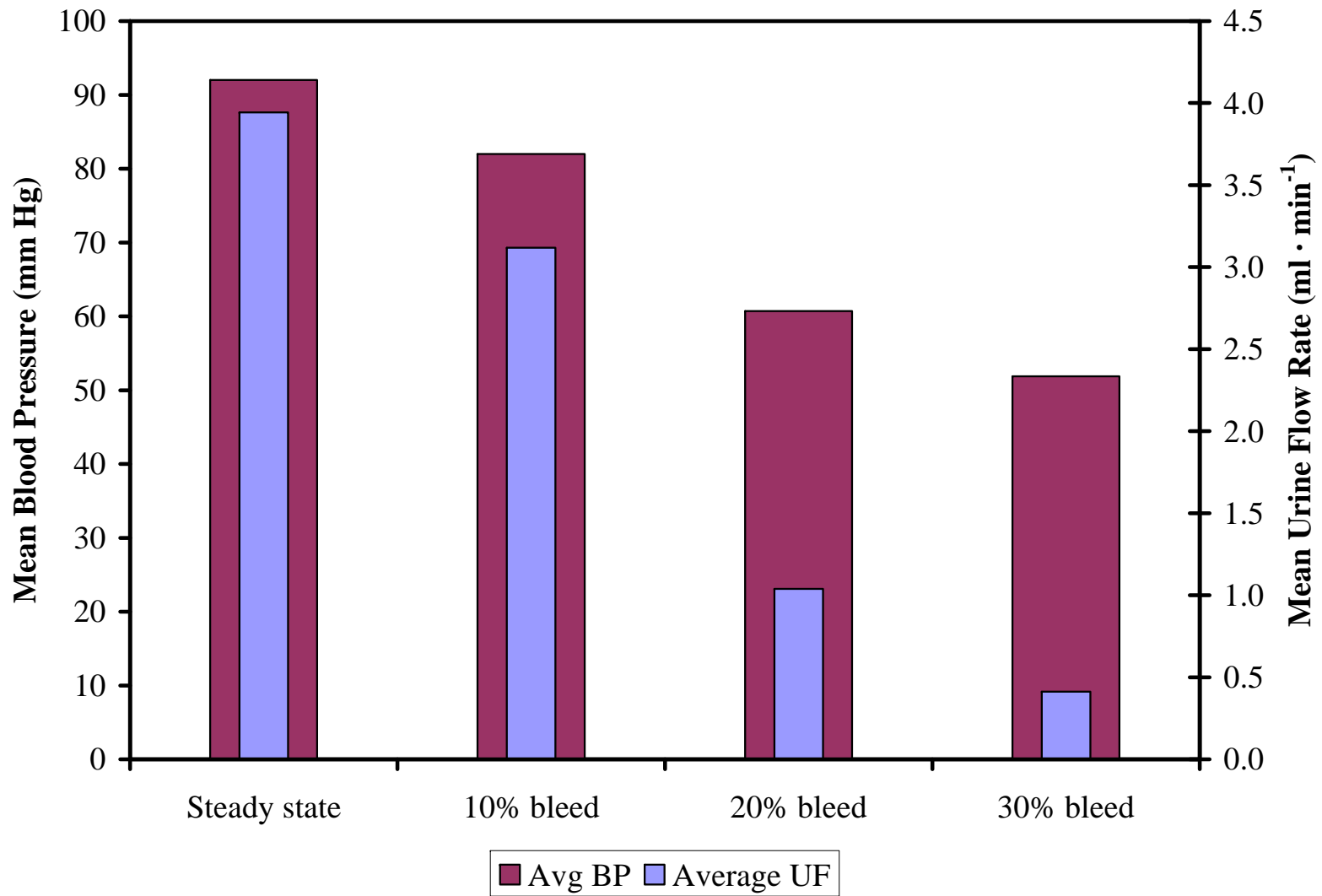
Can the urine flow rate (UFR) be a new physiological measure?

