# Challenges of laboratory hematology in COVID-19

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# Titles

- CBC
- ESR and CRP
- D-Dimer

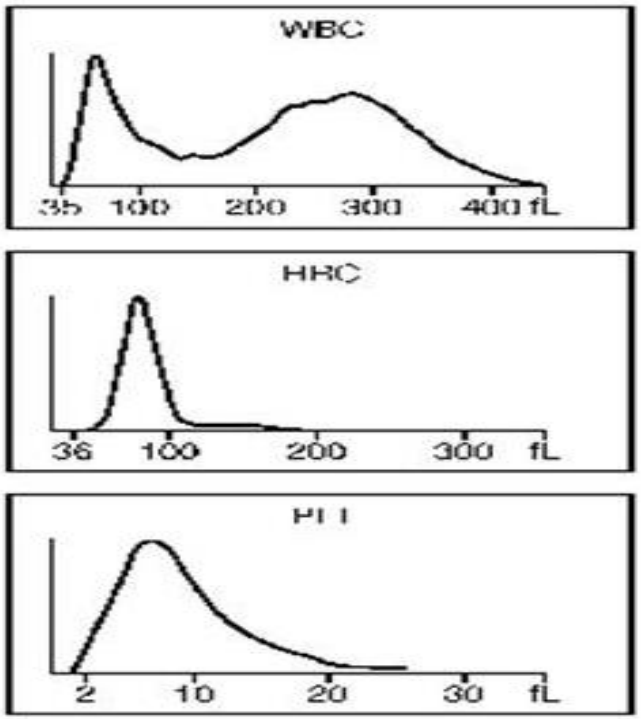
# CBC

# Differential white blood cells count (normal adult)

| | Absolute Values | Percentage. |
|---|---|---|
| Neutrophil | 2.0-7.0 x$10^9$/L | 40-75 % |
| Lymphocytes | 1.0-3.0 x$10^9$/L | 20-45 % |
| Monocytes | 0.2-1.0 x$10^9$/L | 2-10 % |
| Eosinophil | 0.02-0.5 x$10^9$/L | 1-6 % |
| Basophile | 0.02-0.1 x$10^9$/L | 0-2 % |

| Test | Result | Flags | Units |
|---|---|---|---|
| WBC | 9.143 | | 10^3/uL |
| UWBC | 9.143 | | 10^3/uL |
| RBC | 3.931 | | 10^6/uL |
| HGB | 11.17 | | g/dL |
| HCT | 32.96 | | % |
| MCV | 83.85 | | fL |
| MCH | 28.41 | | pg |
| MCHC | 33.88 | | g/dL |
| RDW | 14.32 | | % |
| RDW-SD | 40.69 | | fL |
| PLT | 223.0 | | 10^3/uL |
| MPV | 9.46 | | fL |
| NE | 67.14 | | % |
| LY | 21.77 | | % |
| MO | 9.57 | | % |
| EO | 0.78 | | % |
| BA | 0.74 | | % |
| NE# | 6.140 | | 10^3/uL |
| LY# | 1.990 | | 10^3/uL |
| MO# | 0.875 | | 10^3/uL |
| EO# | 0.071 | | 10^3/uL |
| BA# | 0.067 | | 10^3/uL |
| NRBC | 0.10 | | /100WBC |
| NRBC# | 0.009 | | 10^3/uL |
| RET | 1.858 | | % |
| RET# | 0.07305 | | 10^6/uL |
| MRV | 100.72 | | fL |
| IRF | 0.387 | | |

