

Commonly used cell line and their characteristics

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Cell culture

- It is the process by which prokaryotic or eukaryotic cells are grown under controlled conditions.
- In this procedure, cells are directly isolated from body of an organism and disaggregated by enzymatic or mechanical procedure or they may be derived from cell lines or cell strains.

Cell lines

- A cell line is a permanently established cell culture that will proliferate indefinitely given appropriate fresh medium and space.
- The choice of appropriate cell line depends on the organism of study, the disease investigated, and the tissue or organ of interest.
- The cells can perpetuate division indefinitely which is unlike regular cells which can divide only approximately 50 times.

Primary cell lines

- Cells which are surgically or enzymatically removed from an organism and placed in suitable culture environment will attach and grow are primary cell lines and they form primary culture.
- primary cells have a finite life span.
- Primary culture contains a very heterogeneous population of cells.

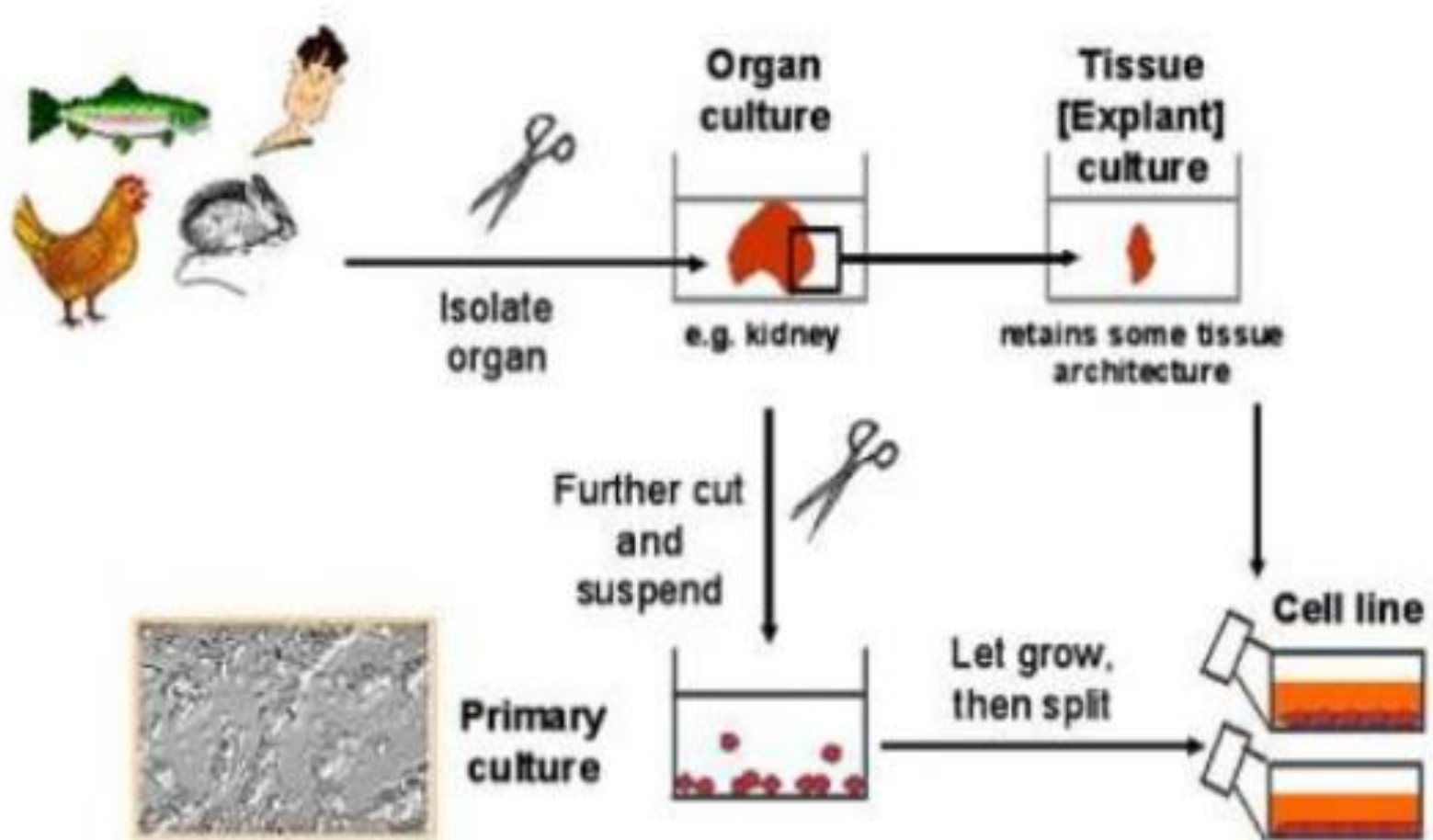
Continuous cell lines

- Continuous immortalized cell lines are comprised of a single cell type that can be serially propagated in culture either for a limited number of cell divisions (approximately thirty) or otherwise indefinitely.
- Grow faster and their chromosomes are haploid.
- Smaller, more rounded, less adherent with a higher nucleus/cytoplasm ratio.

Difference between primary and continuous cell culture

properties	primary cell culture	continuous cell culture
source	Mixture of cells freshly derived from the tissue of origin e.g., laboratory animal, human biopsy sample etc.	Mixture of cells derived from human and animal tumors.
Life span	Cell line derived from primary culture has limited lifespan. They usually divide only limited number of times before losing their ability to proliferate (a genetically determined event known as senescence)	Can be sub-cultured indefinitely.
Morphological change	All the cells retain their normal <u>karyotype</u> .	Cells will not display same <u>karyotype</u> .

How can a cell line be derived?



Characteristics of cell lines

- The growth pattern and and morphological appearance of the cell line should be determined and should be stable from the master cell bank to the end of production cells.
