Types of cell cultures

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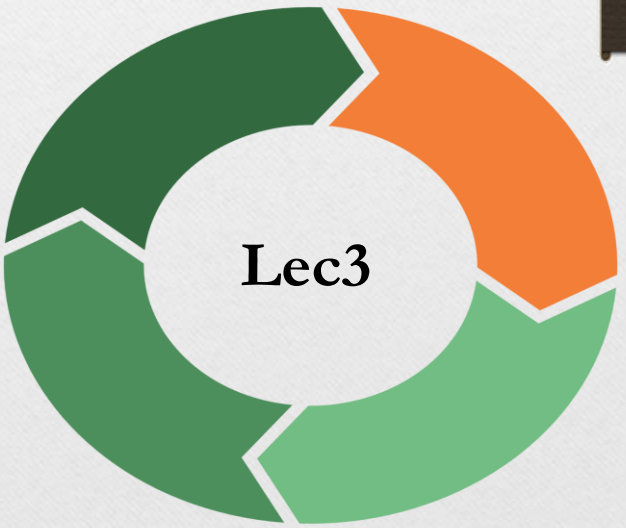

A- Primary cell culture

The growth of cells separate from the parental tissue in culture medium using suitable glass or plastic containers is called Primary Cell Culture. There are two types of it:

1- Monolayer cultures or Adherent cells; Cells shown to require the **attachment for growth**. They are usually derived from tissues of organs such as **kidney**.

2- Suspension Culture; **Cells which do not require attachment** for growth. They are derived from cells of the **blood system**.

3 -Micro Carrier Beads :

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- Micro carrier beads are small spherical particles with diameter 90-300 Mm
- Made up of dextran or glass.
- Increase the number of adherent cells per flask.
- Come in a range of and sizes.
- The cells grow at a very high density, which rapidly exhausts the medium.
- At the recommended concentration when the microcarriers are suspended they provide 0.24 m2 area for every 100 ml of culture flask.

