

Lec1 \ Animal Tissue Culture

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"تخيلوا أننا أخذنا خلية حيوانية واحدة فقط... برأيكم، ما الذي يمكن أن نفعله بها في المختبر؟"



- تنمو وتتكاثر
- يمكن أن ندرس مرضًا معيناً.
- يمكن اختبار دواء جديد عليها.
- ربما نستخدمها لإنتاج لقاح.
- يمكن أن تفيد في زراعة الأعضاء مستقبلاً.

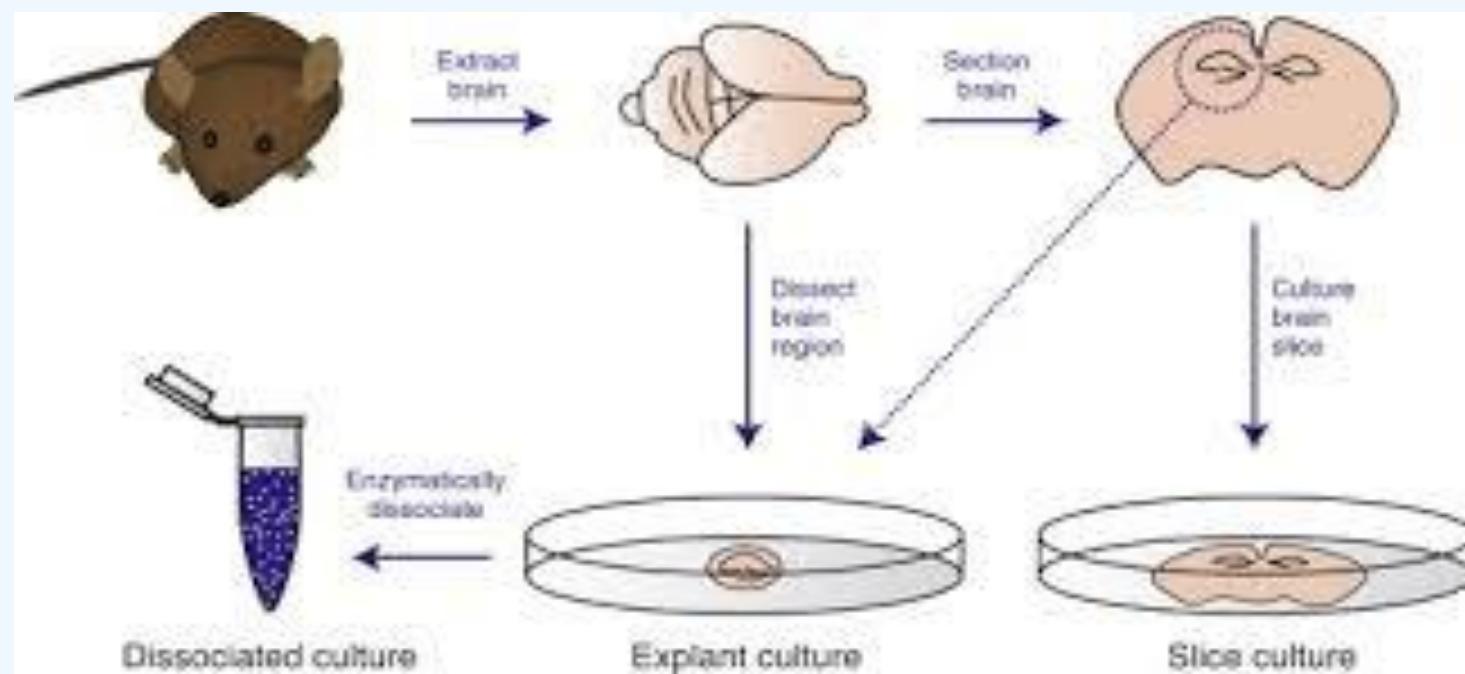


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Historical Background

- Ross Harrison - First frog nerve fiber culture.
- Alexis Carrel - Long-term culture of chicken heart tissue.
- Development of specific media ,Modern advances: Antibiotics, aseptic techniques.



