

(1→3)-β-D-Glucan

分生組 吳佩倚

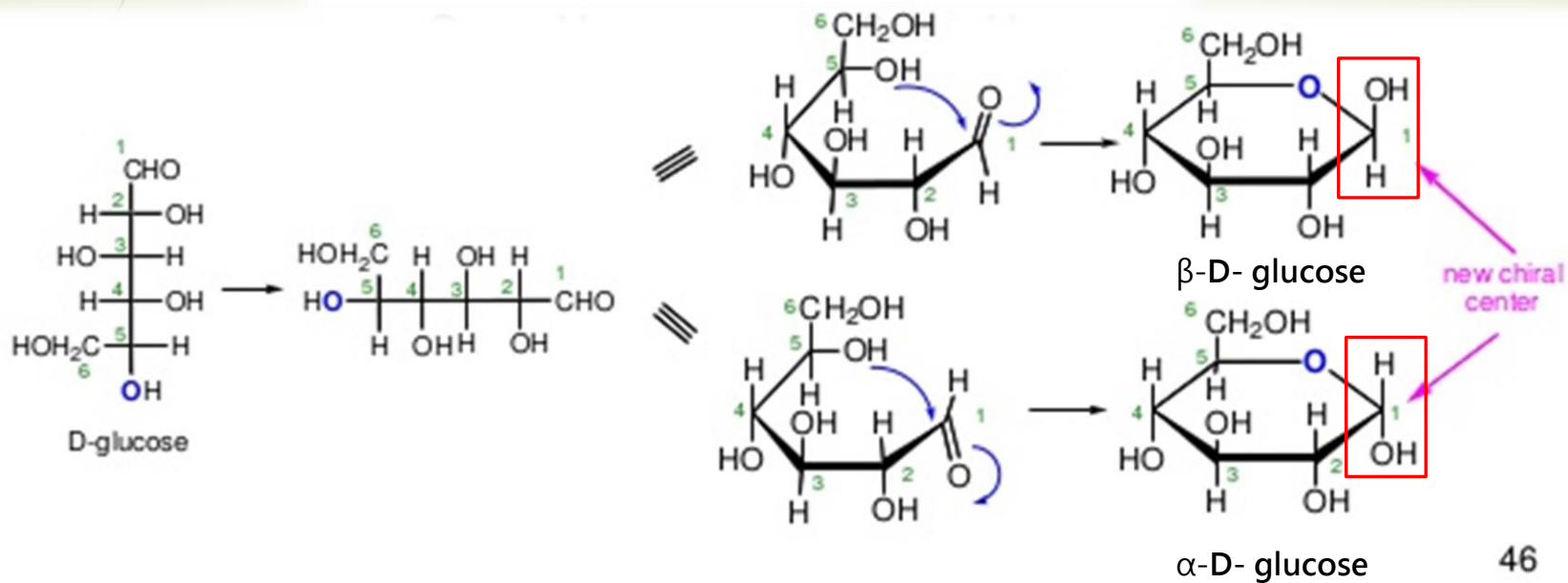
UCL



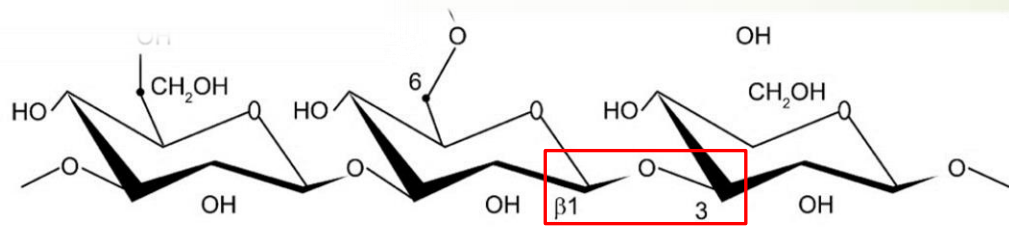
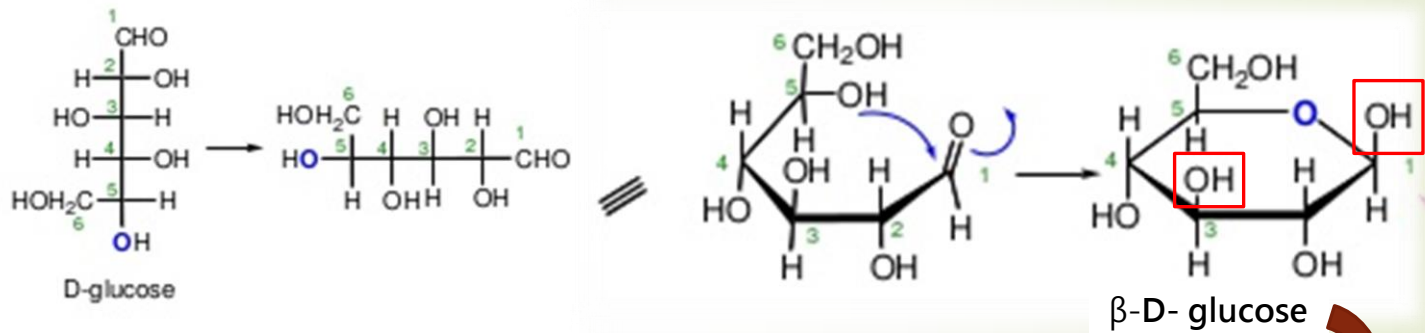
Outline

