# University of Basrah

College of Science

Department of Pathological Analysis

## Course title: Tissue Culture Techniques

## 209ت

By

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# Cell Morphology

Regularly examining the morphology of the cells in culture (i.e., their shape and appearance) is essential for successful cell culture experiments. In addition to confirming the healthy status of your cells, inspecting the cells by eye and a microscope each time they are handled will allow you to detect any signs of contamination early on and to contain it before it spreads to other cultures around the laboratory. Signs of deterioration of cells include granularity around the nucleus, detachment of the cells from the substrate, and cytoplasmic vacuolation. Signs of deterioration may be caused by a variety of reasons, including contamination of the culture, senescence of the cell line, or the presence of toxic substances in the medium, or they may simply imply that the culture needs a medium change. Allowing the deterioration to progress too far will make it irreversible.

# Mammalian Cells

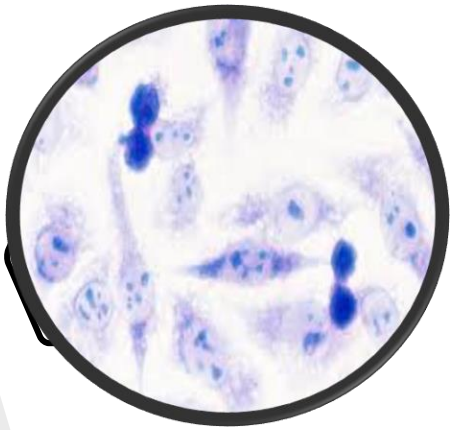
Variations in Mammalian Cell Morphology

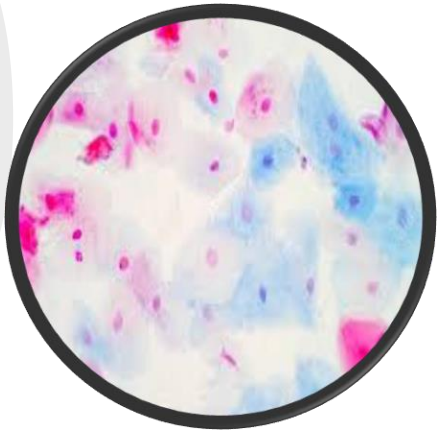
Most mammalian cells in culture can be divided in to three basic categories based on their morphology.

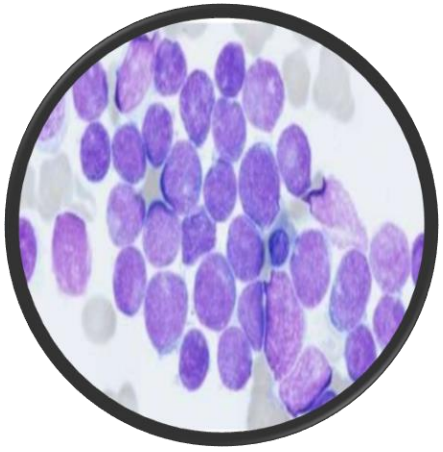
- **Fibroblastic** (or fibroblast-like) cells are bipolar or multipolar and have elongated shapes. They grow attached to a substrate.

- **Epithelial-like** cells are polygonal in shape with more regular dimensions, and grow attached to a substrate in discrete patches.

- **Lymphoblast**-like cells are spherical in shape and they are usually grown in suspension without attaching to a surface. In addition to the basic categories listed above, certain cells display morphological characteristics specific to their specialized role in host.







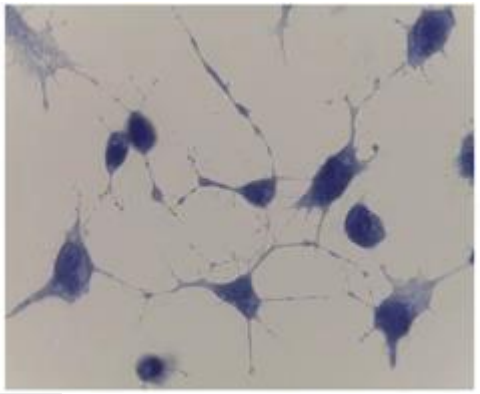
- **Neuronal cells**

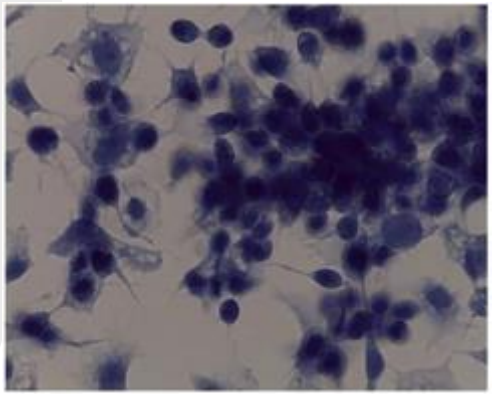
exist in different shapes and sizes, but they can roughly be divided into two basic morphological categories,

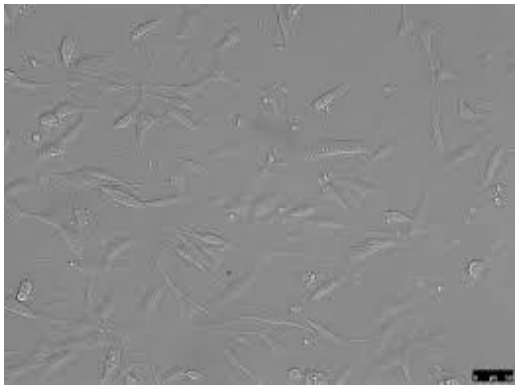
**-type I** with long axons used to move signals over long distances

-**type II** without axons. A typical neuron projects cellular extensions with many branches from the cell body, which is referred to as a dendritic tree.