Introduction

Animal tissue culture: is the growth of tissues separate from the animal in vitro (in the laboratory culture media)



Cell line

Cell line

Every cell present in **the human body is not capable of growing in the laboratory**, **only a few types of cells can grow in vitro**, but they are neither suitable for industrial use nor for scientific purpose, **why?**

Because many cells die during the course of time **releasing toxic substances which inhibit the activity of other living cells.**

نشاط

هل يوجد فرق بين **Cell line** و زراعة الانسجة الحيوانية



Procedure for production of a cell line:

- 1- A piece of tissue is removed from an organism.
- 2- Adhesion between cells is **broken by enzymes like trypsin or collagenase.**
- 3- The cells are transferred to bottle which contains cultured medium.
- 4- The cells are incubated at 37°C in 5-10% CO₂ and 90-95% O₂
- 5- The cells grow, divide and cover the surface of the container, this culture is referred to as **primary cell** culture, **all cells will stop dividing due to contact inhibition.**

Procedure for production of a cell line:

6- The cells are transferred to a **fresh medium** and will again start growing.

This type of repetitive culturing of the cells is limited, why?

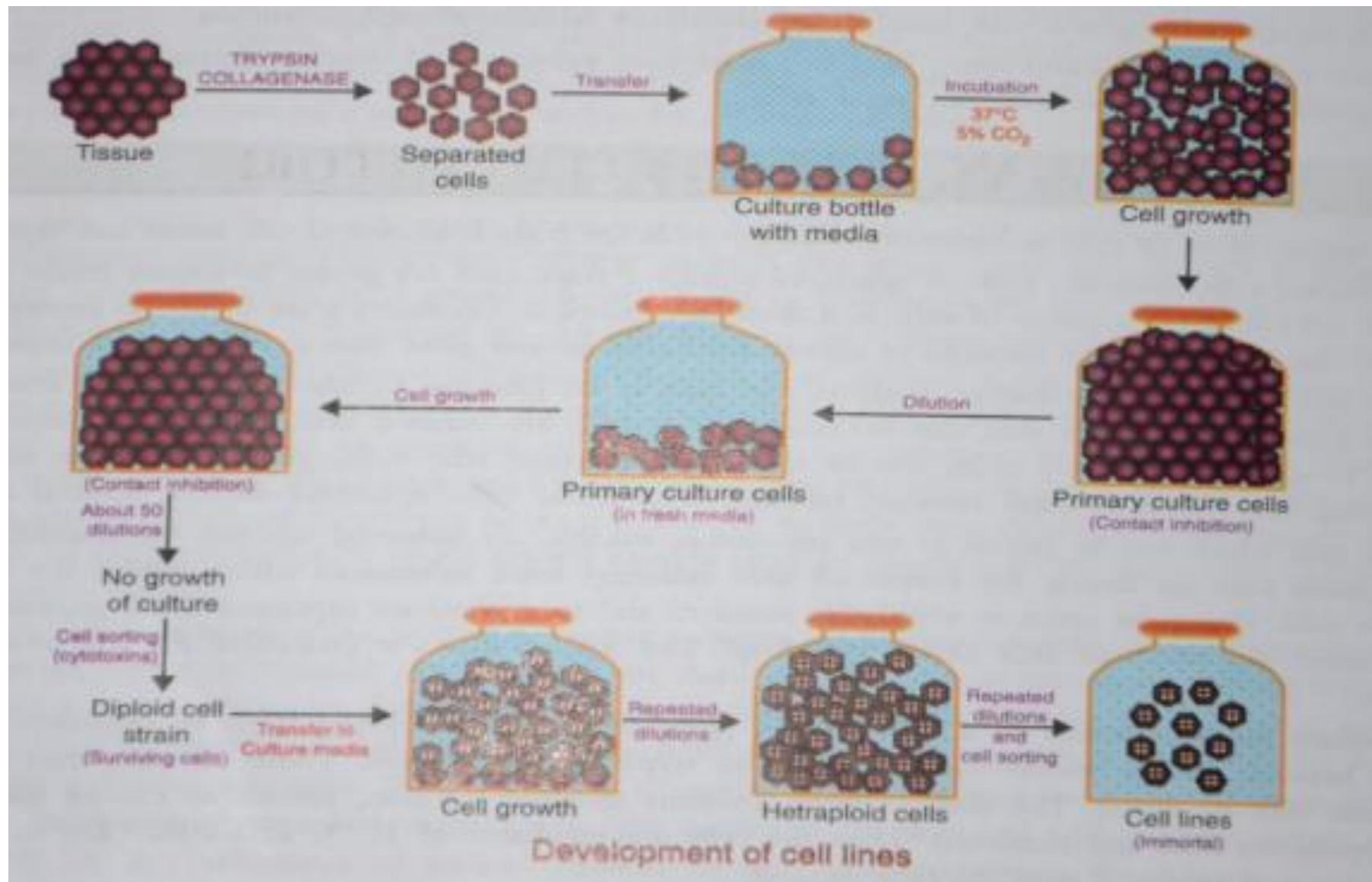
1-Because the growth of animal cells stop after about 50 divisions