- ▶ (1→3)-β-D-Glucan
 - ✓ Structure
 - ✓ Introduction
- ▶ Mechanism of entering human body
- ▶ Fungitec® G-test ES
 - ✓ Principle
 - ✓ Sample information
 - ✓ Material
 - ✓ Result
- ▶ Conclusion

Structure



Structure

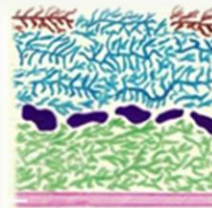
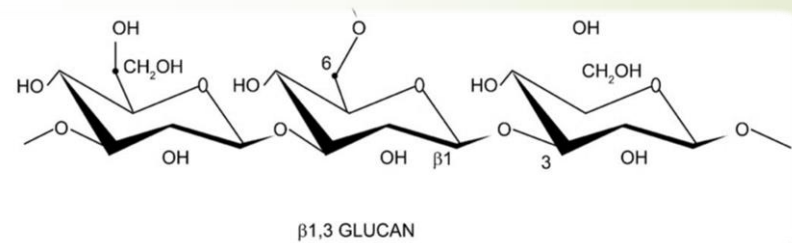


β 1,3 GLUCAN

β 1,3 ГЛЮКАН

(1-3)- β -D-Glucan

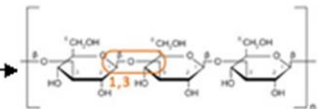
- Component (60-90%) of the cell wall of most fungi
- Soluble in alkali solution: triple helix \rightarrow single helix \rightarrow detect
- Low concentration in healthy human: from normal flora
- Auxiliary diagnosis of deep fungal infection
 - other diagnosis: tissue biopsy with special stains or X-ray



