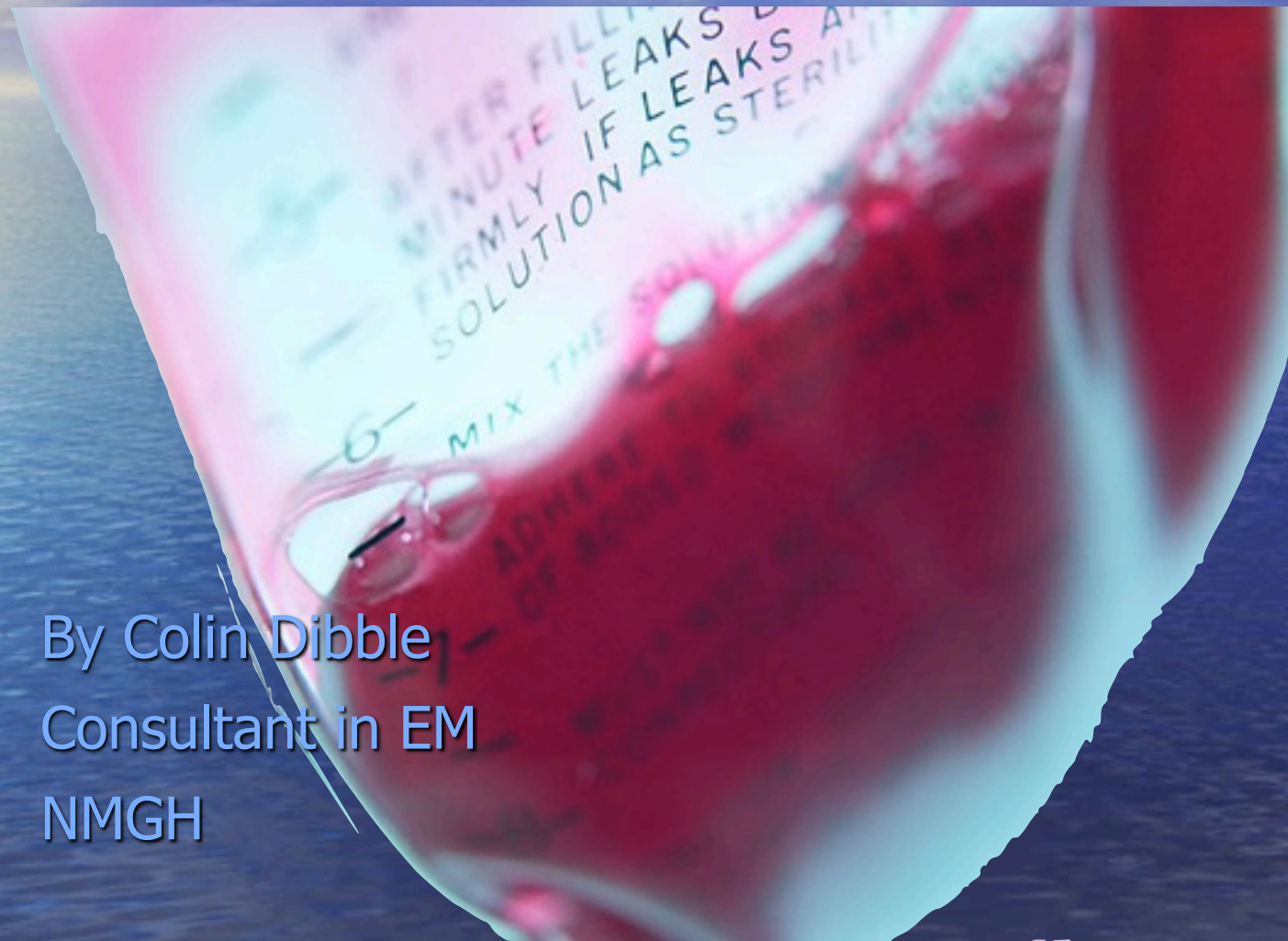


Fluid Resuscitation

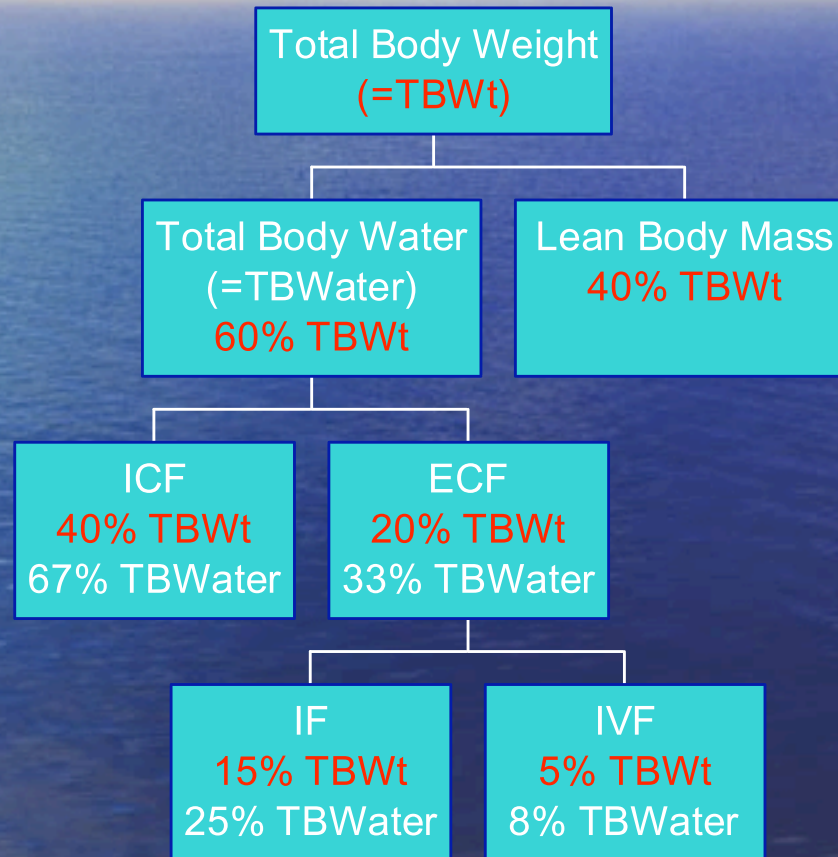


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Contents

- Fluid & Electrolyte Physiology
- Shock
- Pathophysiology of shock
