

Physiology

Dengue Frontier Training Workshop
UiTM Selayang

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PHYSIOLOGY

- Pathophysiology of dengue fever
- Plasma leakage
- Insensible fluid loss
- Hyperglycemia

DEHYDRATION

Pathophysiology – Plasma Leakage

- DENV-infected cells → inflammatory mediators → immune complexes formed → complement cascade activated → vascular permeability + hemorrhagic manifestations.
- Memory T lymphocytes → cytokines → tissue inflammation (secondary infections)
- Clinically significant plasma leakage (WHO) = plasma leakage leading to shock or fluid accumulation, sufficient to cause respiratory distress, or both.

Insensible fluid loss

•Body :

Body Surface Area =

$$\sqrt{\frac{\text{height(cm)} \times \text{weight(kg)}}{3600}}$$

Insensible loss: 600–900 mL (lungs and skin).

(With fever, each degree above 98.6°F [37°C] adds 2.5 mL/kg/d to **insensible losses**;

insensible losses are decreased if a patient is undergoing mechanical ventilation; free **water** gain can occur from humidified ventilation.)

Sample Scenario

80 yo ESRF lady on haemodialysis (HD) Ht: 160cm, 75kg

- Unwell 3 days, missed her HD yesterday
- Not taking orally well
- No urine output

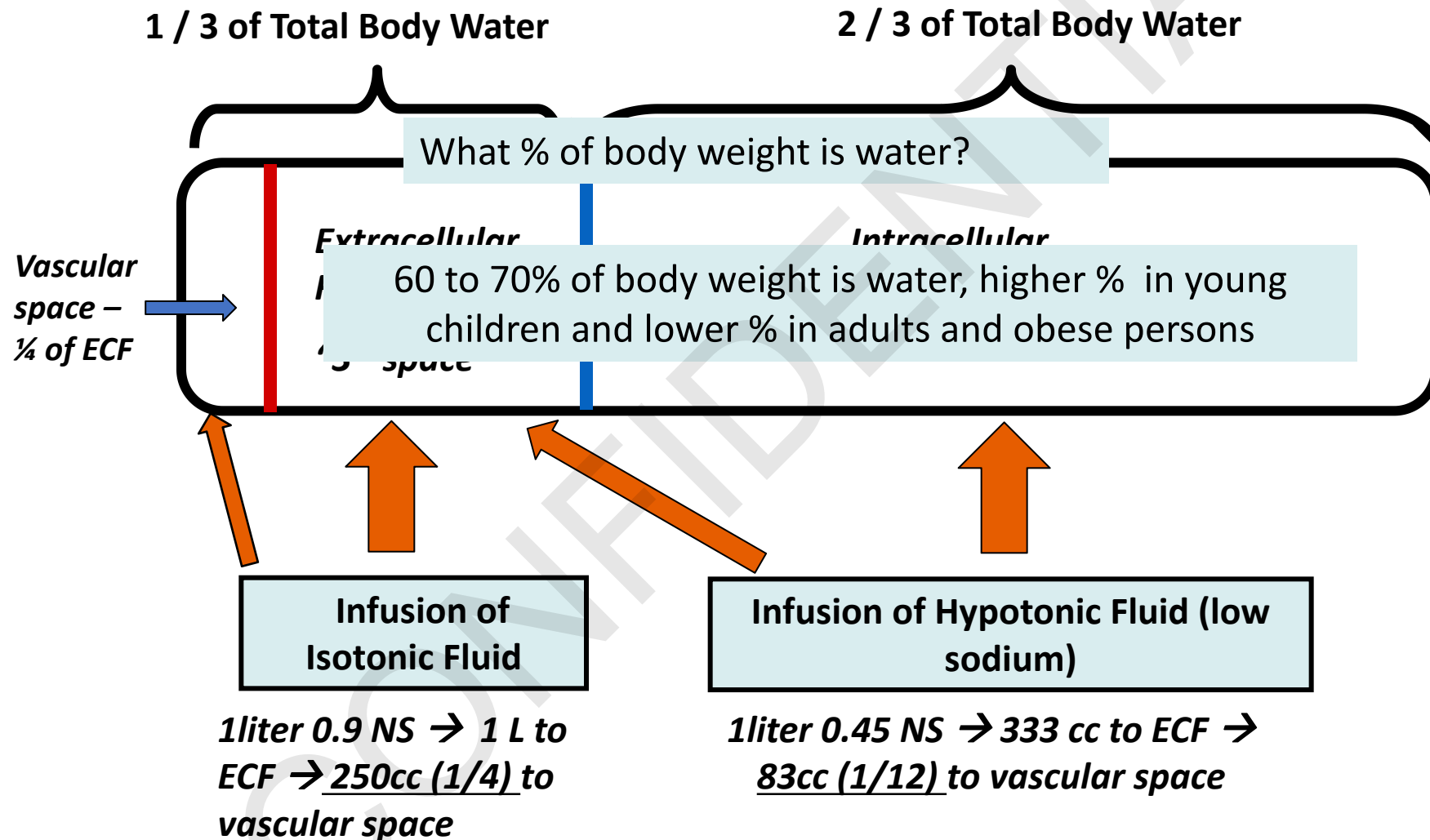
Assessment: temp: 39 deg, tongue coated, tachycardia, low volume