Fungal Cell Wall

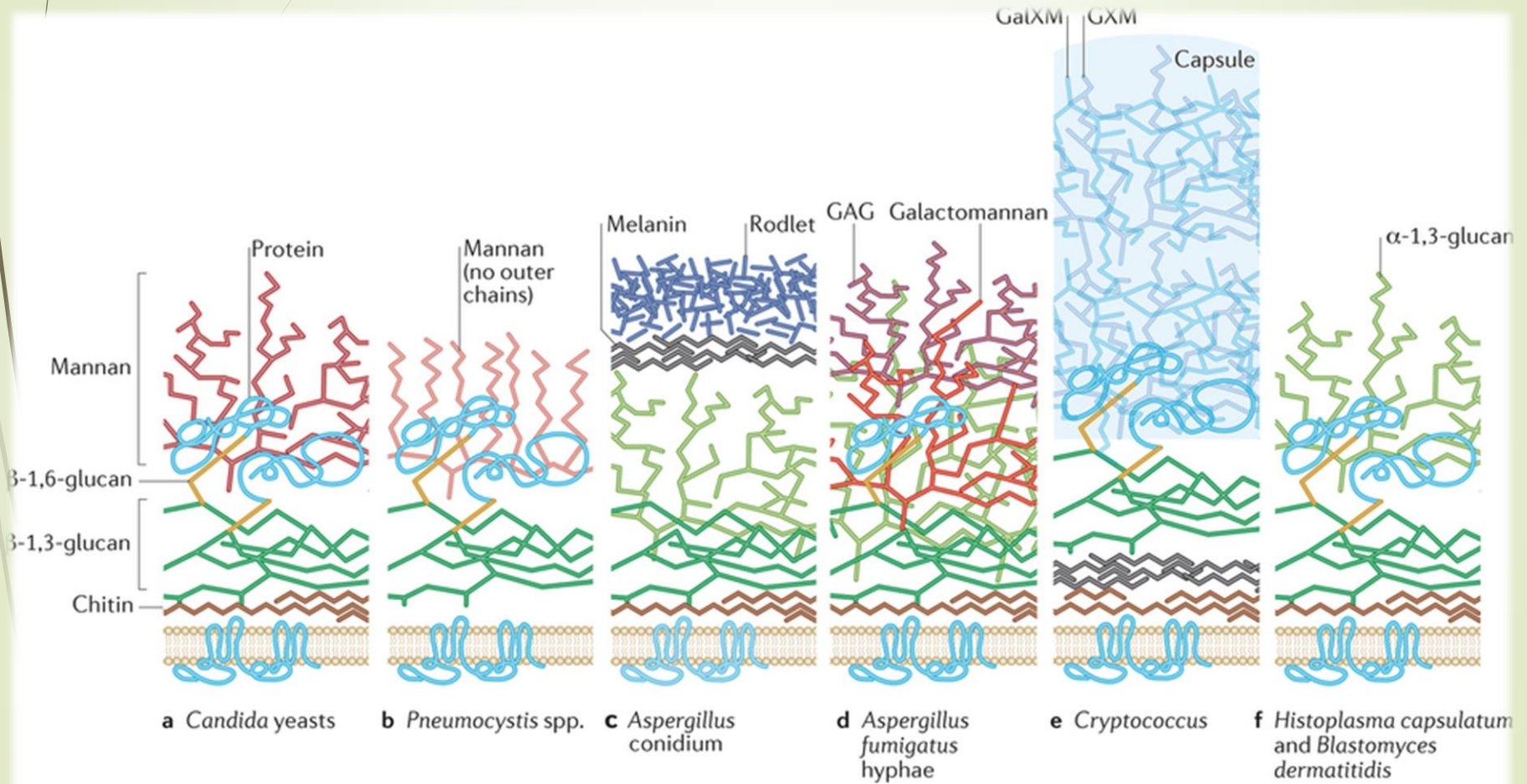


(1-3)- β -D-glucan Triple Helix Structure



(1-3)- β -D-glucan Single Helix Structure

Cell wall of fungi



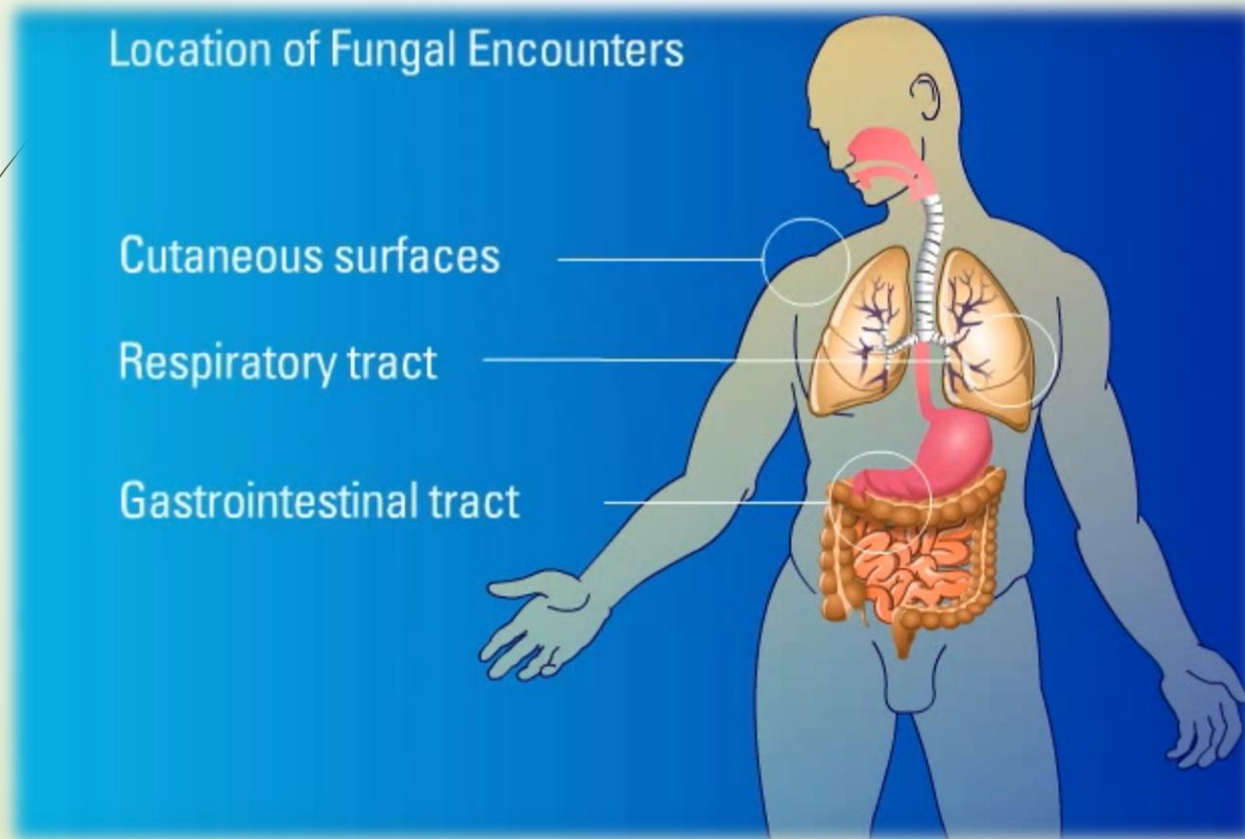


