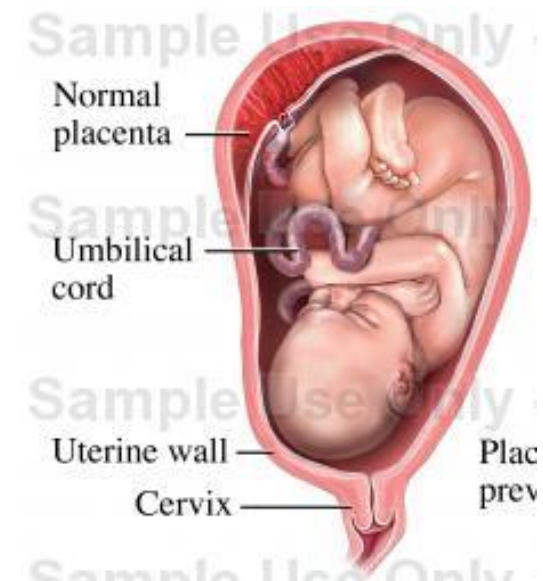


Pregnancy Test

(Detecting Human chorionic gonadotropin in urine)

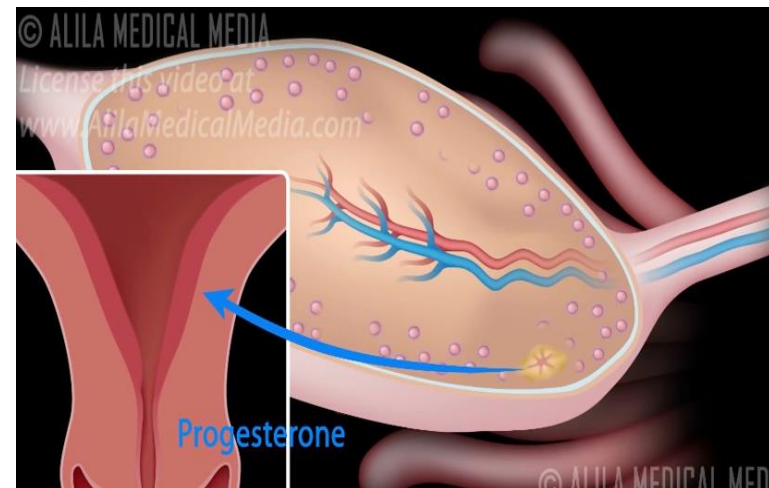
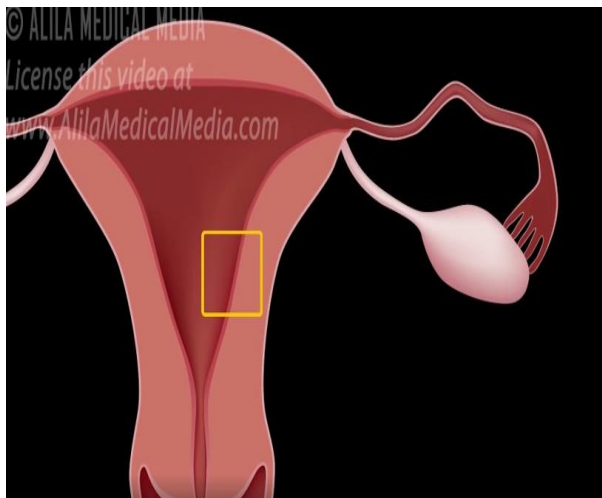
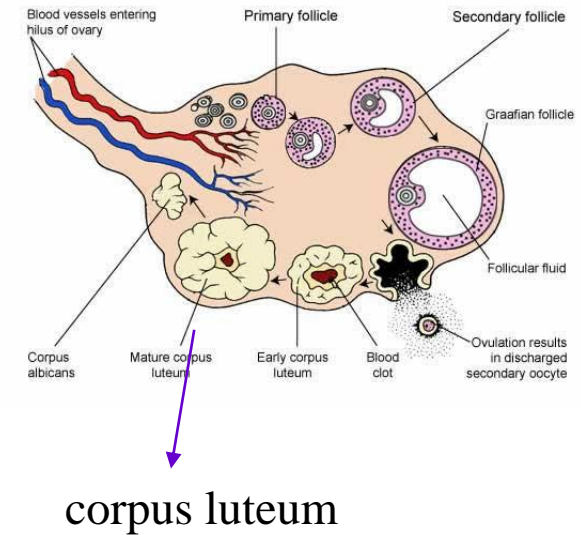
- Human chorionic gonadotropin:

- Human chorionic gonadotropin (hCG) is a glycoprotein hormone produced by a portion of the placenta following implantation.
- The qualitative hCG test can be used to see if a woman is pregnant or not.



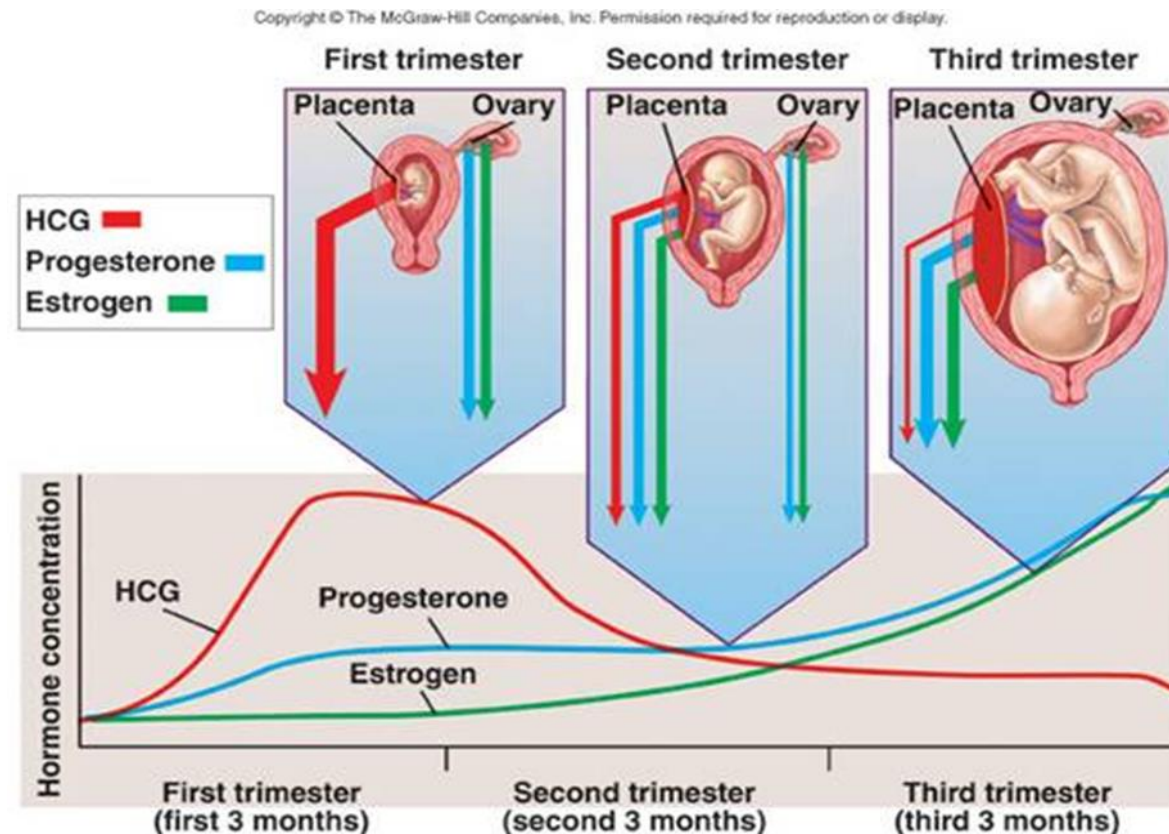
-hCG Role in pregnancy:

- **Promotes the maintenance of the corpus luteum (which means yellow body in Latin) during the beginning of pregnancy in the ovary** → This allows the corpus luteum to secrete the progesterone during the first trimester. Progesterone enriches the uterus with a thick lining of blood vessels and capillaries so that it can sustain the growing fetus.
- Human chorionic gonadotropin also plays a role in **cellular differentiation/proliferation**.