Steps of Primary Cell Culture

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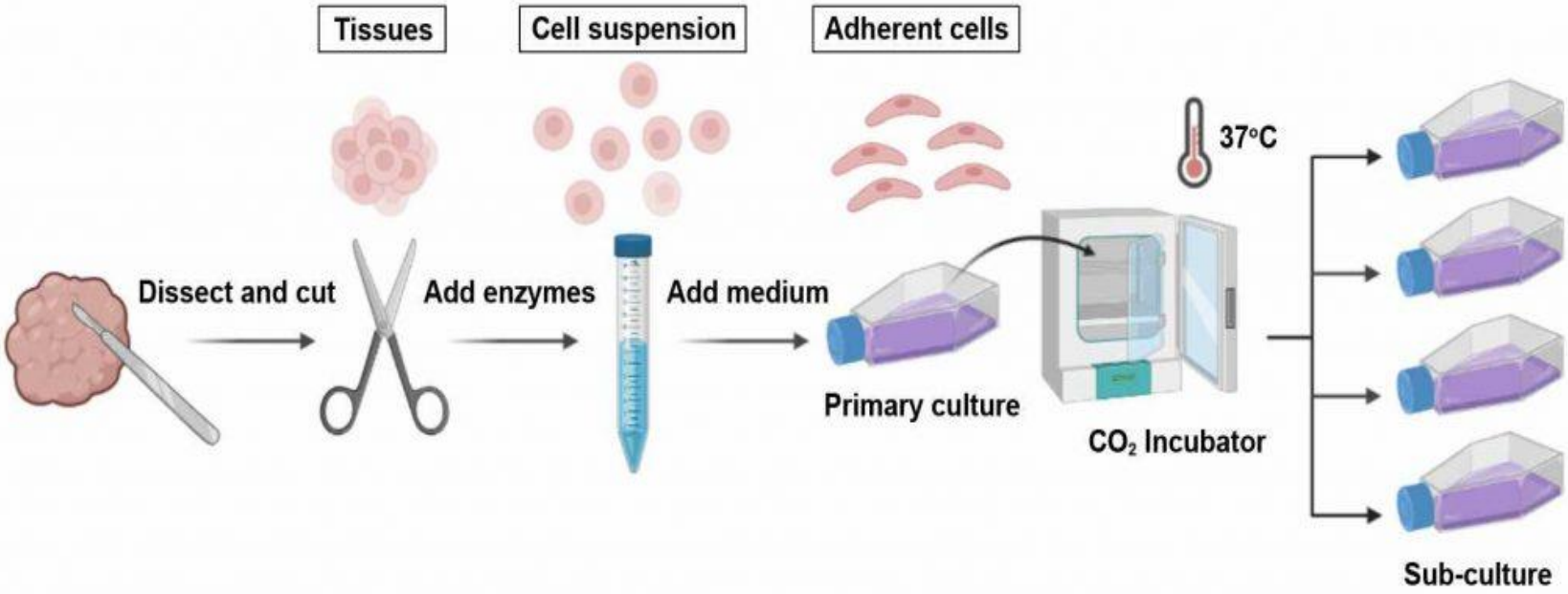
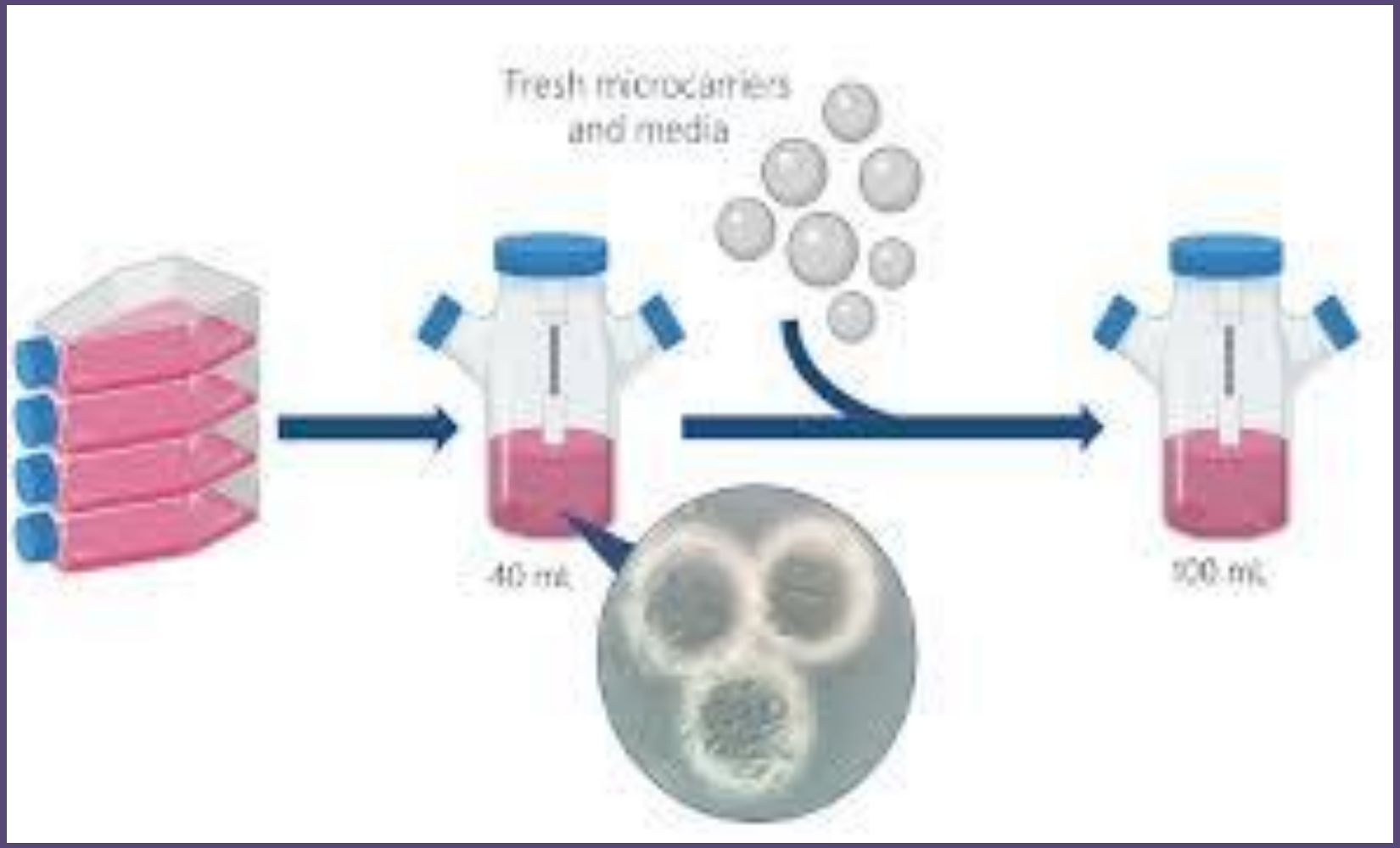



Fresh microcarriers
and media
40 mL
100 mL

B- Secondary cell cultures or cell line

When a primary culture is sub-cultured, it becomes known as secondary culture or cell line. Subculture (or passage); is the transfer of cells from one culture vessel to another culture vessel.