Mechanism of Entering human body

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Deep fungal infections

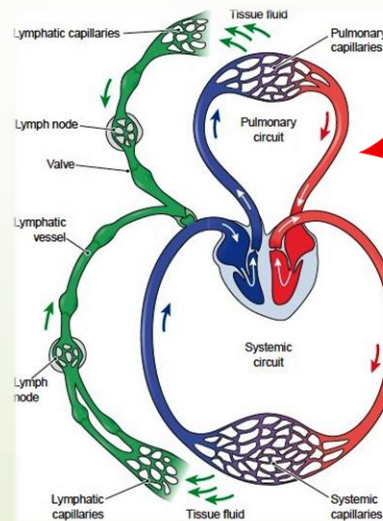
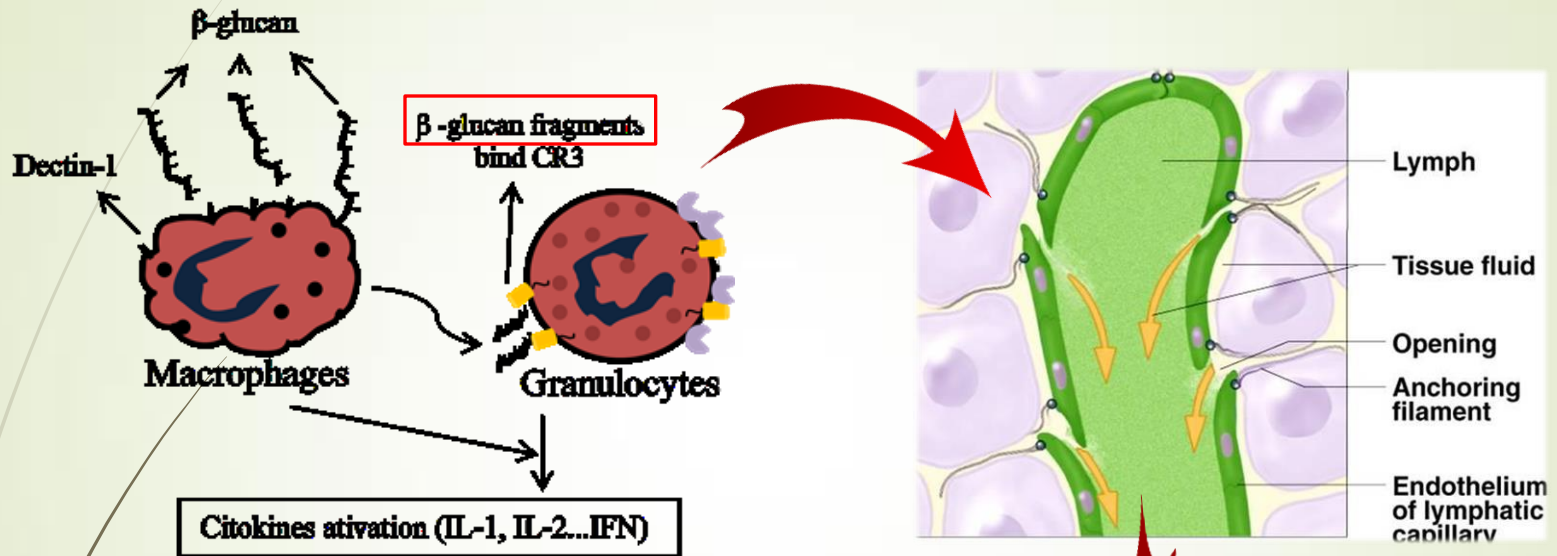
- Fungus found in the blood stream or organ