- hCG levels :

- During the first trimester, hCG levels rise steadily and rapidly, peaking around 10 weeks' gestation, and subsequently taper off to less than 10% of peak levels and **remain constant** for the duration of the pregnancy.



- hCG levels in pregnant and non pregnant women:

- In pregnant women, depressed urine hCG levels may indicate **threatened abortion**.
- In non pregnant women, elevated levels of hCG can lead to a cancer diagnosis since some cancerous tumors produce this hormone.

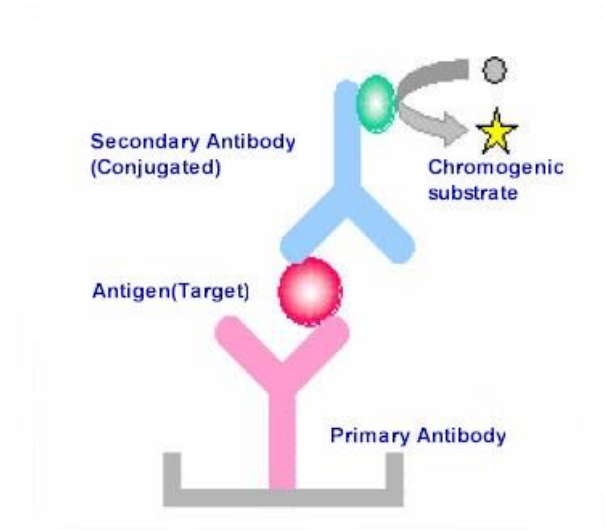
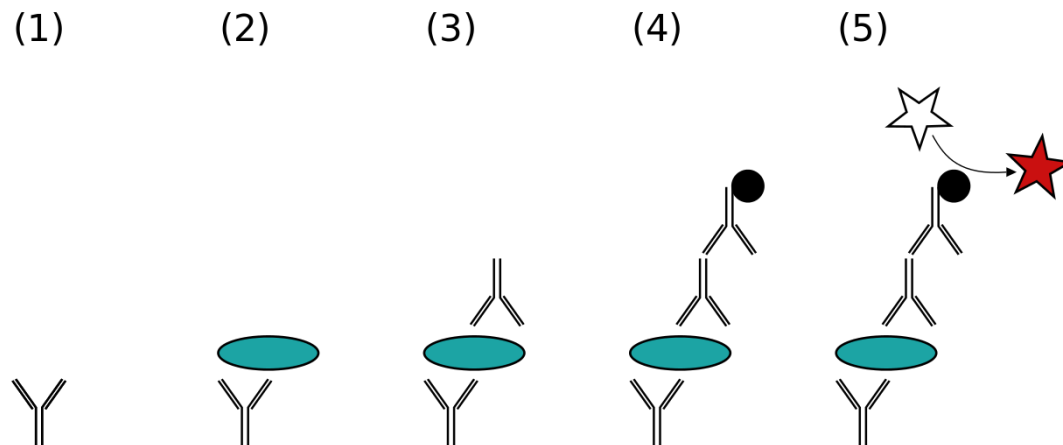
Practical Part

- Objective:

- To detect and confirm pregnancy.