HCT 36%

DEHYDRATION

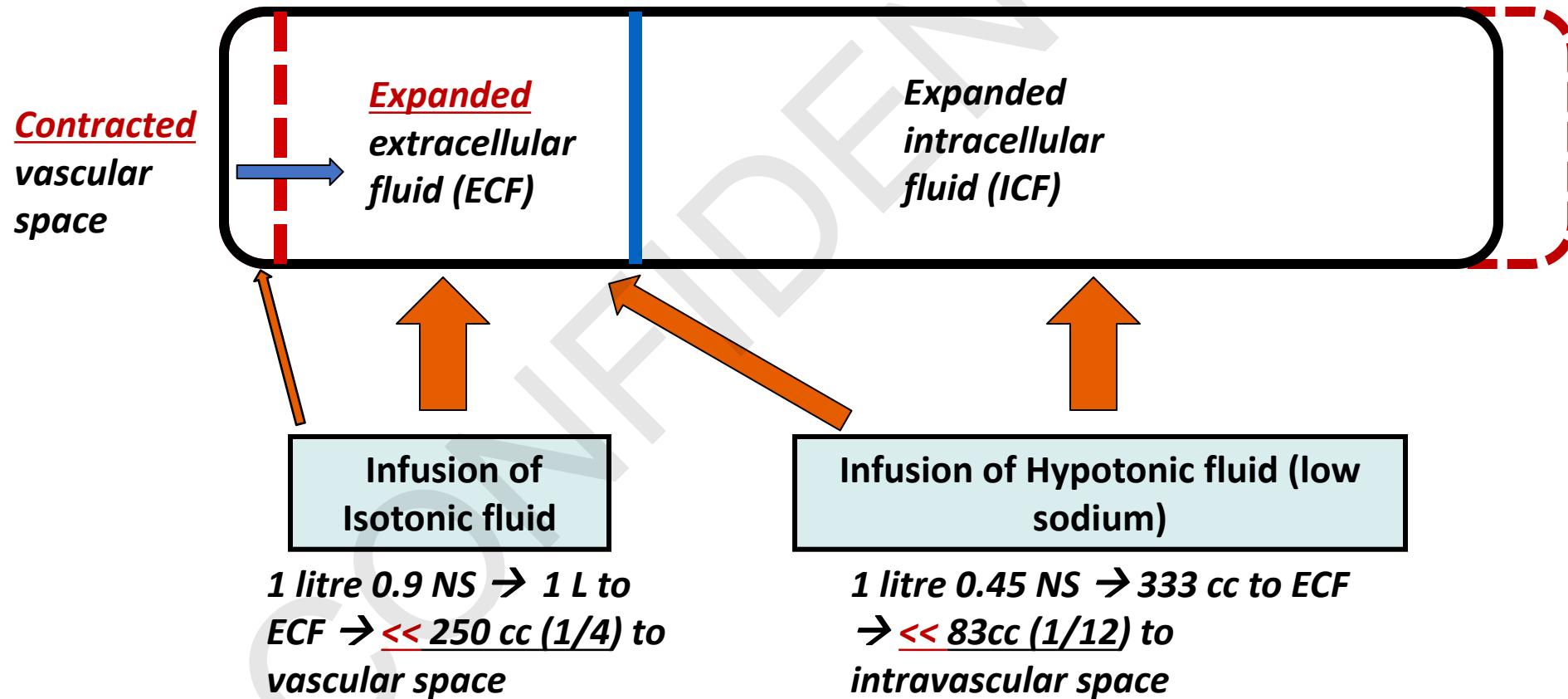
- Is she dehydrated?
- How much insensible fluid loss? How much is her BSA?
- Should we give her IV hydration? Should we HD her? Should we give her oral hydration?

