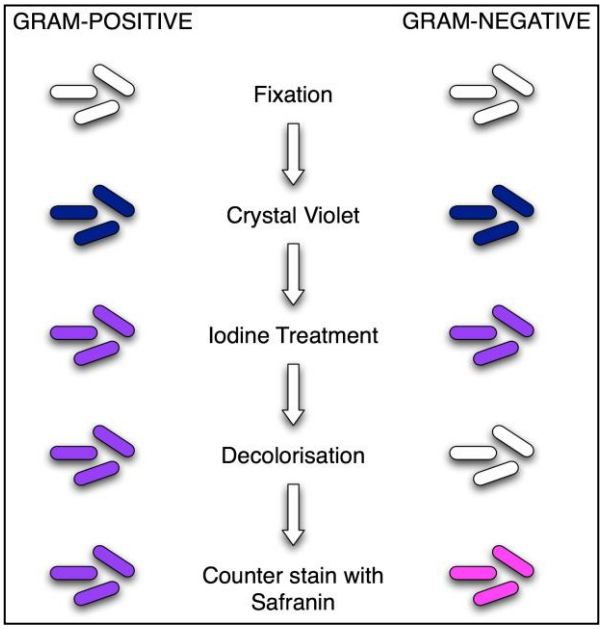
- **The problem of this week**: neutropenic patient presenting mainly with fever and septicemia which resulted in septic shock.
- **Septic shock**: results from arterial vasodilation and venous blood pooling that stems from systemic immune response to microbial infection.
- In a patient presenting with septic shock, a blood sample must be taken and culture is done.
- **Question**: why do we need to culture the blood?
  - **Answer**: because the amount of organism in the blood is not enough to be detected or examined directly by the microscope, so we need the organism to multiply and grow.
- **Procedure**:
  - Tie a tourniquet around the patient's arm.
  - Clean the area with 70% isopropyl alcohol (defatting: removing fat present on the skin at the site where blood will be taken). Start cleaning from the center and going out in one direction.
  - Insert the vacutainer in the median cubital vein. This vacutainer allows the blood to be directly withdrawn from the patient to blood culture bottle.
  - A specific amount of blood will be withdrawn by a specific pressure present inside the blood culture bottle.
  - There are different types type of culture media bottle each used for a specific age of the individual.

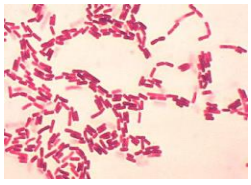
Children		
<2 years	2ml	In one set* of bottles
2-5 years	8ml	In two sets of bottles
6-10	12ml	
11-15	20ml	
>15 years and adults	30ml	In three sets of bottles
*** = sets of bottles = aerobic & anaerobic**		

  - The culture bottle has two types of media (solid & liquid). In addition, it contains beads which have the capacity to absorb CO_2. After blood is withdrawn from the patient directly into the bottle it will be placed in an incubator → if an organism is present and it produces and multiplies → CO_2 will be released and taken by those beads → and this is going to be detected by the machine.
  - **If the result of the culture is (-)** → a blood smear will be taken and examined → if still (-) → blood smear will be examined again after 48 hours, 72 hours, 1 weak & 21 days → if the organism is detected in the smear → a sub-culture will be produced.
  - **Note**: the blood smear will be examined under the microscope after it is stained by Gram stain. The procedure of Gram stain is shown in the figure.



- **Opportunistic infection**: is an infection which is caused by opportunistic microorganisms that usually do not cause disease in healthy host (one with a healthy immune system). A compromised immune system, however, presents an opportunity for the pathogen to infect.
- **Nosocomial infection (hospital-acquired)**: is an infection whose development is favored by a hospital environment, such as one acquired by a patient during a hospital visit or one developing among hospital staff.

Examples on these organisms include

Pseudomonas aeruginosa	Candida albicans	Staphylococcus epidermidis
Also know as blue pus organism because they produce blue-green pigment (pyoverdin-pyocyanin) which can be seen in patient's wound or discharges.	It belongs to fungi group which is subdivide to: single yeast cells & multicellular molds. candida belongs to the unicellular yeast cells	it is a normal microbiotaa found on the skin
 It is a Gram (-) bacilli which is strictly aerobic (needs oxygen or otherwise it dies).	It needs to be grown on sabrod media (which is rich in carbohydrates). it has a characteristic mousy, beer smell	to differentiate between it and S.aureus → S.aureus is coagulase (+) & DNAse (+) while S.epidermidis is coagulase (-) & DNAse (-)
 When this organism is grown on any uncolored culture in an aeroobic condition, the pigment will be produced.	Under the microscope: they are discribed as yeast cells or Gram (+) big oval and small rounded cells	It is Gram (+) cocci arranged in clusters (grape-like).
It has a chracteristic grape-like odor	It multiplies by budding التبرعم	Staph is catalase (+) while strept is catalase negative. when bubbles appear by adding the microorganism to H_2O_2 it means that it is catalase (+)
 It is oxidase (+) although all gram (-) enterobacteriaceae are oxidase (-)	When culture is produced, agglutination test or germ tube can be done to identfy if candida belongs to albicans species or not. candida albicans will for germ tube