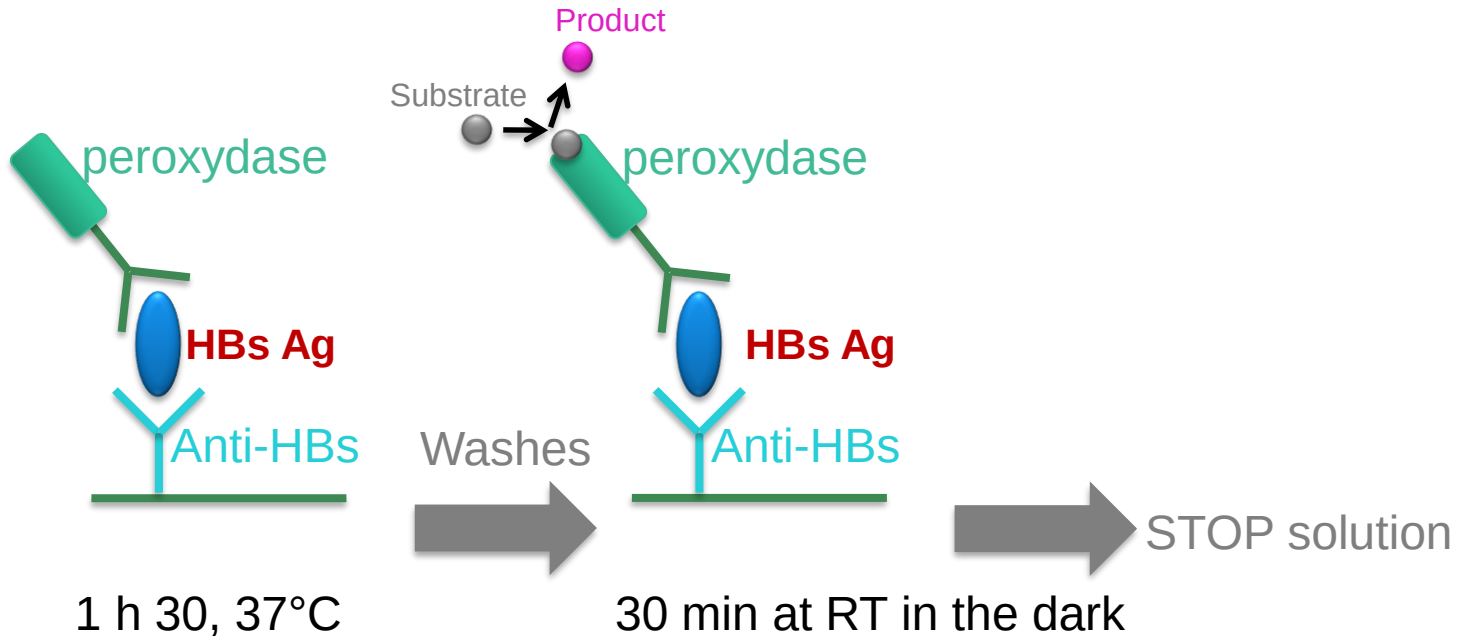
Diagnosis of hepatitis B

OTU1: diagnosis of infectious diseases

26/03/25

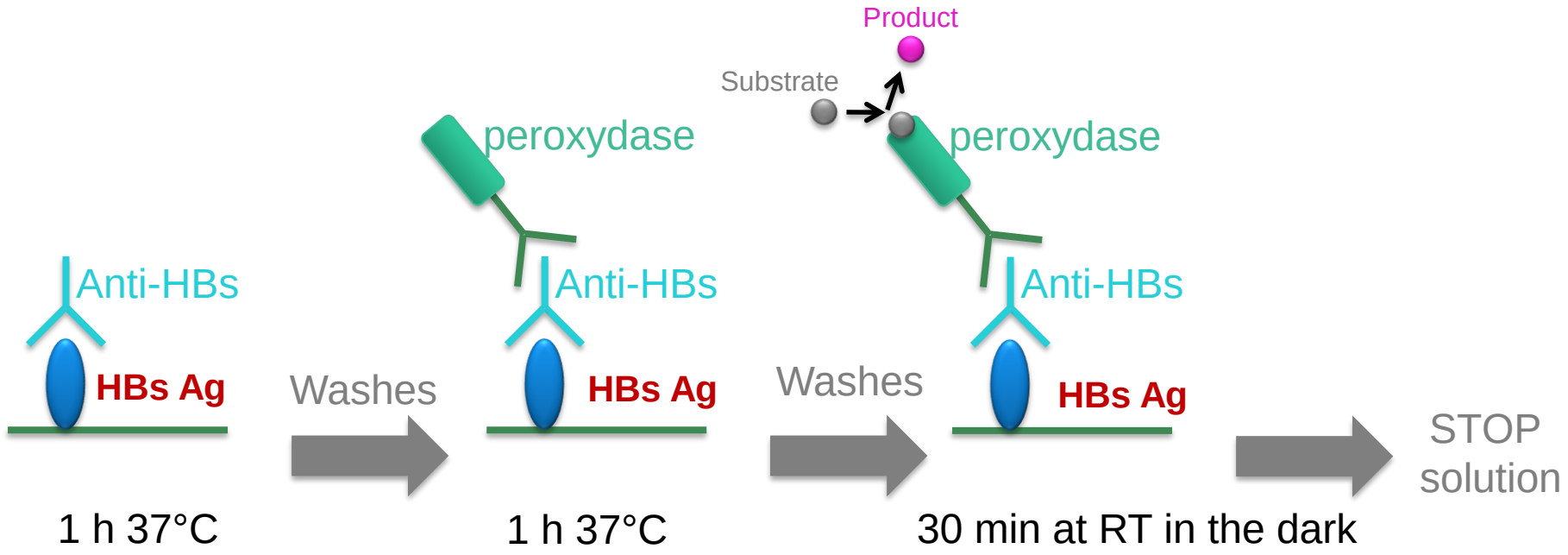
Detection of HBsAg

A1	
B1	Negative controls
C1	
D1	