Mechanism of Releasing

- ▶ sloughed from cell wall of fungi
- ▶ Released after macrophage phagocytosis

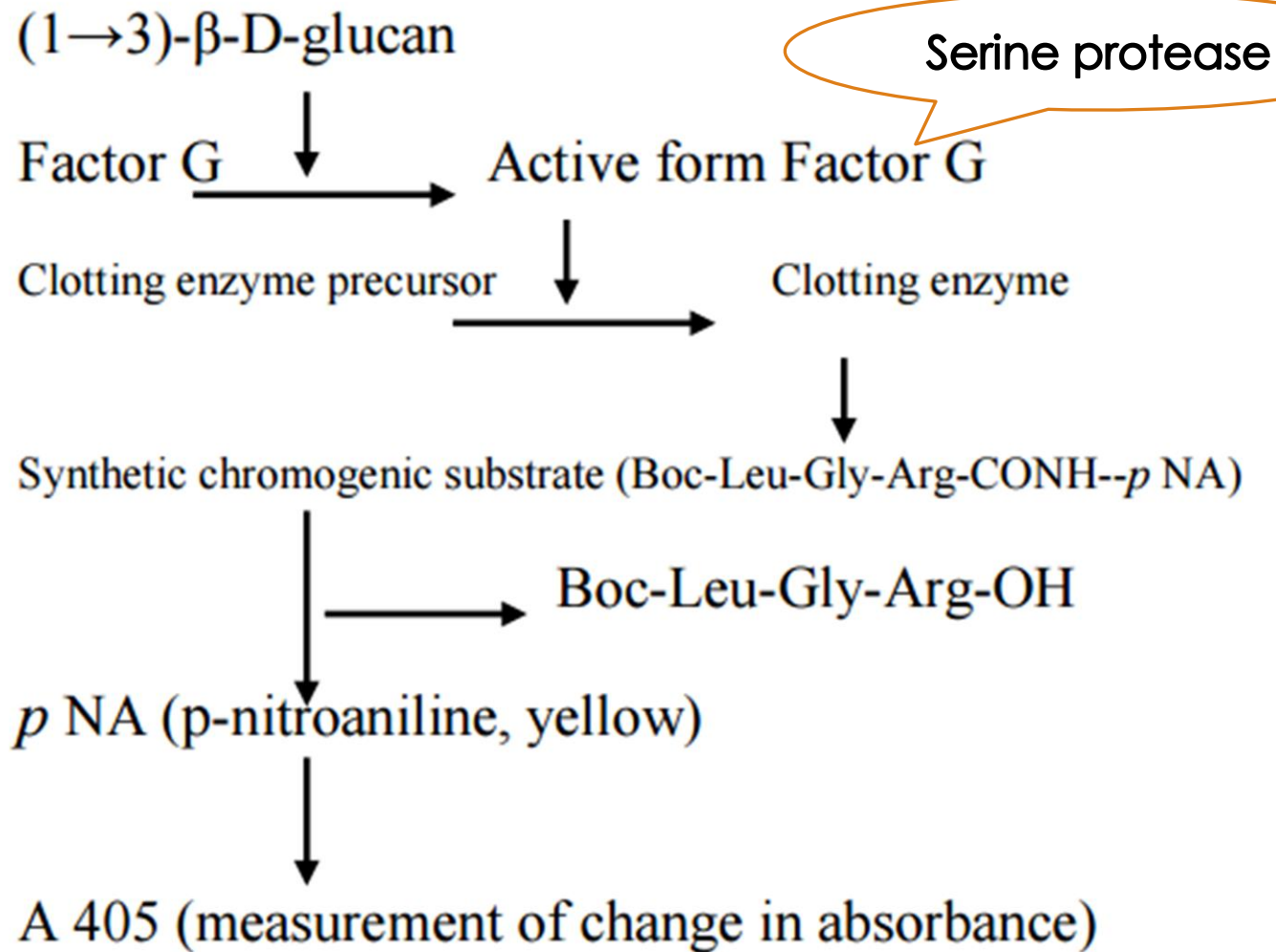
Route into blood



Fungitec® G-test ES

-NISSUI PHARMACEUTICAL CO., LTD.