This system has the **advantages** over the static **monolayer culture**:

- It provides an increase in the surface area
- Provides constant gentle agitation of the medium
- Provides increased ratio of surface area of medium to its volume

advantages in propagation of cells by **suspension culture** method:

- The process of propagation is much faster.
- The frequent replacement of the medium is not required.
- Have a short lag period.
- Treatment with trypsin is not required.
- A homogenous suspension of cells is obtained.
- The maintenance of them is easy and bulk production of the cells is easily achieved.
- Scale-up is also very convenient.

There are two types of Cell Line or Cell Strain:

Finite cell Lines	Continuous Cell Lines
• Have a limited life span	• Have unlimited life span, Exhibit heterogeneity
• They grow in monolayer form	• They grow in monolayer or suspension form
• Exhibit the property of contact inhibition	• Absence of contact inhibition
• The growth rate is slow	• The growth rate is rapid
• The doubling time is around 24-96 hours	• The doubling time is 12-24 hours

Scale up of animal cell culture

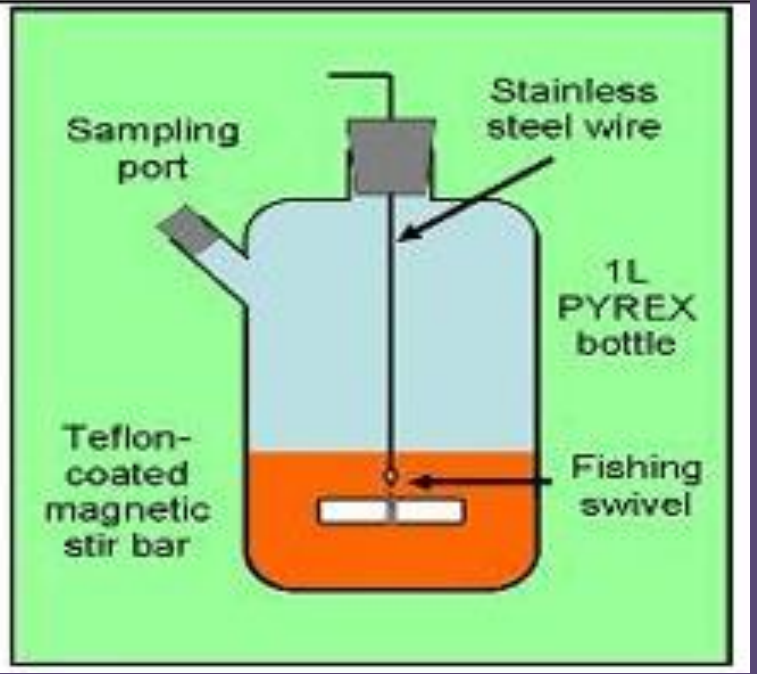
Scaling up is the modifying a laboratory procedure, so that it can be used on an industrial scale.