2-either due to lack of proper culture media or built-in-senescence mechanism.

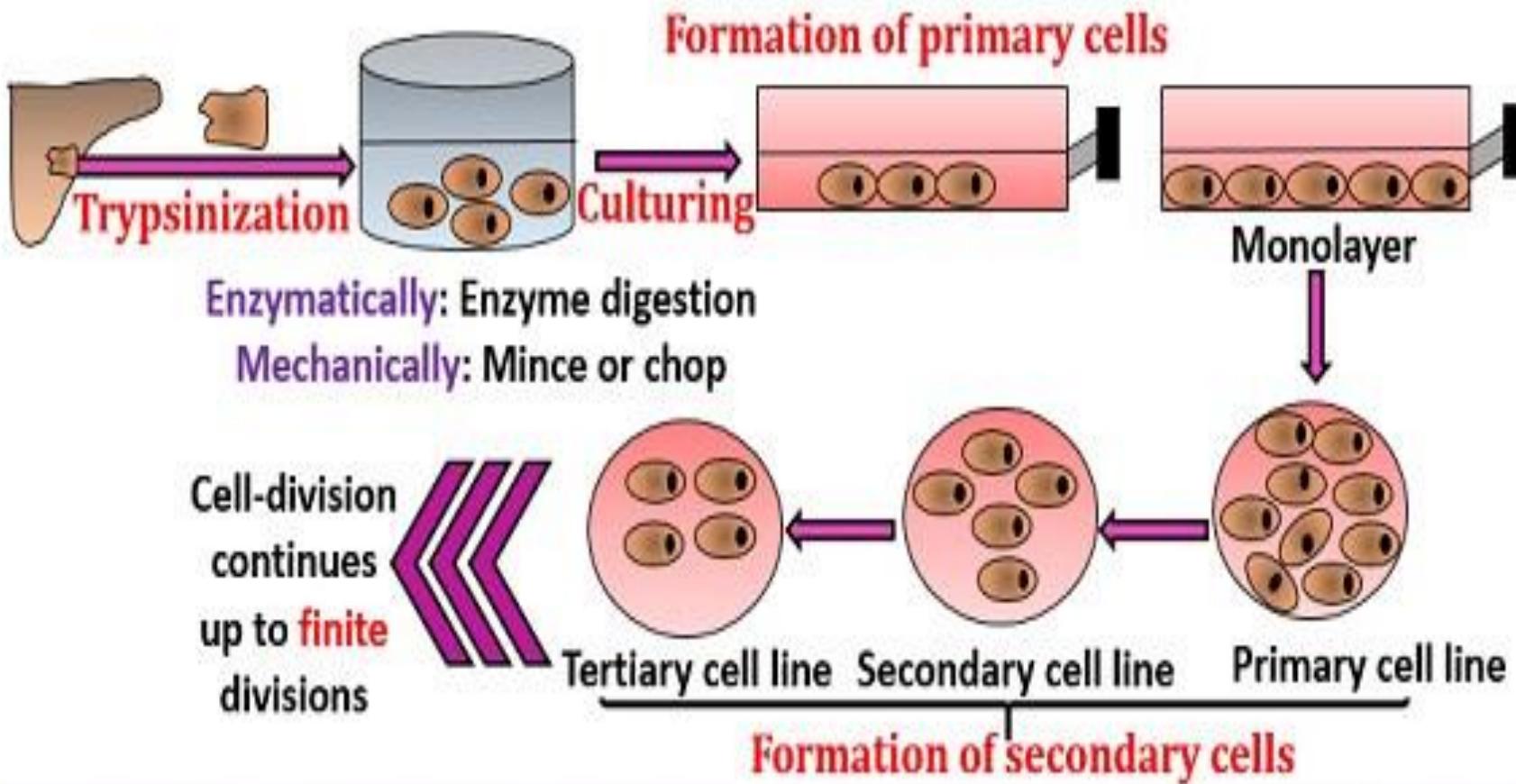
7- Some cells continue to grow after numerous transformations, these are termed as **diploid** cell strains, these cells also lose the ability to grow after sometimes.