- Recognition of Shock
- Management of Shock
- Which Fluids to use?
- Questions

Fluid & Electrolyte Physiology



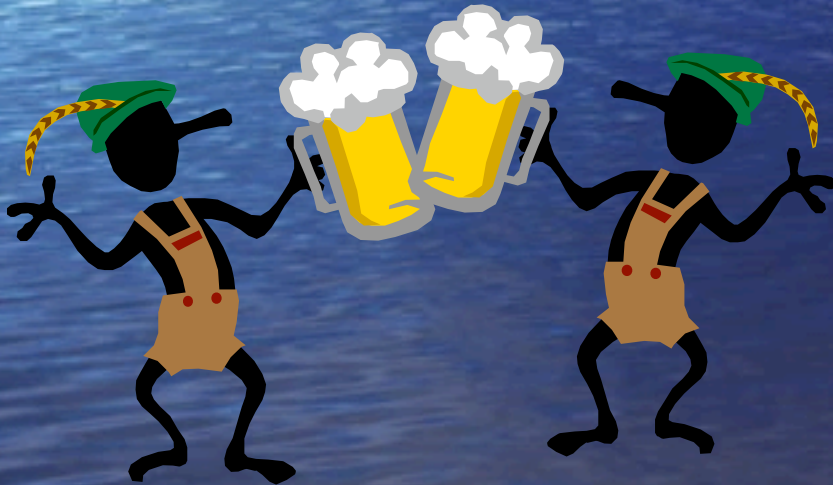
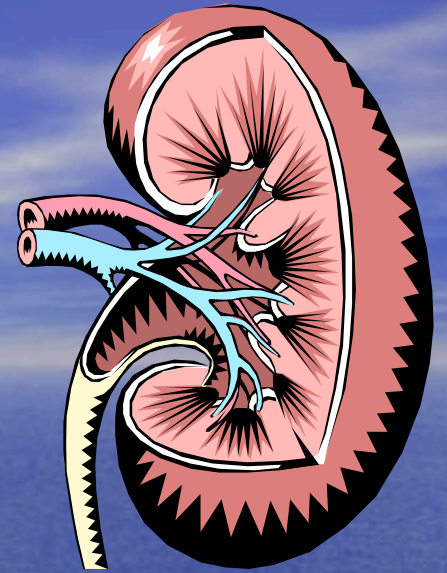
Electrolytes Distribution