E1	Positive control
F1	
G1	Samples to test
H1	



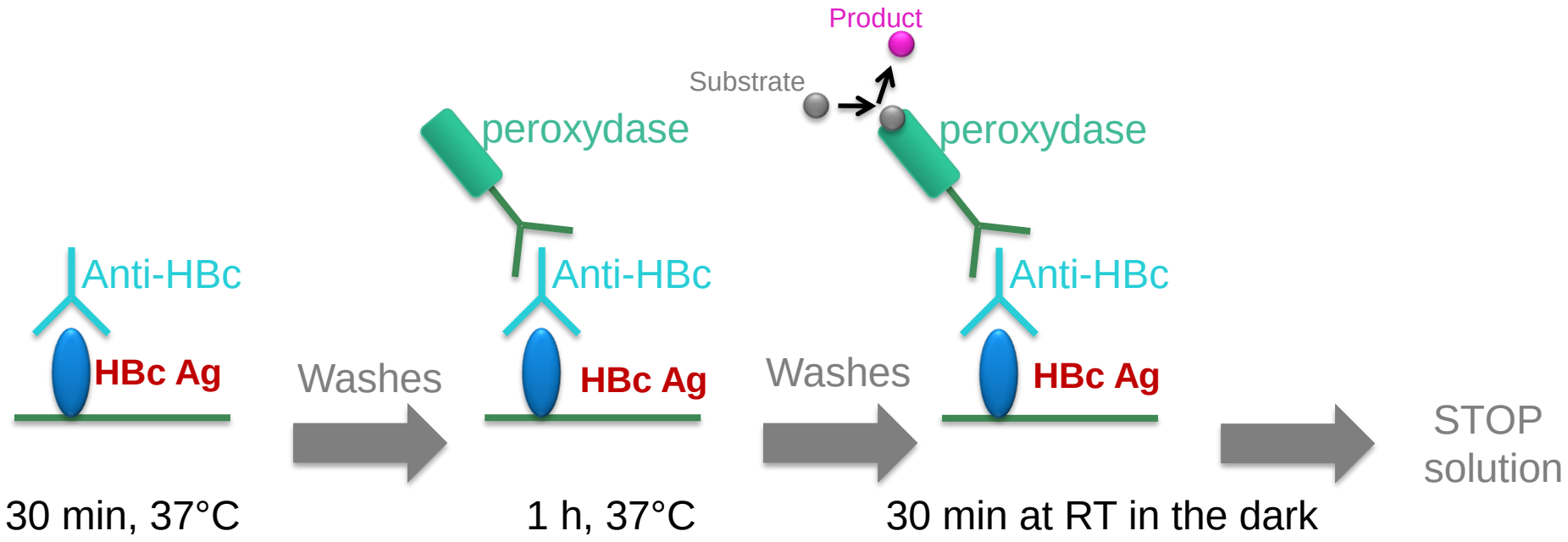
Detection of anti-HBs antibodies

A1	Negative control
B1	Calibrator X1
C1	
D1	Positive controls
E1	
F1	Samples to test
G1	
H1	