Procedure for production of a cell line:

8- Few cells among diploid cell strains will survive; these are termed as **heteroploid** cells because they undergo many chromosomal rearrangements and deletions. These cells will grow indefinitely as long as the medium is replaced, becoming effectively immortal. These survivors are **known as cell line**.







Animal cell culture: For Normal Cells

نشاط جماعي



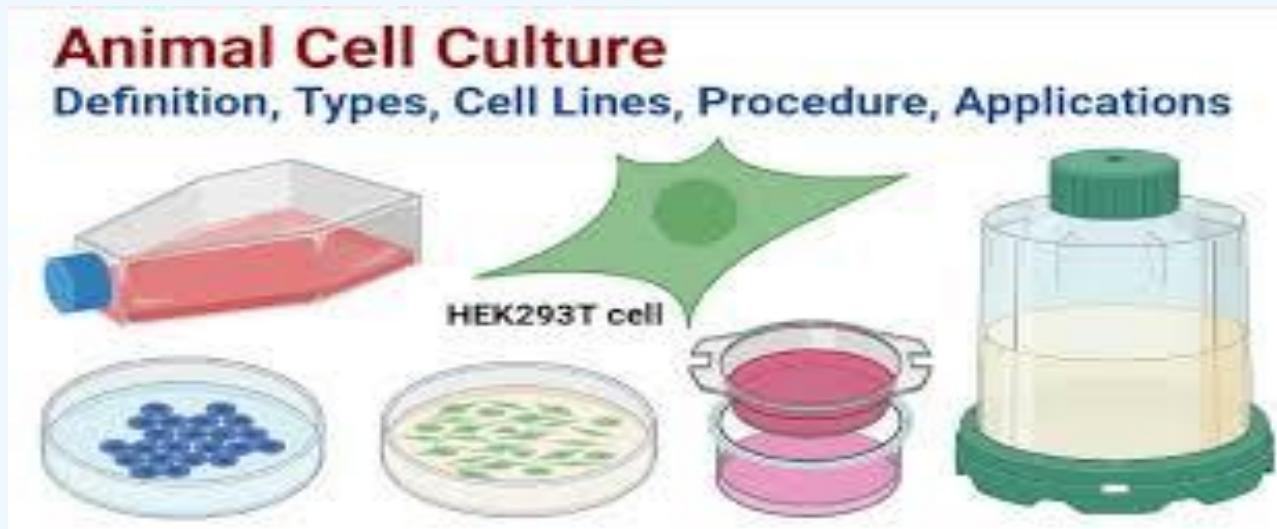
إذا تمكنا من استنبات خلايا حيوانية خارج الجسم لفترات طويلة بنجاح،
فهل يمكن اعتبار ذلك **بديلاً حقيقياً لاستخدام الحيوانات في التجارب**
العلمية؟

ناقشو في مجموعاتكم المزايا والعيوب والتحديات العلمية المرتبطة بهذا الأمر.

Culture medium:

Culture medium: It is the environment provided for the growth of the cells in the laboratory, similar to those conditions that the cells have been exposed to in vivo. Culture media consists of:

- **Physical media:** a support or matrix ex:Ph O₂ ,H₂O ,heat
- **Chemical media:** appropriate nutrients, hormones and stromal factors.ex : Cytokines IL-6.Growth factors SCF