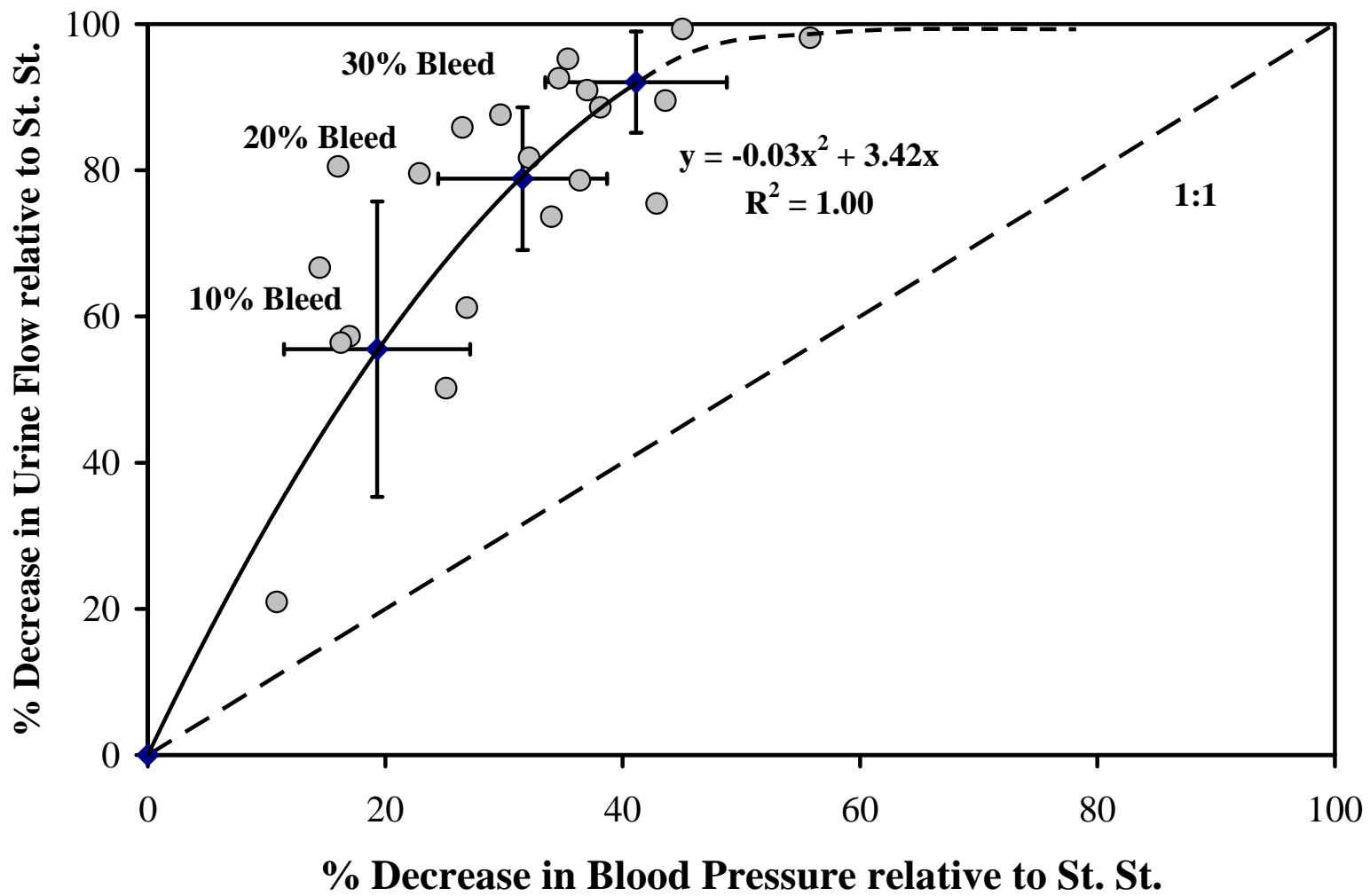
- **What is the normal UFR?**
- **What is the normal UFR curve looks like?**
- **How dose the UFR respond to blood loss?**
- **How dose the UFR compare to other hemodynamic measures in response to blood loss?**