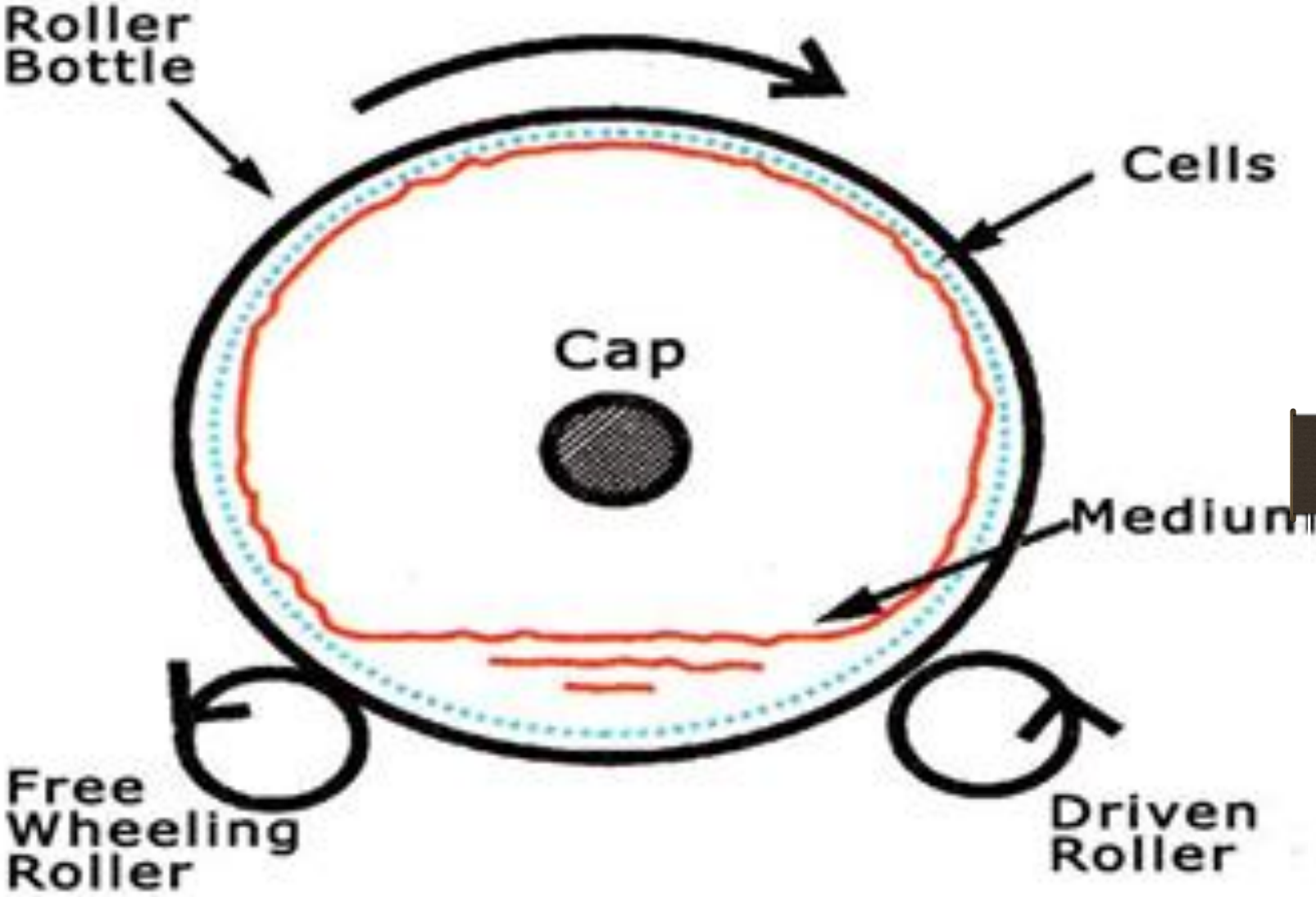
For scale-up of animal cell culture process:

- with Micro Carrier Beads are used **for adherent** cells Roller Bottles
- The Roller bottles **provide a total curved surface** area of the micro carrier beads for growth.
- The continuous rotation of the bottles **helps to provide medium** to the entire cell monolayer in culture.

Spinner flasks are used for suspension cultures.

The spinner flask consists of flat surface glass flask is fitted with a Teflon paddle that continuously turns and agitates the medium. This stirring of the medium improves gas exchange in the cells in culture. The spinner flask used at commercial scale consists of one or more side arms for taking out samples.


Sampling port
Stainless steel wire
1L PYREX bottle
Teflon-coated magnetic stir bar
Fishing swivel


Roller
Bottle
Cells
Cap
Medium
Free
Wheeling
Roller
Driven
Roller

نشاط

في أحد المختبرات، كان الباحثون يحاولون دراسة تأثير دواء جديد على الخلايا. قال أحدهم :"هل نستخدم خلايا مأخوذة مباشرة من الأنسجة الحية، أم خلايا تم زراعتها مسبقًا في المختبر

Applications of animal cell culture:

1. They are used as substitute hosts to study the pattern of viral infection.
2. They are used in the manufacture of vaccines, antibodies, hormones, interferon, vitamins, steroids, pharmaceutical drugs…etc.
3. They are good tools for testing the potency of drugs.
4. They are served as models to study the metabolism of various substances.
5. They are used in study of the effects of toxins and contaminants.
6. Cancer research, which requires the study of uncontrolled cell division in cultures.
7. Cell fusion techniques.