نشاط جماعي

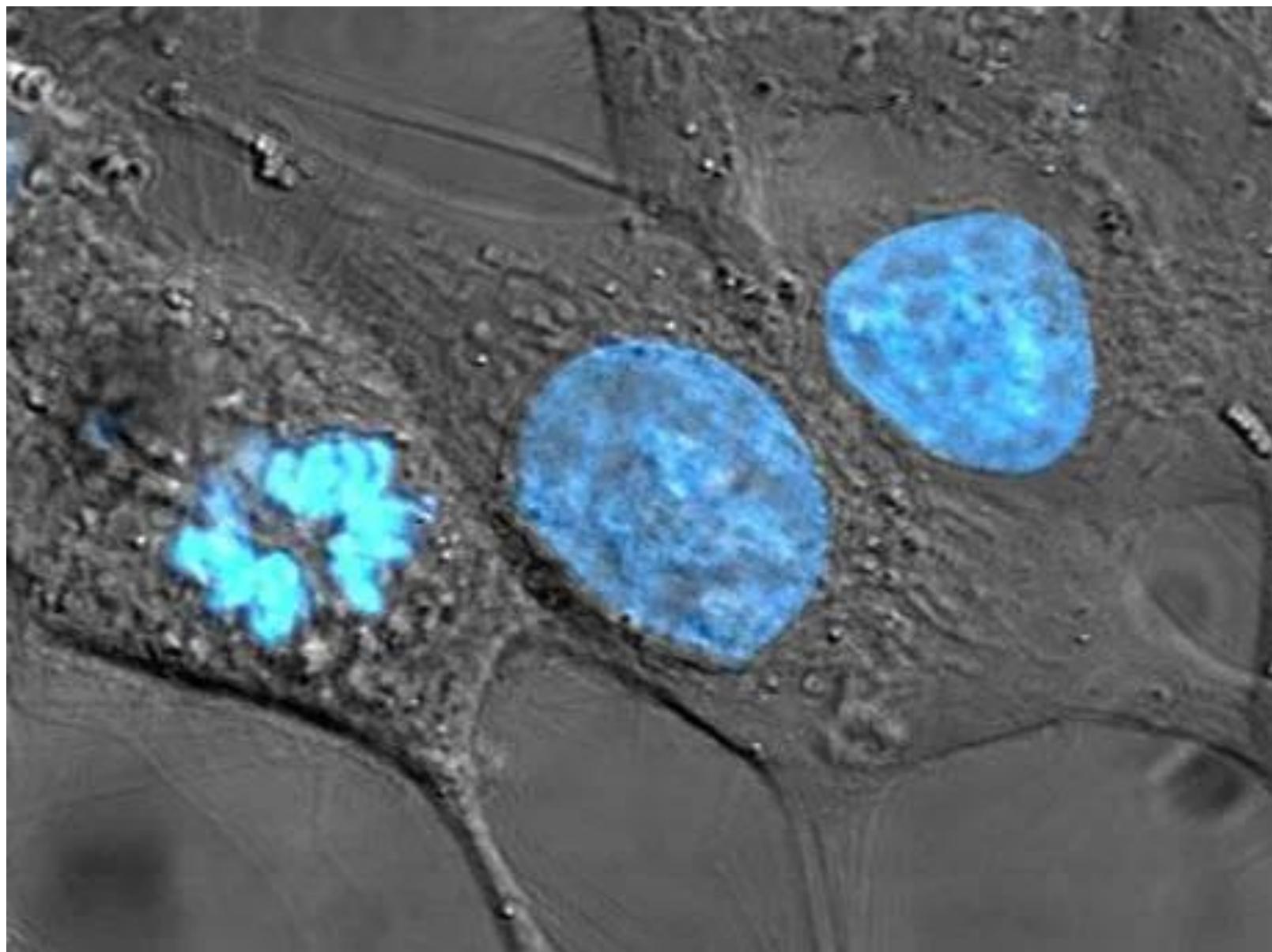
اذكر أنواع Growth factors



Culture medium

Serum is the most economical, easily available and most widely used culture medium for animal cell culture; **fetal calf serum** is the preferred one.

The major functions of serum as a culture medium are: to provide nutrients, hormones, growth factors, attachment and spreading factors, binding proteins, vitamins, minerals, lipids, protease inhibitors and pH buffer



Disadvantages of serum:

- Virus, fungi and bacteria may contaminate the serum easily
- Some enzymes presents in serum can convert the cell secretions into toxic compounds



Now there are three types of artificial culture media:

- Serum –free culture medium
- Protein- free culture medium
- Chemically defined media

Eagles minimal essential medium (EMEM), Dulbeccos modified enriched medium (DMEM) and Rosswell park memorial institute (RPMI) are examples on artificial culture media

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