Principle: dynamic nephelometry



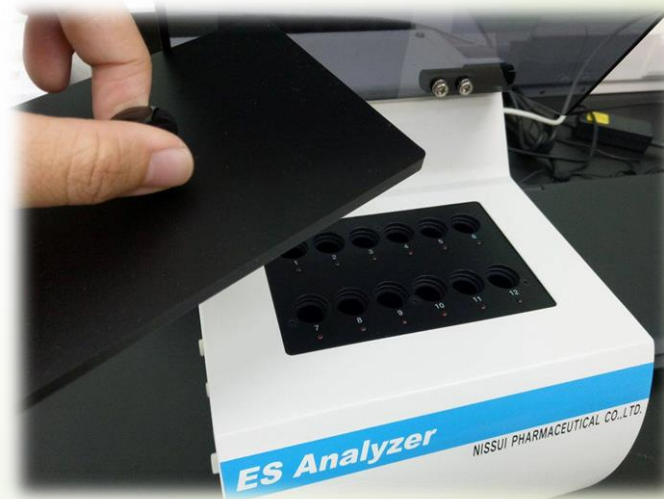
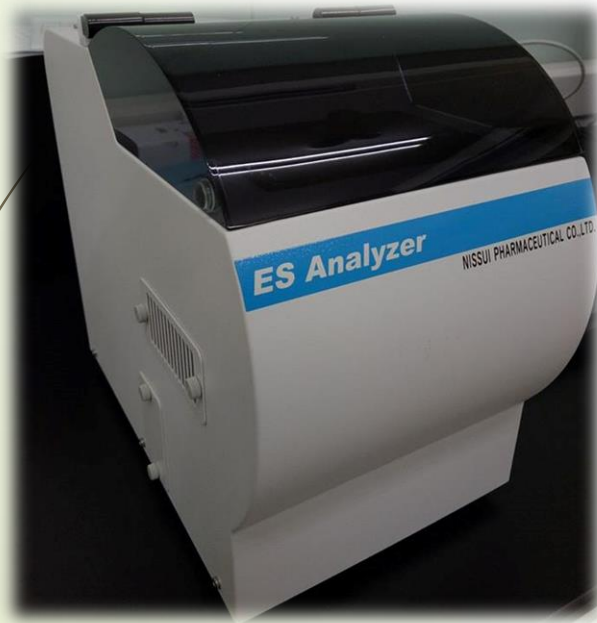
Sample Information

- Collection tube: TERUMO Heparin tube
- Type: Plasma, Heparin-Sodium
- Amount: whole blood 3 mL; plasma 0.3 mL
- Condition: Transport in 2°C ~16°C, store in -80°C



ES analyzer

- Incubator + spectrophotometer



Materials

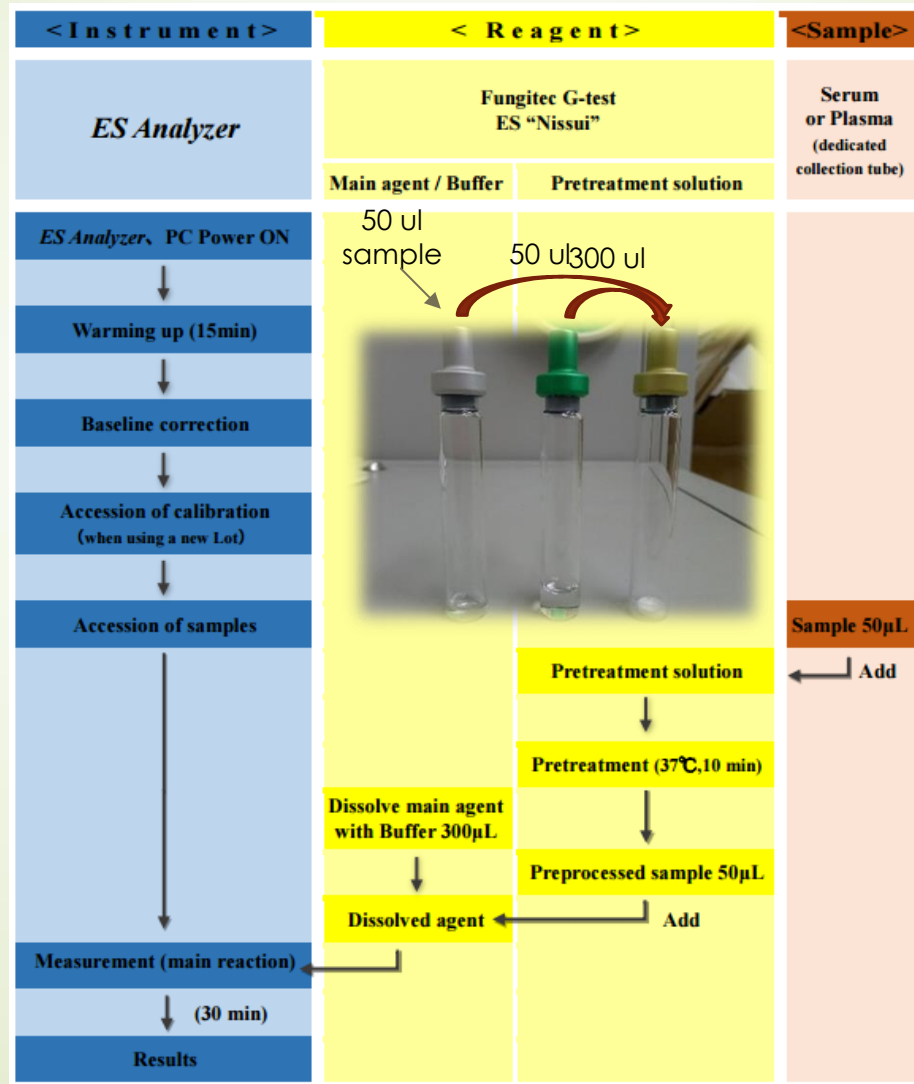
- ▶ Reagents:
 - ✓ Pretreatment solution: gray cap, alkaline, 200 μ L
 - ✓ Buffer solution: green cap
 - ✓ Main agent: gold cap, main reaction
- ▶ Toxipet tips: endotoxin and beta-glucan free