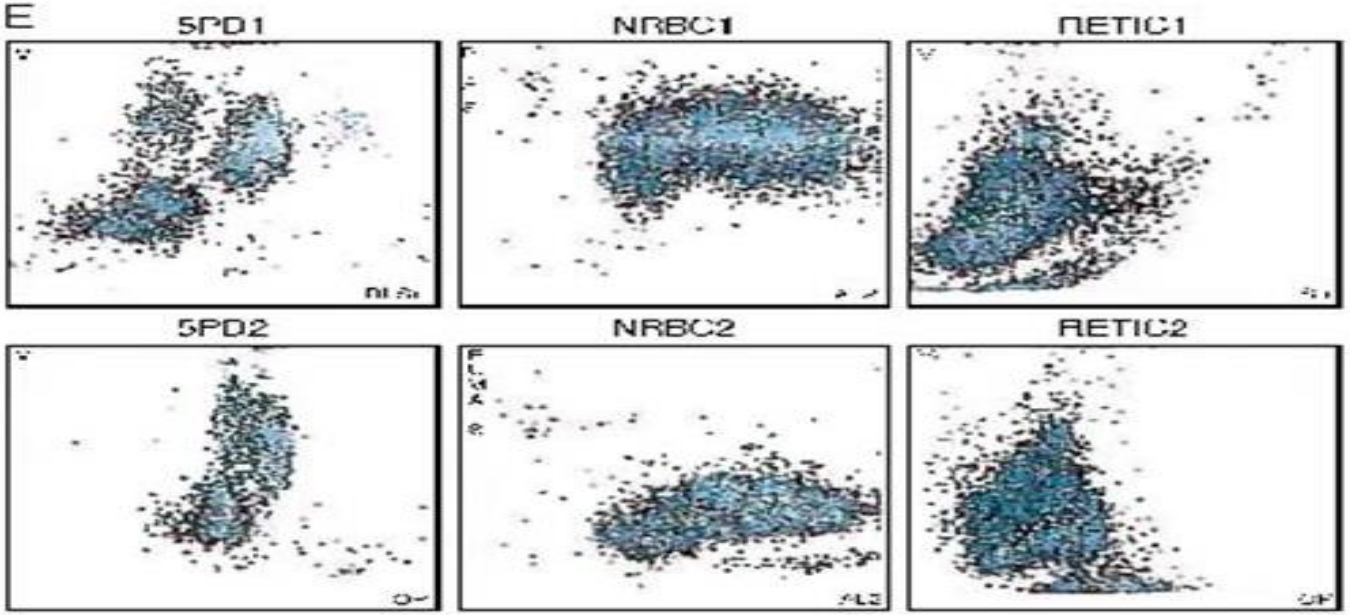
D




F

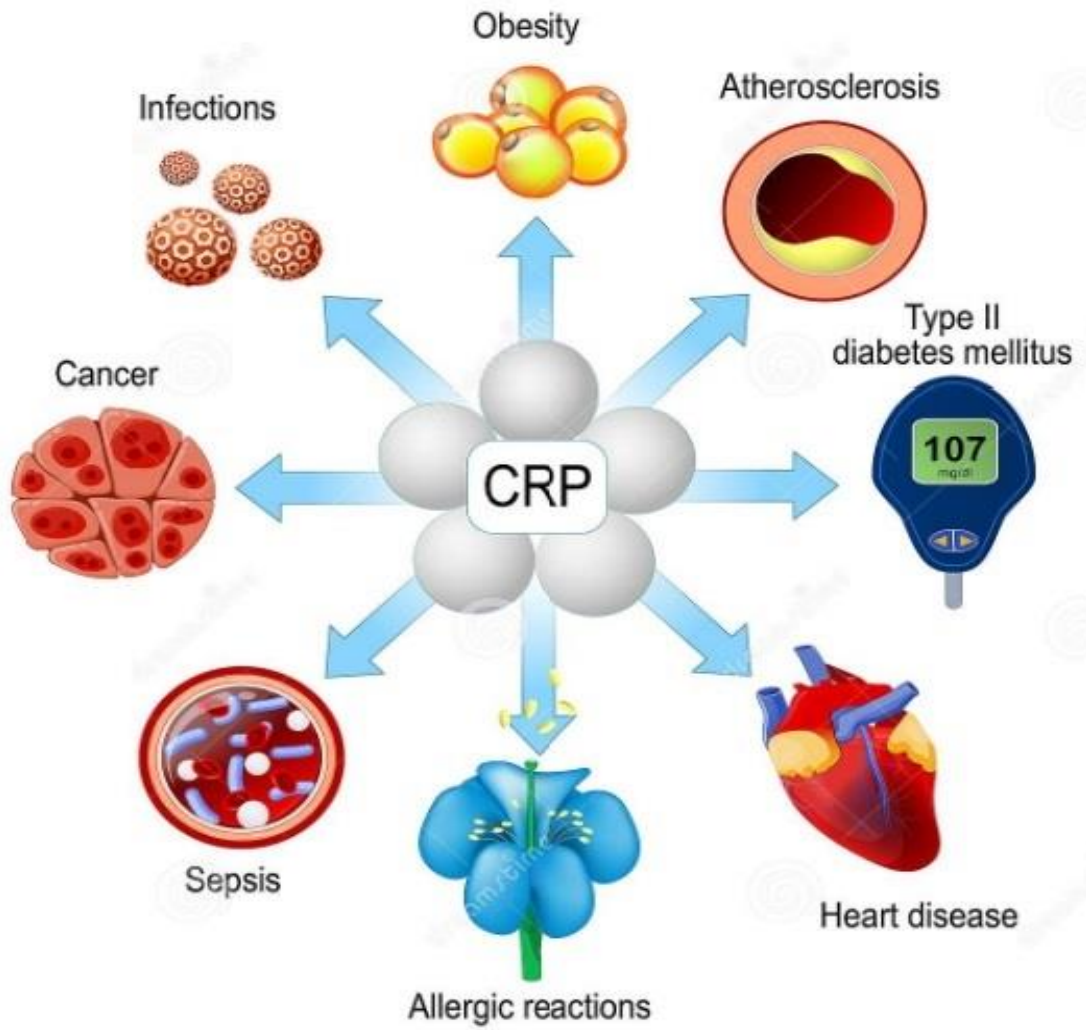
Suspect

E



# CRP and ESR

# Increased levels of C-reactive protein



- The **CRP** measured in the range from **10 to 1000 mg/L.** This test may be used to detect inflammation.

- The **hs-CRP** test accurately detects lower levels of the protein than the standard CRP test. It measures CRP in the range from **0.5 to 10 mg/L**. This test is used to evaluate individuals for risk of CVD.