	High Concentration	Low Concentration
ECF	Na, Cl	K, phosphates, proteins, Mg
ICF	K, Mg, phosphates, proteins	Na, Cl

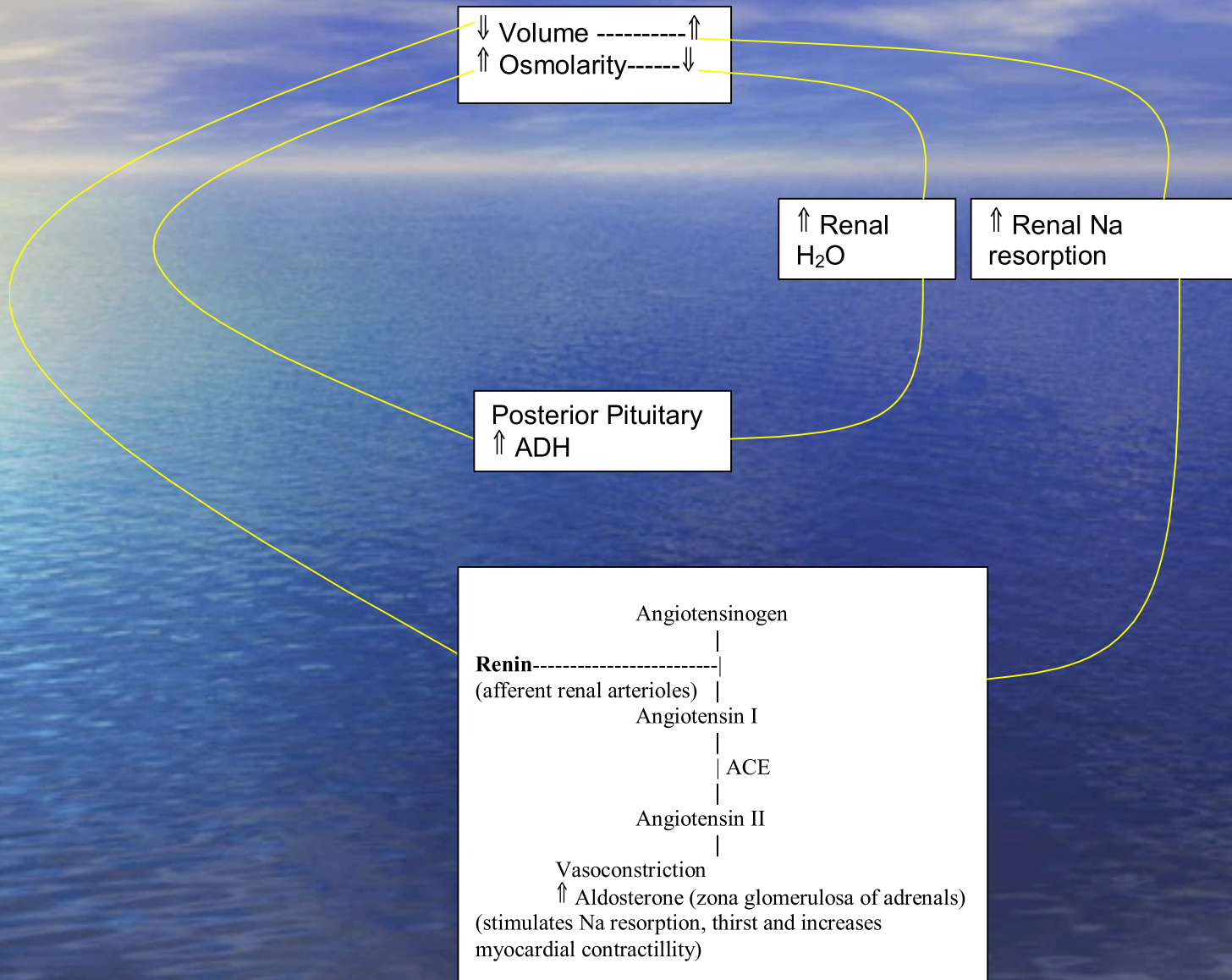
Homeostasis

- **IN (2-3L)**
- Drinking
- Food
- Metabolism

- **OUT**
- Urine
- Lungs (500-700ml/d)
- Stool (100ml/d)
- Skin (250-350ml/d)
- Sweat (up to 1.5L)



Control of Fluid/Electrolytes



Shock

- =Inadequate tissue perfusion
- Hypovolaemic (fluid/blood loss)
- Septic (distributive/capillary leak)
- Anaphylactic (distributive/capillary leak)
- Cardiogenic (pump failure)
- Neurogenic (distributive)