Why isotonic fluids?



What happens in the critical phase?

Fluid shifts – in a capillary leak situation



Hemodynamic assessment: Clinical

Peripheral

Vs

Central circulation

Skin perfusion

Organ perfusion

Cardiac Output

Respiratory Compensation

Hemodynamic Assessment – Monitoring urine output

Why is monitoring of urine output crucial in haemodynamic monitoring?

Reflects renal blood flow -- kidneys regulate intravascular volume.

In early shock state, kidneys conserve fluids by reducing urine volume.

In severe shock, no urine is produced.

What is considered adequate urine output?

In outpatient setting, the patient should drink enough fluids to pass urine about 4 to 6 times a day.

A patient with dengue shock should pass at least 0.5 ml/kg urine per hour.

An indwelling catheter will give an accurate measurement. If the urine volume exceeds this amount, consider reducing the IV fluid therapy.

Pitfall?

In uncontrolled diabetes or hyperglycemia, inappropriately large quantities of urine is produced.

Shock becomes worse because of glycosuria.

Sample scenarios

- What is the pt able to drink, pee, walk. What is the hydration status?

Magic Questions + CCTVR

- Second scenario, not drinking, but pee a lot. What should u think about

Hyper glycemias

- Drink enough, pee enough, but too lethargic to walk

Na 124, K 3.8 (ELECTROLYTE IMBALANCE) – not everything is shocked

Case study

46-year-old female – Day 1

History: **High fever**

Muscle ache

Headache

Poor appetite

PE: **Temp 39.3°C**

BP: 120/76 mmHg

PR 88/min

RR 16/min

Throat: not inflamed

No rash

CVS/Resp system/Abdomen - normal

CBC	D1
HB	13.5
HCT	39
WBC	7.2
PLT	235

Diagnosis : Acute Febrile Illness

	D1	D2
HB	13.5	13.1
HCT	39	38
WBC	7.2	5.3
PLT	235	151

Urine examination	
Protein	Nil
Red cells	2
White cells	5
Bacteria	+
Ketones	3+

Doctor's diagnosis is urinary tract infection

Vomiting and feeling unwell after 3rd day of illness



	D1	D2	D3	D4	D5	D6	D7
HB	13.5	13.1	12.8	15.2	13.9	12.5	12.4
HCT	39	38	34	48	42	38	37
WBC	7.2	5.3	4.2	3.1	2.8	4.1	5.3
PLT	235	151	123	74	17	15	35