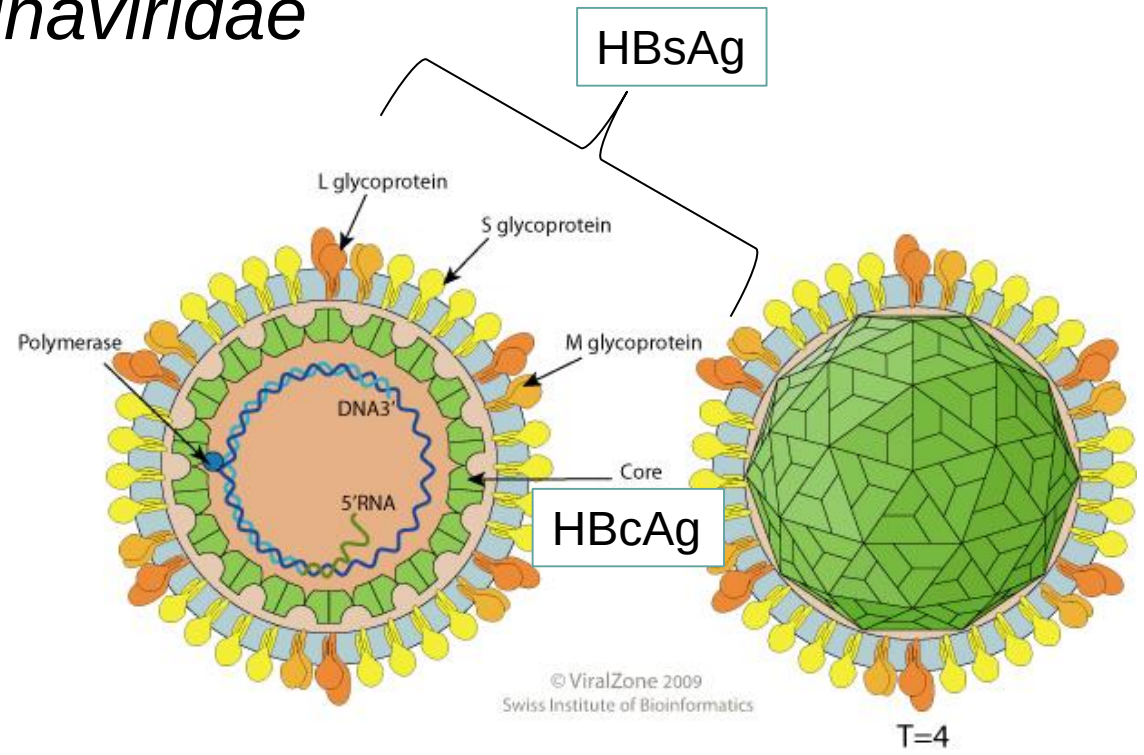
Detection of total anti-HBc antibodies

A1	Negative controls
B1	
C1	Positive controls
D1	
E1	
F1	Samples to test
G1	
H1	



Hepatitis B virus (HBV)

- Family: *Hepadnaviridae*



- Structure: enveloped, icosahedric capsid
- Partially dsDNA circular genome, about 3.2 kb
- One of the smallest virus infecting human (42nm)

Hepatitis B: viral markers

- **HBs antigen / anti-HBs antibodies**

– Marker of HBV infection, can be detected in blood and the cytoplasm of hepatocytes

– **HBsAg persistance > 6 month = chronic hepatitis**

– anti-HBs antibodies : protection (vaccine = recombinant HBsAg)

- HBc antigen **/ anti-HBc antibodies**

– Ag not detected in blood, but found in hepatocyte

– anti-HBc antibodies in serum: are not protective

– Anti-HBc IgM are used to diagnose acute infection

Hepatitis B: viral markers

- **HBe antigen**

Detected in the blood → **replication marker**

- **anti-HBe antibodies**

- Detected in persons with no or lower levels of HBV replication
- Ag HBe disapear when anti-HBe are produced (seroconversion)
- ! precore mutants

- **HBV DNA (in serum)**

- HBV DNA correlates with levels of circulating viral particles = **measure viral replication**

Hepatitis B: diagnostic techniques

- **Direct diagnosis**

  - detection of antigens in serum : HBsAg and HBeAg by laboratory-based immunoassay (ELISA) (also RDT for HBsAg)

  - HBV DNA in serum : PCR (quantification = viral load)