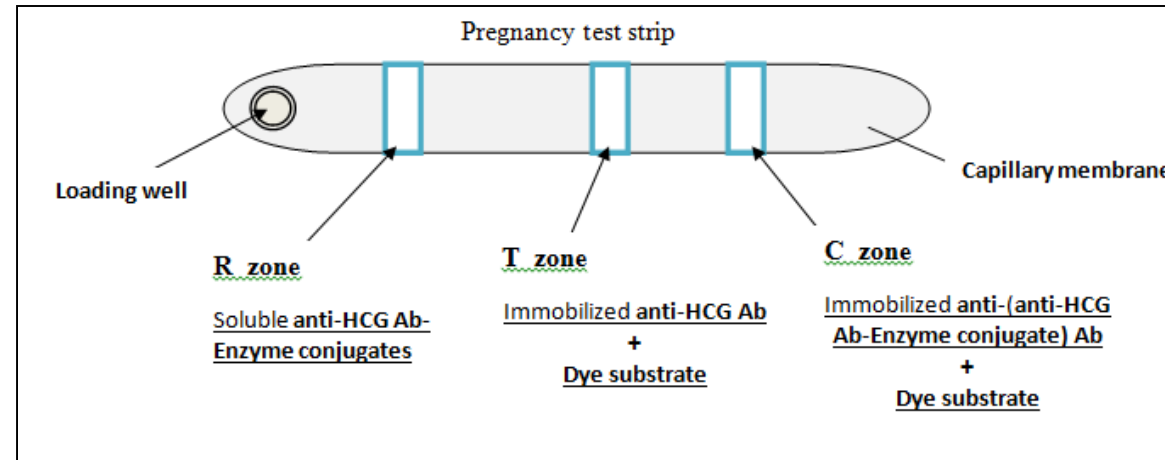
- Principle:

- Urine pregnancy tests use the enzyme-linked immunosorbent assay (ELISA) technique, using a highly specific monoclonal antibody directed against the β -subunit of human chorionic gonadotropin (β -hCG).



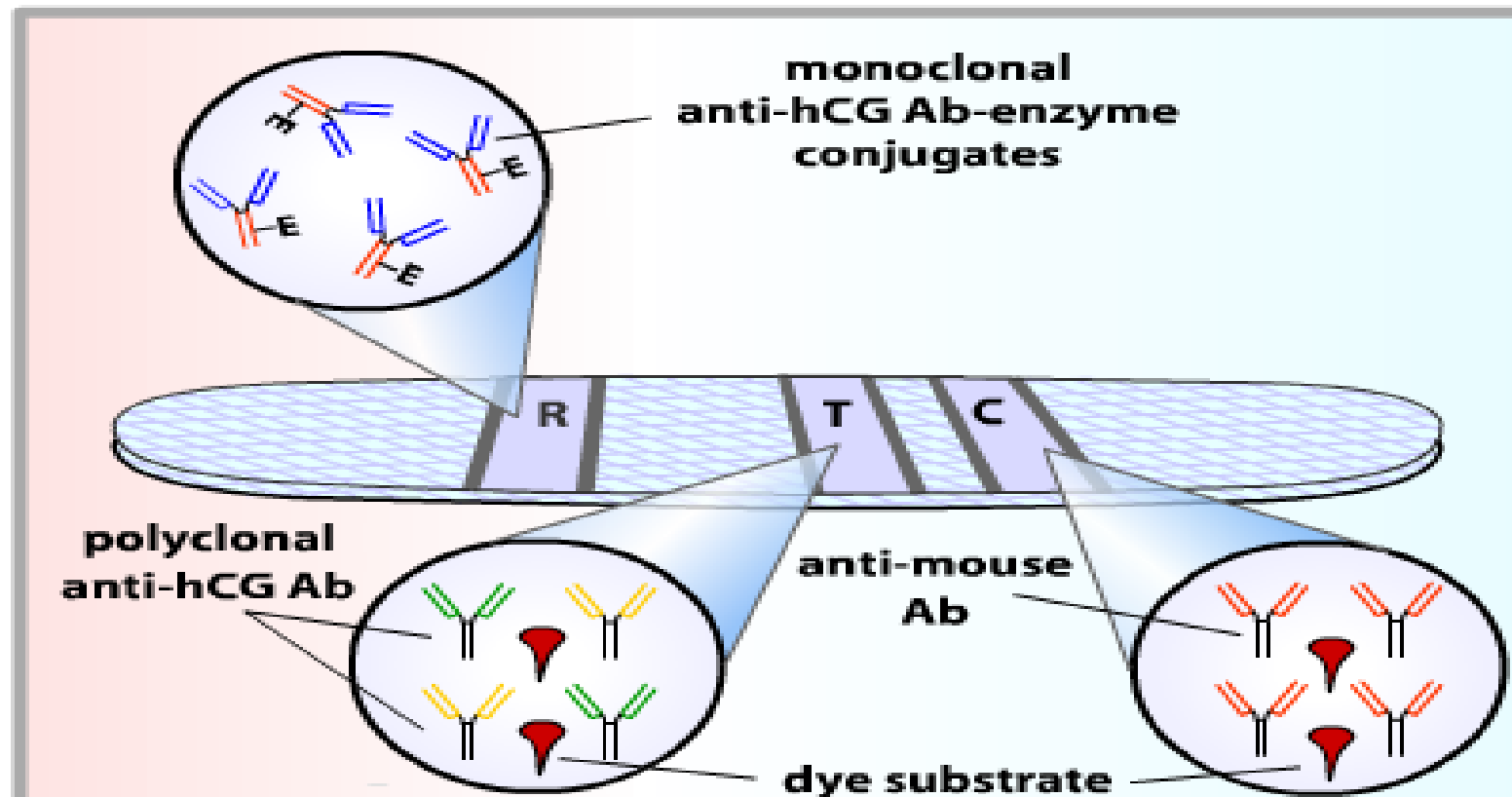
- Principle cont':