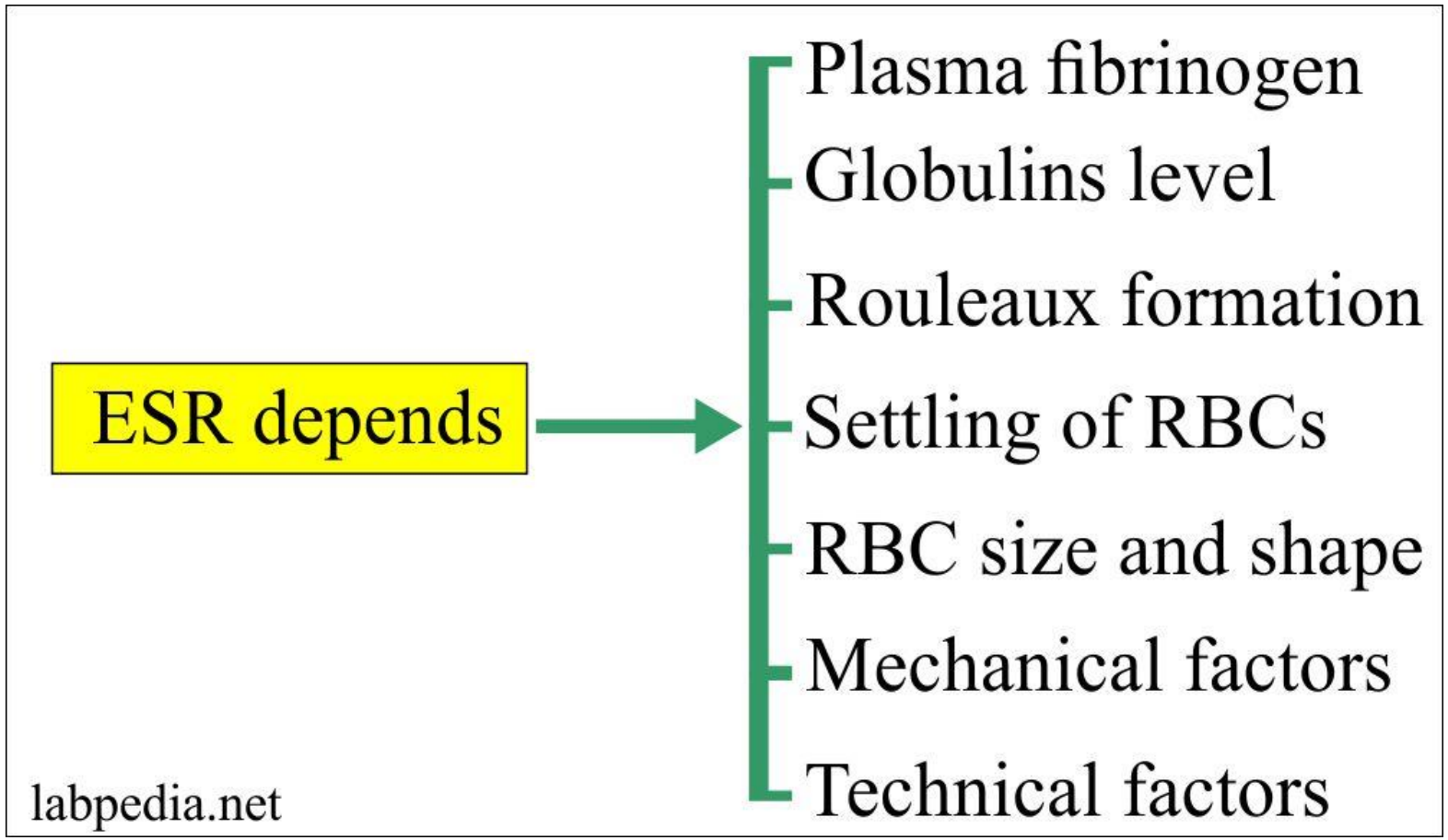
| hs-CRP Value | Cardiovascular Disease Risk Level* |
| --- | --- |
| < 1 mg/L | **low** risk |
| 1-3 mg/L | **average** risk |
| > 3 mg/L | **high** risk |

| DVT | hs-CRP (mg/L) Median (Min-Max) ($p$=0.160) | D-Dimer (μg/L) Median (Min-Max) ($p$=0.619) |
|---|---|---|
| Positive | 62.90 (17.10–301.0) | 5030 (1890–5030) |
| Negative | 46.25 (3.30–301.0) | 4650 (920–5030) |

**Abbreviations:** DVT, deep vein thrombosis; hs-CRP, high-sensitivity C-reactive protein; SD, standard deviation.

Table 1. Reference values for ESR.

| Age | Male | Female |
|---|---|---|
| 0-50 | <15 mm/h | <20 mm/h |
| 51-85 | <20 mm/h | <30 mm/h |
| >85 | <30 mm/h | <42 mm/h |