- **Indirected diagnosis :** ELISA

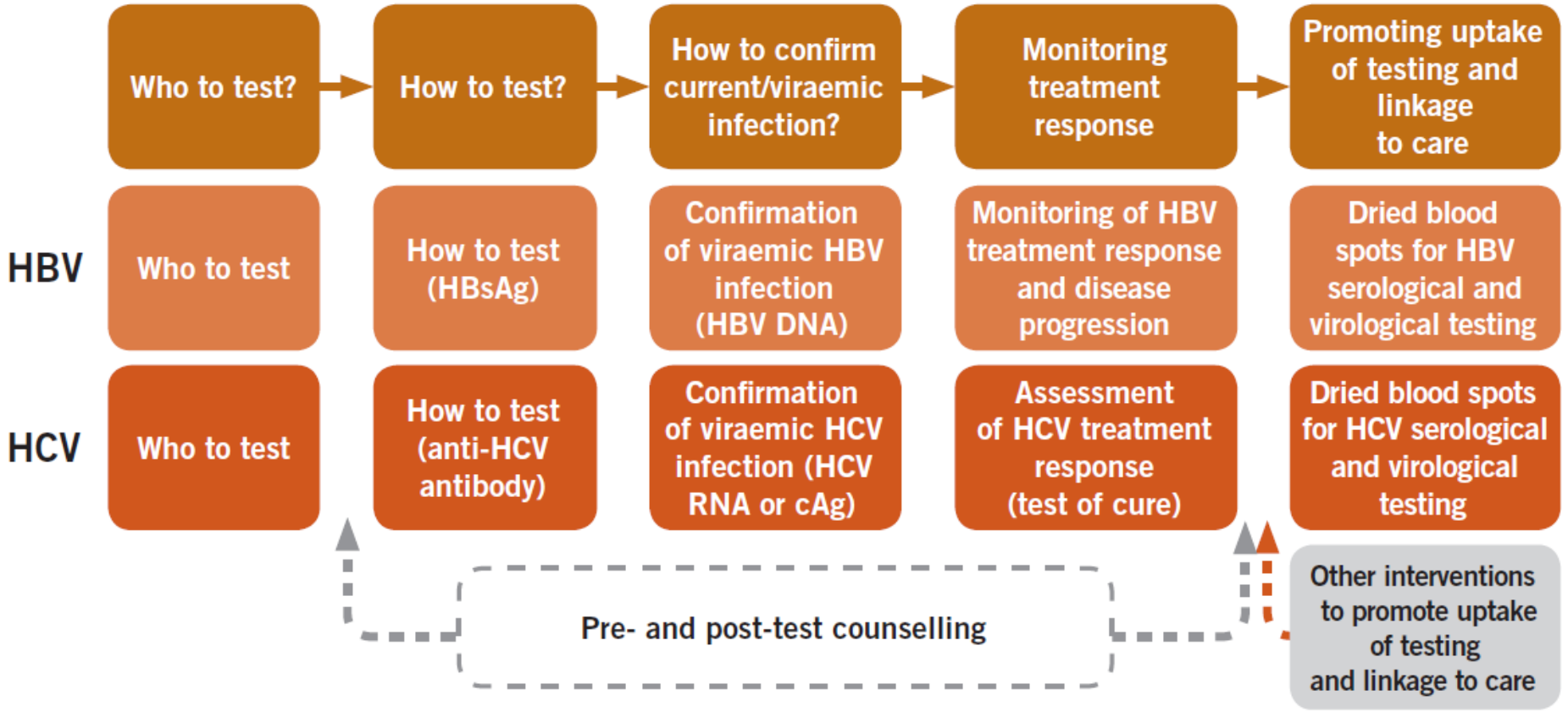
  - anti-HBs antibodies : vaccination or resolved infection

  - anti-HBc antibodies:

    . IgM : acute infection

  - anti-HBe antibodies: usually a sign of positive evolution (or pre-C mutation→ measure or viral load)