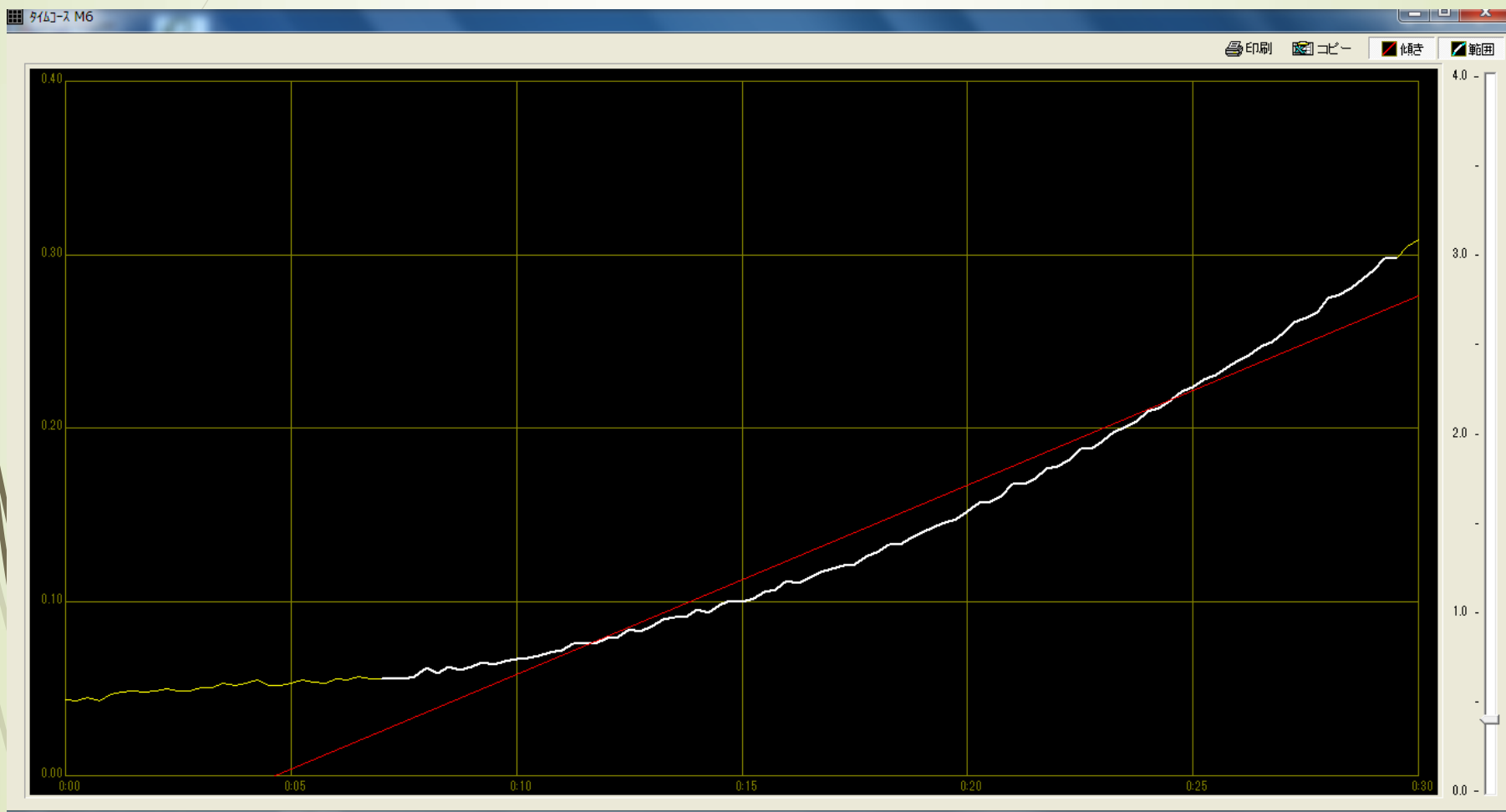
Factor G
+ Clotting enzyme
+ 呈色物質



Flowchart of measurement

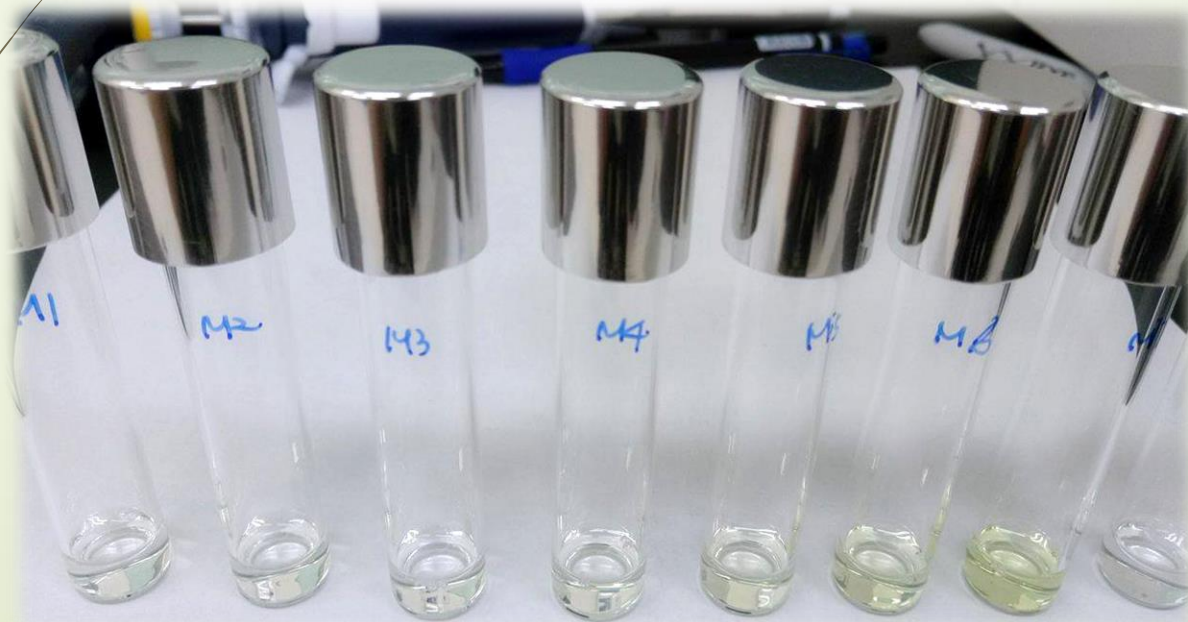


吸光度變化圖



Result

- Reportable range: 4-500 pg/mL
- >20 pg/mL: deep fungal infection



Con. (Low -----High)

Conclusion

- ▶ Advantages:
 - ✓ Detection prior to symptom
 - ✓ Specimen: serum or plasma → readily available
 - ✓ Test duration: short (30 min)
- ▶ Disadvantages:
 - ✓ Can't detect *Rhizopus*, *Mucor* etc.
 - ✓ Also present in some plants or bacteria
 - ✓ Presumptive diagnosis

Reference

- ▶ Package insert of Fungitec® G-test ES “Nissui” (1→3) -β-D-Glucan Kit
- ▶ (1→3) -β-D-Glucan Operation Manual, Nissui Pharmaceuticals Co. Ltd
- ▶ Fungitell® β-D-Glucan Assay
- ▶ β-D-Glucan Testing Is Important for Diagnosis of Invasive Fungal Infections
- ▶ Medscape: (1 → 3)-β-D-Glucan Assay
- ▶ The effects of β-glucan on human immune and cancer cells *Journal of Hematology & Oncology* 2009
- ▶ β-glucan: Crucial component of the fungal cell wall and elusive MAMP in plants
- ▶ β-D-Glucan Assay for the Diagnosis of Invasive Fungal Infections: A Meta-analysis *Clin Infect Dis* (2011) 52 (6): 750-770.
- ▶ Interactions of fungal pathogens with phagocytes, *Nature Reviews Microbiology*

Q&A

Thanks for your listening