Pathophysiology of Hypovolaemic Shock

- Activation of water/electrolyte retention systems to increase circulating volume
- Inhibition of vagus centre resulting in tachycardia
- Sympathetic NS/Adrenaline causing vasoconstriction of non-essential organs
- As pre-load reduces and above mechanisms fail, drop in BP =LATE sign
- Release of stress hormones eg cortisol
- Hypoperfusion/hypoxia leads to acidosis and tissue damage eg ARF, gut translocation



Recognition of Shock



- History may help
- ABCD
- Rapid shallow respiration
- Usually rapid pulse (except neurogenic), normal in elderly/beta blockers/athletes
- Reduced mentation
- Reduced urine output

Differences in types of shock

	Hypovolaemic	Sepsis	Anaphylaxis	Neurogenic	Cardiogenic
Pulse	↑	↑	↑	Normal	↑
Pulse Pres.	↓	↑	↑	↑	↓
BP -late	↓	↓	↓	↓	↓
Urine	↓	↓	↓	↓	↓
CVP	↓	↓	↓	↓	↑

Grades of Hypovolaemic shock

ADULTS:

Blood loss	Class I	Class II	Class III	Class IV
	<750ml	750-1500ml	1500-2000	>2000
Loss % bv	<15%	15-30	30-40	>40
Pulse Rate	<100	>100	>120	>140
BP	Normal	Normal	↓	↓
Pulse press.	Normal/inc r.	↓	↓	↓
Resp. rate	14-20	20-30	30-40	>35
Urine output	>30ml/hr	20-30	5-15	Negligible
CNS	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic
Fluid replacement	Crystalloid 3:1	Crystalloid 3:1	Crystalloid & blood	Crystalloid & blood

Management of Hypovolaemia

- ABCD assessment
- High flow O₂, head down
- at least 2 cannulae of 16-14G
- Rapid **warmed** crystalloids, physiological saline or Ringers-Lactate/Hartmanns
- 1-2L adults/ 20ml/kg x3 if req. in paed
- Monitor P/BP/skin/GCS/Urine/?CVP
- Then consider blood if bleeding
- Not to 'normal' parameters in ongoing

Colloids

- Thought to stay in circulation longer due to large molecules
- Thought to exert oncotic pressure to reduce pulmonary oedema (but no actual reduction found)
- Thought to pass less into ECF in leaky capillaries, but does and then can exert oncotic pressure in ECF leading to ↑

Crystalloids vs Colloids

- Higher mortality using colloids in trauma¹
 - Most systematic reviews find no benefit or deleterious effects of using colloids²
 - 1L saline=43p, 1L Gelafusin=£9.26 (BNF)
 - No difference between the effect of different colloids³ except in cost
- 1. Rizoli SB, 'Crystalloids and colloids in trauma resuscitation: a brief overview of the current debate' *Journal of Trauma-Injury & Critical Care*. 54(% Suppl):s82-8, 2003 May
 - 2. Schierhout G. Roberts I. 'Fluid resuscitation with colloid or crystalloid solutions in critically ill patients: a systematic review of randomised controlled trials' *BMJ* 1998;316:961-964 (March)
 - 3. Bunn F. Alderson P. Hawkins V. 'Colloid solutions for fluid resuscitation. [update of Cochrane Database Sys Rev. 2001; (2):CD001319; PMID: 11405985]

Crystalloid/Colloids

Colloids		Crystalloids	
Benefit	Disadv.	Benefit	Disadv.
1:1 blood replacement	Cost	Cheap	3:1
Longer in IVC	Clotting	Widely avail.	No O ₂ carrying
	Cross matching		
	?↑mortality		
	No O ₂ carrying		

Blood Products

- Packed red cells, not whole blood
- O neg-immediately
- Group Specific-10 minutes
- Fully cross matched-1 hour
- Oxygen carrying, but no platelets/clotting factors
- Can result in reaction/anaphylaxis/ fever/ hypokalaemia/ hypocalcaemia/infectious diseases/ volume overload/ hypothermia



Saturday, 24 January 2009

QUESTIONS

Summary

- Recognise shock from history/exam
- Remember BP is a pre-terminal sign
- Can be hypovolaemic/ septic/
anaphylactic/ neurogenic/ cardiogenic
- early/ urgent treatment
- Use crystalloids &/or packed red cells