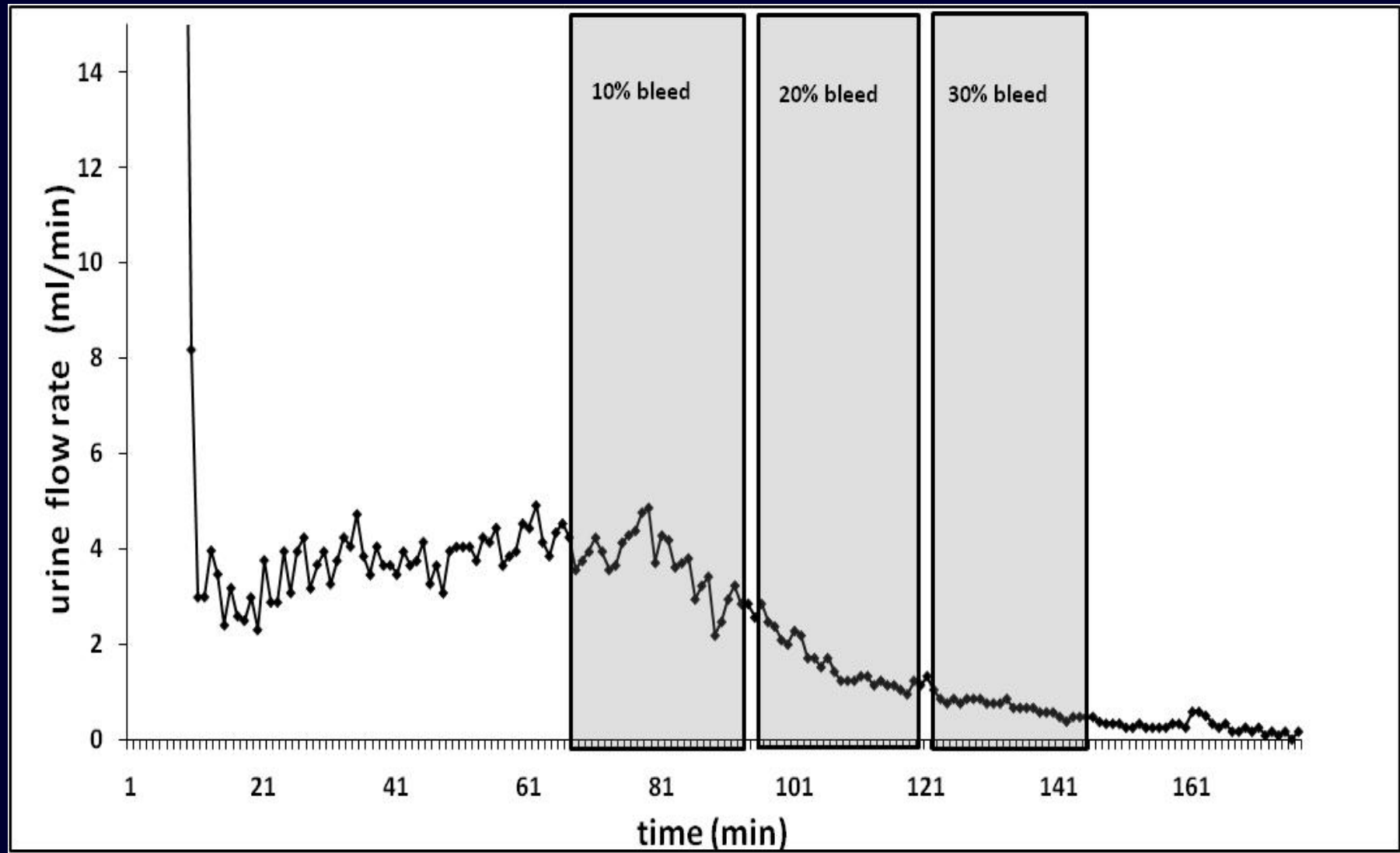
Methods

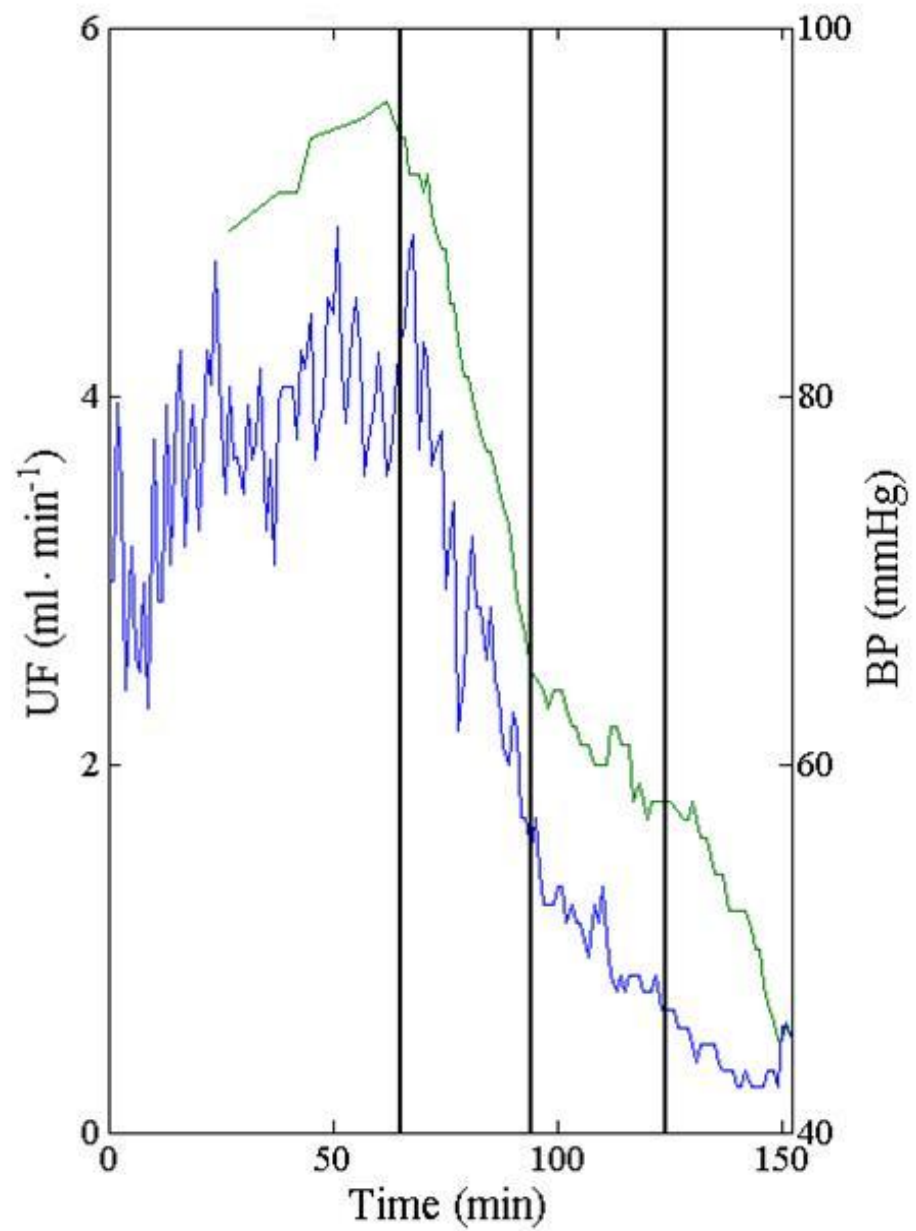
- **7 Anesthetized Pigs - 50+/-10kg**
- **Steady state 68+/-12 min**
- **Constant 15ml/min bleeding**
- **Invasive arterial BP, HR, CO, Bx, lactate**
– **at 10%, 20% and 30% of EBV.**
- **Continues - UFR.**