Who and how to test

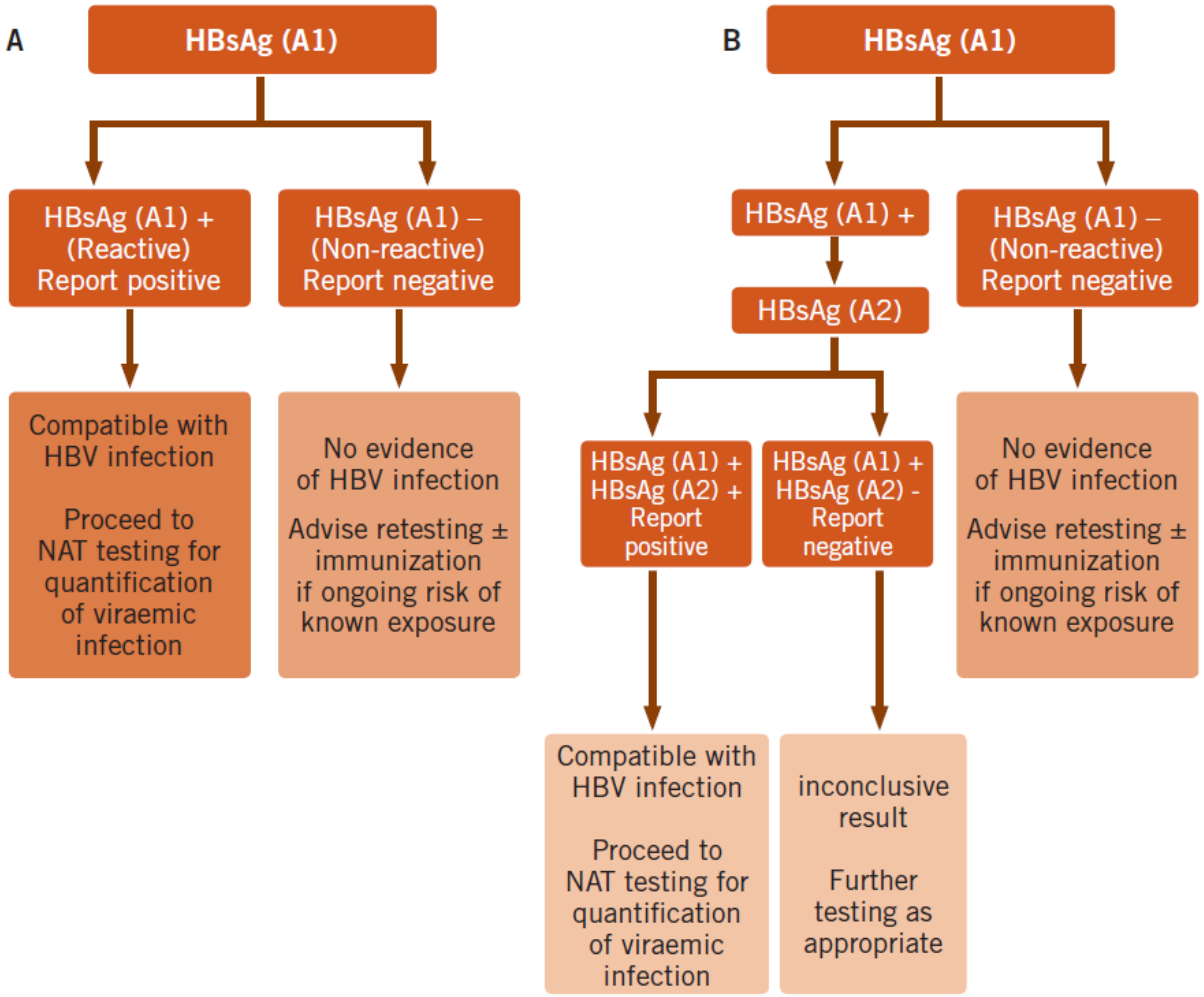


Testing is part of the strategy for **elimination of viral hepatitis**

How to test: WHO recommandations

→ **detection of HBsAg** (Single RDT or laboratory-based immunoassay)

FIG. 7.1 WHO-recommended testing strategies for diagnosis of chronic HBV infection with (A) Single assay with HBsAg seroprevalence above 0.4%, and (B) Two assays with HBsAg seroprevalence below 0.4%



Rapid diagnostic test for HBs Ag detection

- single-use disposable test
- immunochromatography
- easy to use, low cost, no requirement of lab facilities
- read visually, results <30 minutes
- sample: capillary whole blood, collected on the finger with a lancet, serum, plasma
- Lower sensitivity/specificity for HBsAg

https://www.biomerieux-asean.com/product/vikiar-hbs-ag

Your results

	HBsAg	Anti-HBs	Anti-HBc
S1	+	-	+
S2	-	+	-
S3	-	+	+

Practical work report

For HBV : 1/group

- Name and description of **the test you performed**
- results and calculations
- interpretation
- conclusion: conclude for each patient (S1, S2, S3), with the 3 markers.
- Deadline 11/04/25

Hepatitis B testing

	HBsAg	Anti-HBs	Anti-HBc
Acute hepatitis B	+	-	+ (IgM)
Chronic infection/ chronic hepatitis B	+ (> 6 months)	-	+
Resolved hepatitis B	-	+	+
vaccinated	-	+	-

if testing is positive (**HBsAg +**) :

- marker of viral replication (**HBeAg and viral DNA**)
- assessment of stage of liver disease (ALT, non-invasive tests)
- co-infections (HCV, HDV, HIV)
- other co-morbidity