- Pregnancy test strip consist of :



1. **The reaction zone (R zone):** soluble anti-hCG antibody-enzyme conjugate. These are mouse monoclonal antibodies linked to an enzyme.
2. **The test zone (T zone):** contains immobilized polyclonal mixture of anti-hCG antibody + dye substrate.
3. **The control zone (C zone):** the dye substrates + anti-mouse antibodies can recognize epitopes on the mouse monoclonal . (control zone act as control sample)

- Different zones in pregnancy test strip:

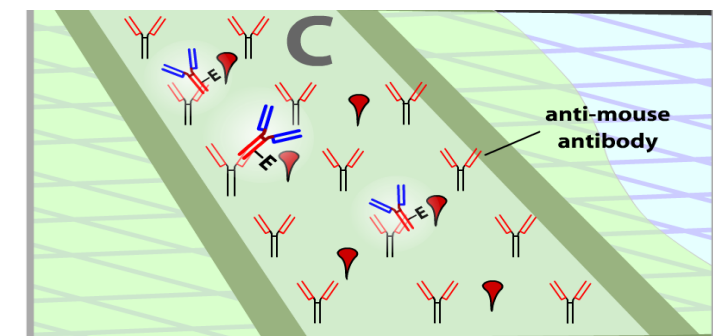
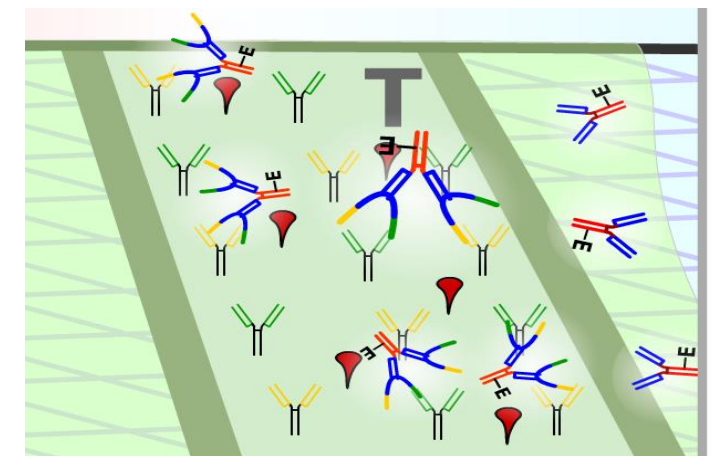
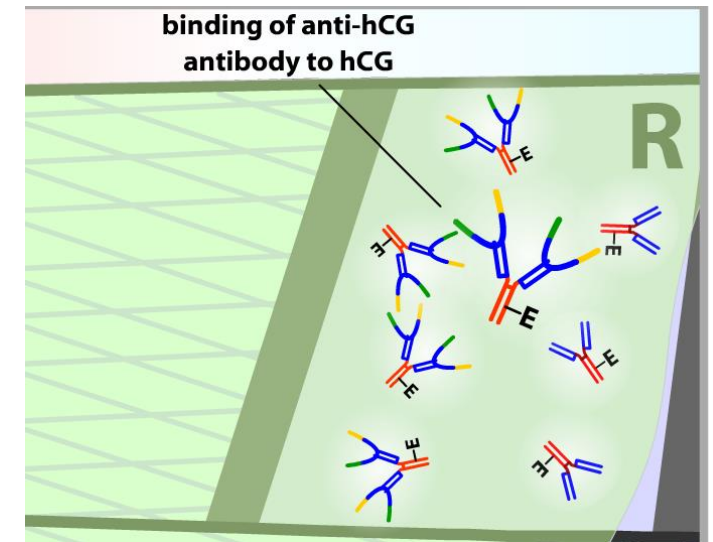