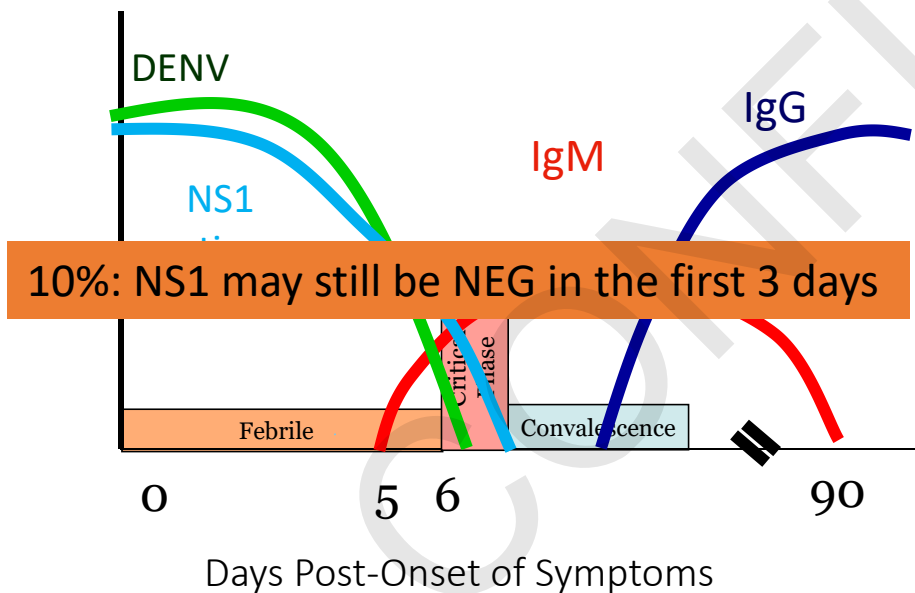
When would you do laboratory confirmation of dengue diagnosis?

When was illness undifferentiated? What test would be most suitable ?

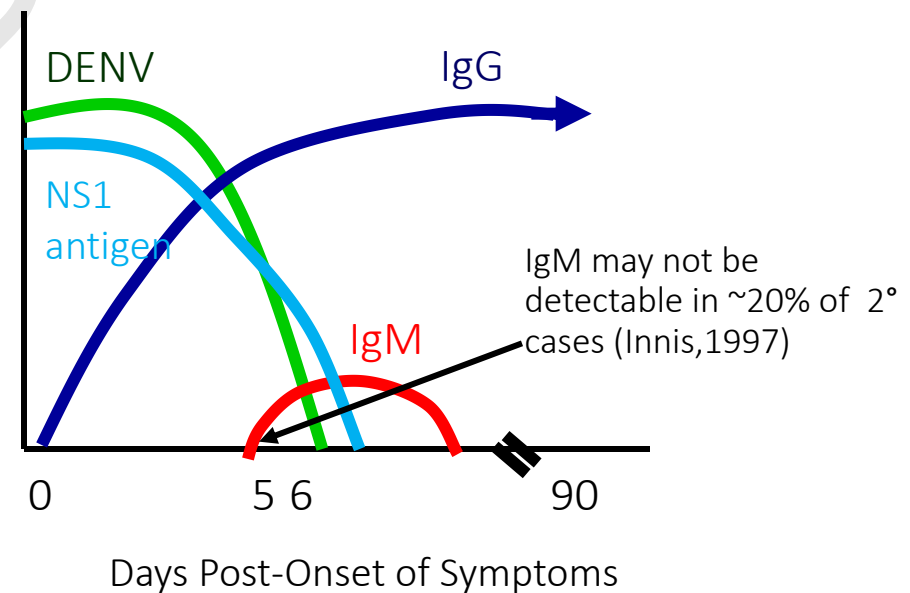
What tests would you order: D3, D4, D5, D6-7?

	D1	D2	D3	D4	D5	D6	D7
HB	13.5	13.1	12.8	15.2	13.9	12.5	12.4
HCT	39	38	34	48	42	38	37
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PLT	235	151	123	74	17	15	35

Primary Dengue Virus Infection



Secondary Dengue Virus Infection



Take home message

- Dehydration happens often
- Insensible loss of fluids
- Temperature increases insensible loss
- Hyperglycemia increases fluid loss
- Electrolyte imbalance

- Educate patient to hydrate (fluids + electrolytes)
- Window period of RDT

Thank you

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