ESR depends
Plasma fibrinogen
Globulins level
Rouleaux formation
Settling of RBCs
RBC size and shape
Mechanical factors
Technical factors
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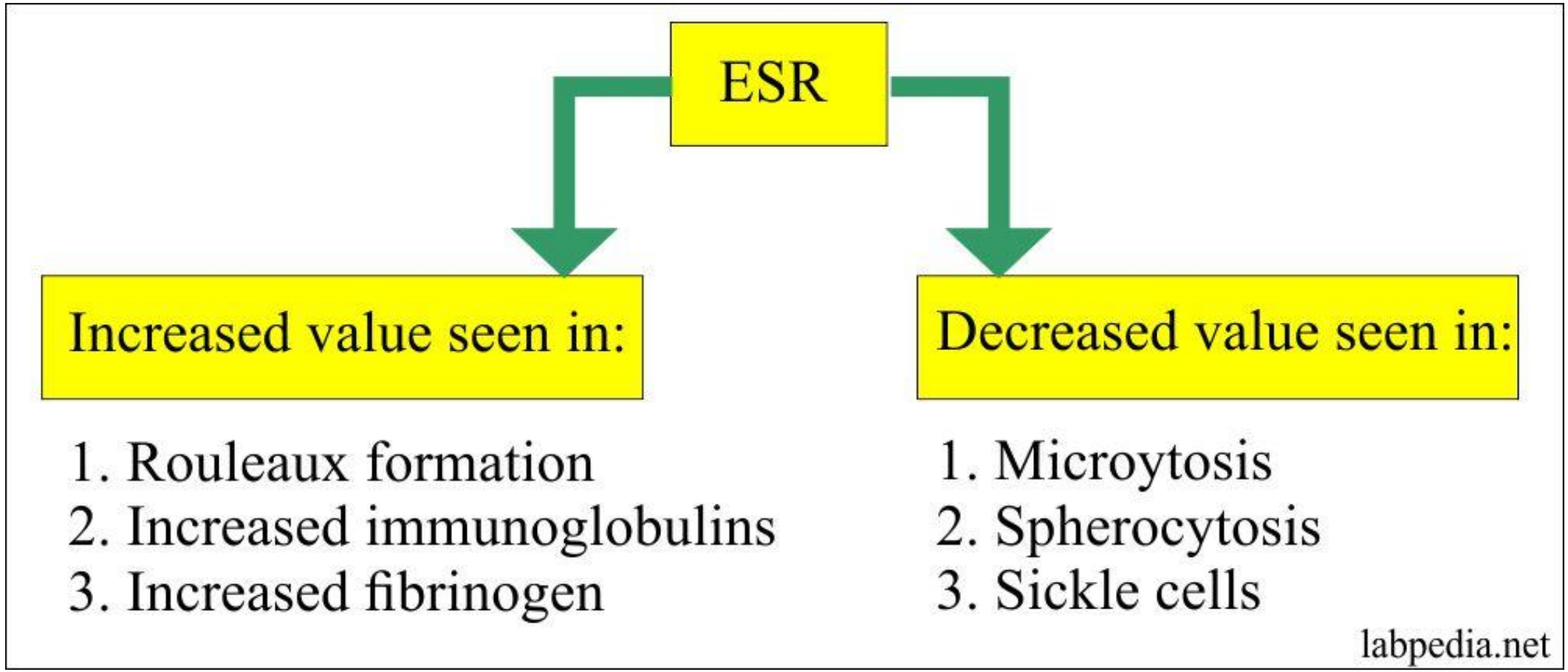
ESR
Increased value seen in:
1. Rouleaux formation
2. Increased immunoglobulins
3. Increased fibrinogen