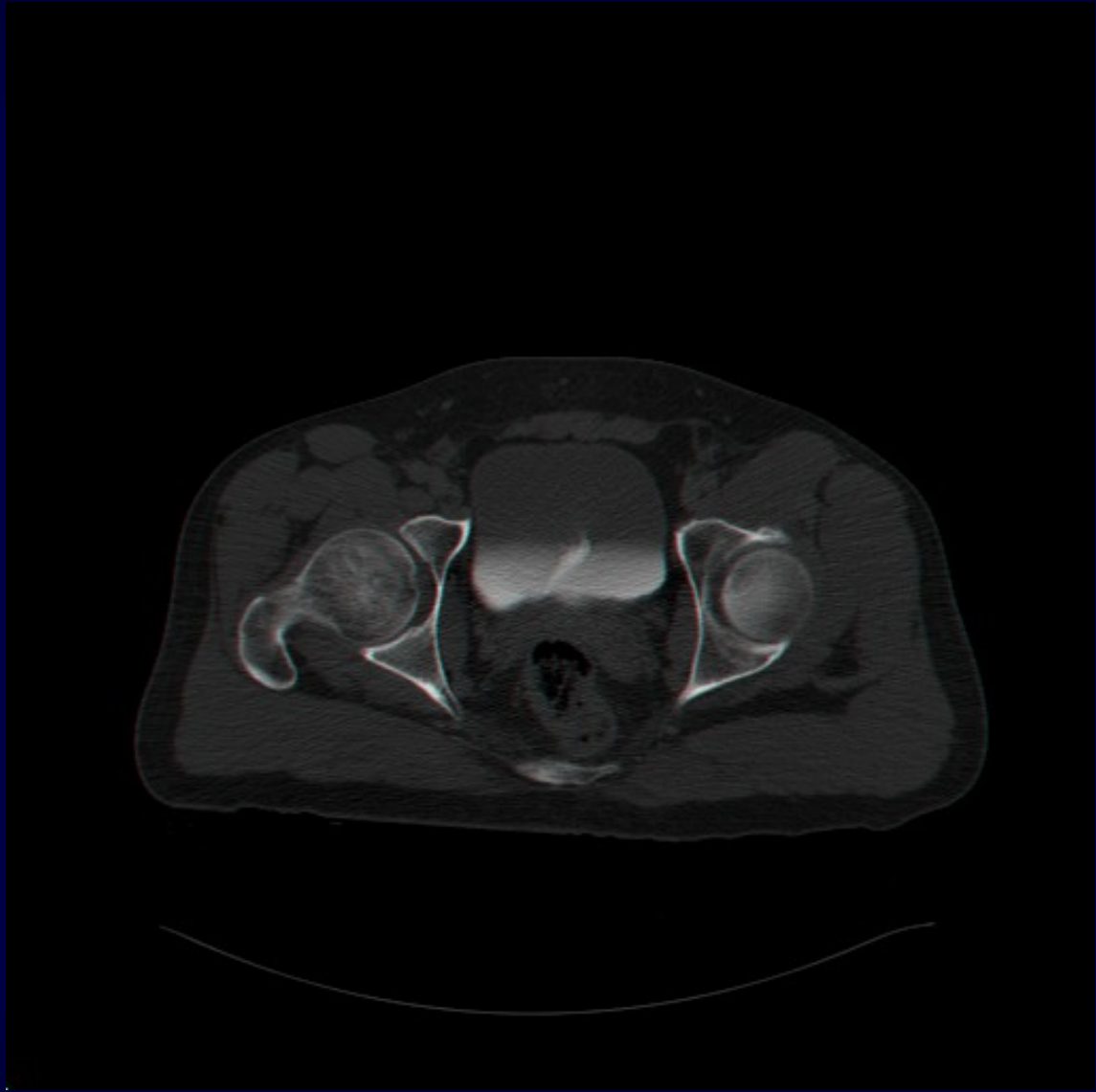












Conclusions

- **Early and sensitive detector of hemorrhagic shock**
- **The natural fluctuations of the UFR**

Endpoint of resuscitation

- Hemodynamic
- Global perfusion
- Regional perfusion?

Possible use of UFR

- **Early simple, non-invasive detection of shock**
- **Regional perfusion based endpoint of resuscitation**
- **Resuscitation closed-loop system**