- If there are specific markers that may be useful in characterizing the cell line, such as marker chromosome, specific surface markers, these should be stable.
- Since, normal cells has limited dividing capacity. Therefore, after a no. of population doublings cell lines derived from normal tissue will die out. This is a genetically determined event involving several different genes and it is called as senescence.

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- Some cell lines may avoid senescence and give rise to continuous cell lines. The ability of a cell line to grow continuously probably reflects its capacity for genetic variation, allowing subsequent selection.
- Many transformed cell lines have provided the best model for induction of differentiation.

Type= Finite from normal tissue

Sr. no.	Cell lines	Morphology	Origin	species	age	ploidy	characteristics
1.	WI-38	Fibroblast	lung	human	Embryonic	Diploid	Susceptible to human viral infection, contact inhibited.
2.	MRC-5	Fibroblast	Lung	Human	Embryonic	Diploid	Susceptible to human viral infection, contact inhibited.
3.	IMR-90	Fibroblast	Lung	Human	Embryonic	Diploid	Susceptible to human viral infection, contact inhibited.
4.	MRC-9	Fibroblast	lung	human	embryonic	Diploid	Susceptible to human viral infection, contact inhibited.

Type = continuous from normal tissue

Sr. no.	Cell lines	Morphology	Origin	species	age	Ploidy	characteristics
1.	3T3-A31	Fibroblast	Connective tissue	Mouse BALB/C	Embryonic	aneuploid	Contact inhibited, readily transformed.
2.	BHK21-C13	Fibroblast	kidney	Syrian Hamster	Adult	Aneuploid	Transformed by polyoma
3.	C7	Epitheloid	Hypothalamus	Mouse			Neurophysin, vasopressin
4.	CHO-K1	Fibroblast	Ovary	Chinese Hamster	Adult	Diploid	Factor VIII, Angiotensin converting enzyme.

Type = continuous from neuroplastic tissue

Sr. no.	Cell lines	Morphology	Origin	species	Age	Ploidy	characteristics
1.	A2780	epithelial	ovary	Human	Adult	Aneuploid	Chemosensitive with resistant variant.
2.	B16	Fibroblast	melanoma	Mouse	Adult	Aneuploid	Melanin
3.	HeLa	Epithelial	cervix	Human	Adult	Aneuploid	G6PD Type A
4.	A549	Epithelial	lung	Human	Adult	Aneuploid	Synthesize Surfactant

- REFERENCES
- **Textbook of animal biotechnology:**B Singh, S K Gautam and M S Chauhan
- ANIMAL BIOTECHNOLOGY: [P.K. Gupta](#)