Decreased value seen in:
1. Microytosis
2. Spherocytosis
3. Sickle cells
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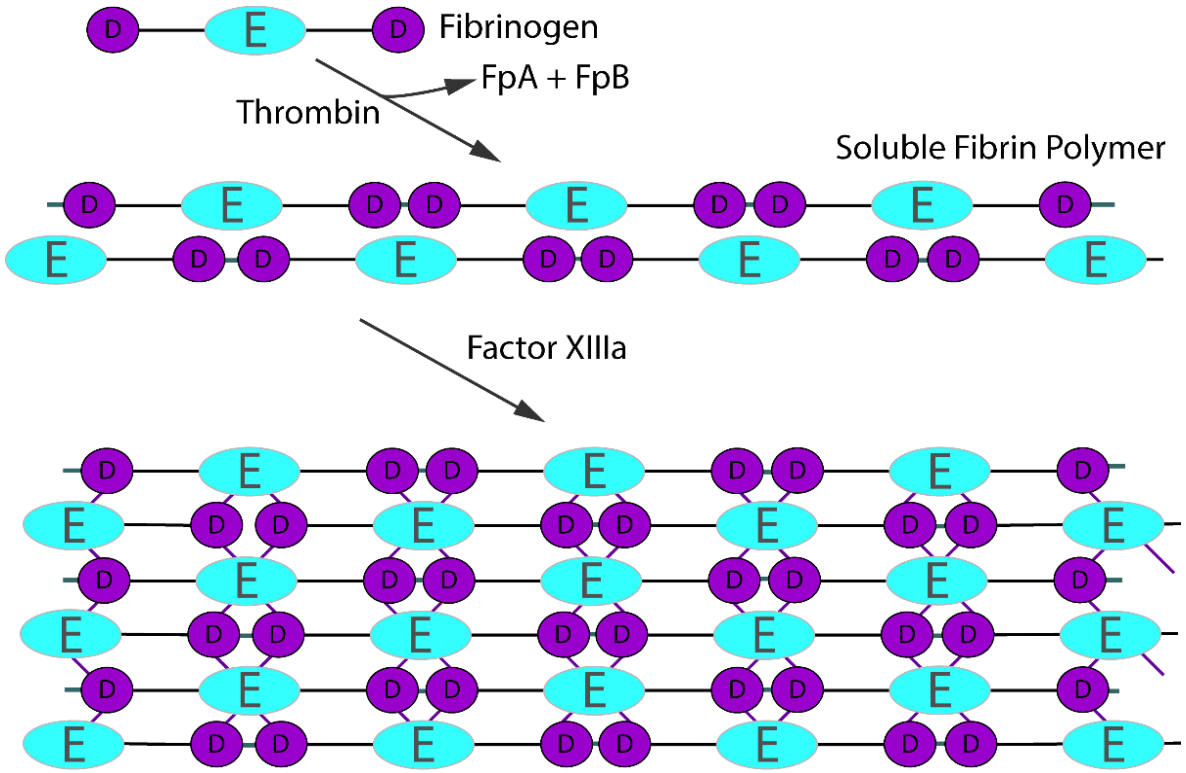
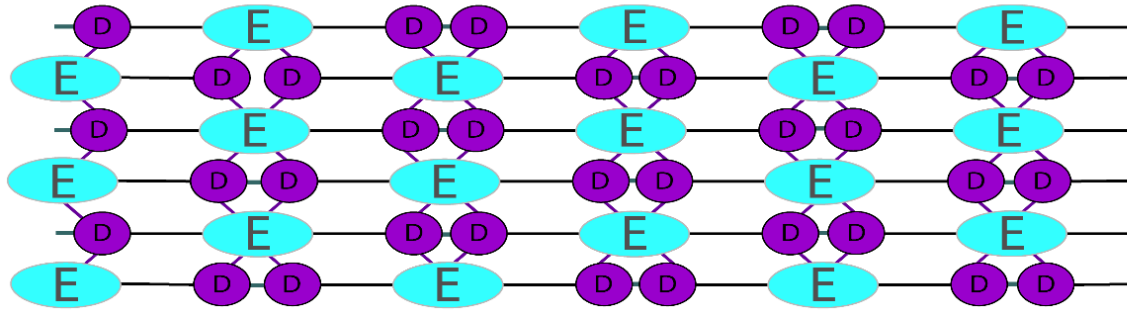
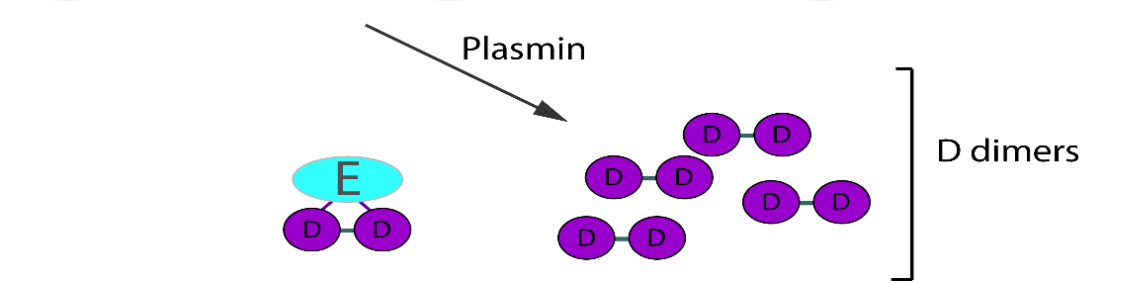
# D-Dimer


Fibrinogen
FpA + FpB
Thrombin
Soluble Fibrin Polymer
Factor XIIIa




Plasmin
D dimers

Thanks