- A nice animation explain the principle of pregnancy test :
<http://www.sumanasinc.com/webcontent/animations/content/pregtest.html>

- Principle cont':

- Sequence of events in pregnant women:

1. A few drops of urine is transferred to the specimen well (loading well).
2. Urine will flow by capillary action from loading well towards R zone carrying along with it the HCG hormone.
3. At R zone, the HCG hormone will react and bind with the **soluble anti-HCG Ab-enzyme conjugates** forming a complex of **HCG hormone - HCG Ab - enzyme conjugate**. (excess Ab will not bind)
4. This complex will migrate towards T zone.
5. At T zone, this complex will react and bind with the **immobilized anti-HCG Ab**, once it binds with the immobilized Ab, this will activate the enzyme thus allowing to act on the dye substrate and produce a **color** that indicates a positive pregnancy result.
6. The excess soluble HCG hormone - HCG Ab - enzyme conjugates complex will pass from T zone to C zone.
7. At C zone, this complex will react and bind with **the immobilized anti-(anti-HCG Ab-Enzyme conjugates) Ab** there, once bound it will activate the enzyme, thus allowing to act on the dye substrate and produce the **color** detecting at C **zone which is an indicator of the activity or reliability of the test**.



-Specimen Collection and Preparation:

- Collect at least 1 mL of urine in a clean, dry, plastic or glass container with no preservatives.
- Specimens may be collected at any time of the day, however the **first morning sample** generally has the **highest** concentration of hCG and is the specimen of choice.

- Procedure:

- NOTE: Bring test components and specimens to room temperature prior to testing.
1. Remove a Testing Device from the foil pouch by tearing at the "notch" and place it on a level surface.
 2. Holding a Sample Dropper vertically, add exactly three drops of the urine specimen to the sample well.
 3. Read results at time indicated in procedure.

-Results:

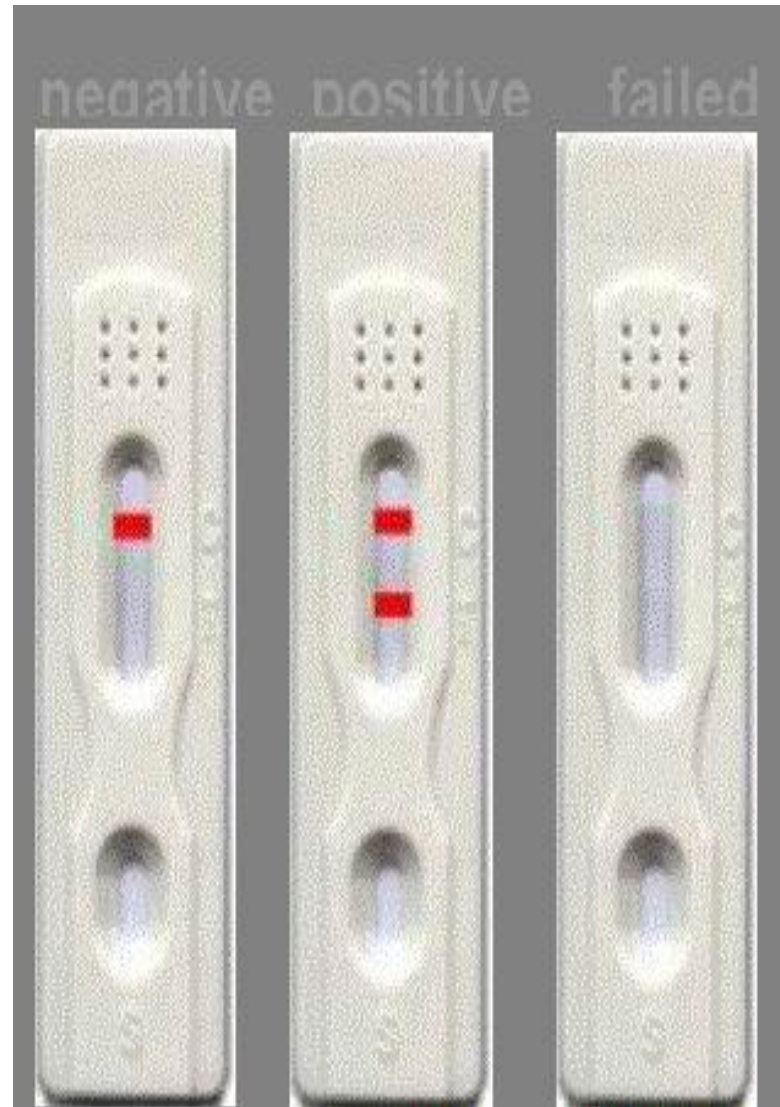
- Follow the instructions on the reagent package insert provided by the instructor to properly perform the test.
- **Interpretation of Results:**
- Based on the package insert correctly interpret the results of the pregnancy test on the a patient sample.
- Record results as “Positive” or “Negative”

SAMPLE TESTED	RESULT
1	

-Discussion:

- Comment on the results and state whether the sample is pregnant or not .

-Urine test kit:



Osmolality in Serum and Urine

- Osmolality and osmolarity:

- **Osmolality** is a measure of the moles (or osmoles) of solute per total weight of solvent in Kg. → expressed as (mol/kg, molal, mOsm/kg).
- **Osmolarity** is a measure of the moles (or osmoles) of solute per unite of total volume in L.
→ expressed as (mol/L, M).

- osmolality test:

- The osmolality test provides a snapshot of the number of solutes present in the blood (serum), urine, or stool.
- **Osmometer**: is a device for measuring the osmotic strength of a solution.

- Serum osmolality:

- Serum osmolality is primarily ordered to investigate hyponatremia (low sodium in serum).
- Higher than normal levels may be due to:
 - ➔ High sodium level (hypernatremia).
- Lower than normal levels may be due to:
 - ➔ Low sodium level (hyponatremia).

-Urine osmolality:

- Urine osmolality is frequently ordered along with serum osmolality.
- This test helps check your **body's water balance** and **urine concentration**.
- **Osmolality** is a more exact measurement of urine concentration than the urine specific gravity test.

-Urine osmolality:

- Greater-than-normal measurements may indicate:

➔ Loss of body fluids (**dehydration**).

- Lower-than-normal measurements may indicate:

➔ Kidney failure.

➔ Diabetes insipidus .