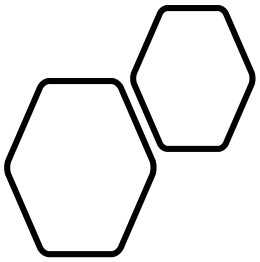
Neuronal cells can be unipolar or pseudounipolar with the dendrite and axon emerging from same process, bipolar with the axon and single dendrite on opposite ends of the soma (the central part of the cell containing the nucleus), or multipolar with more than two dendrites.





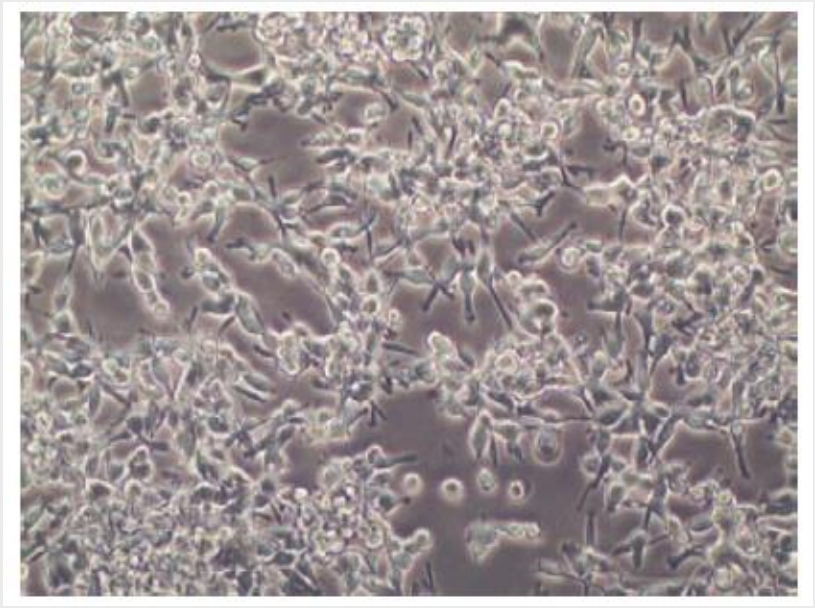


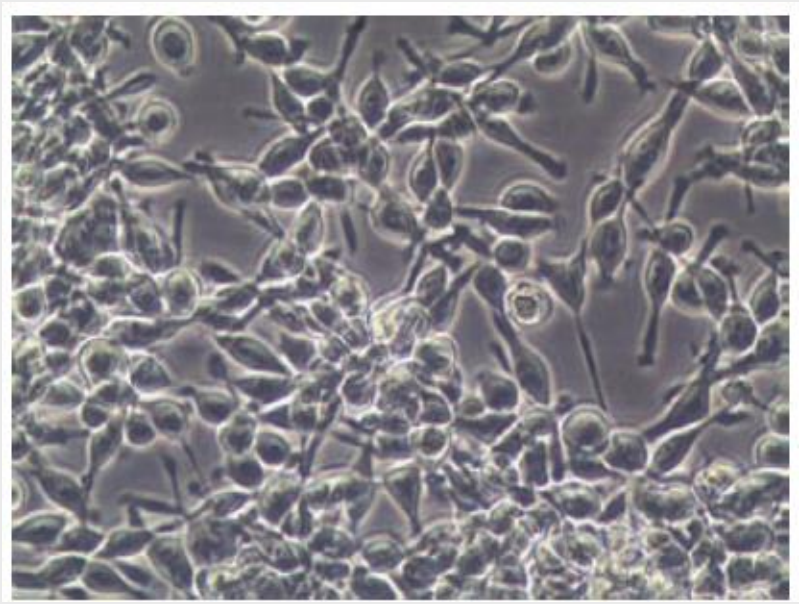
# Morphology of 293 Cells



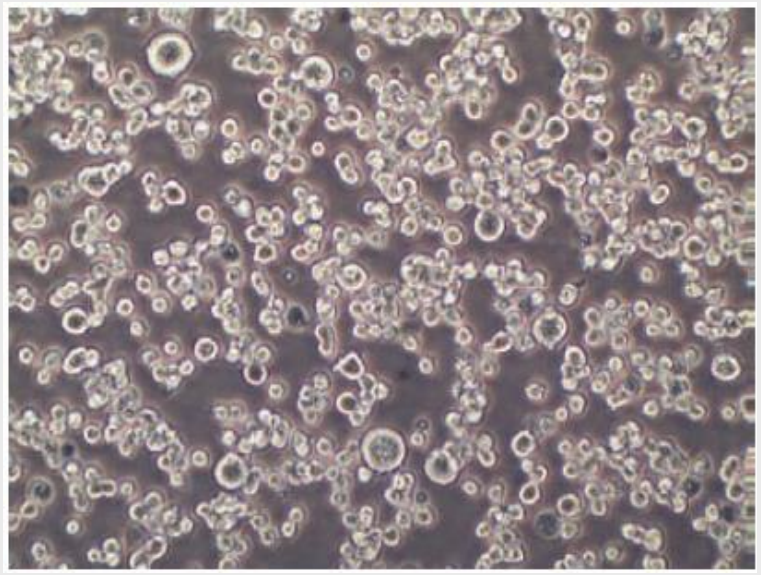
The 293 cell line is a permanent line established from primary embryonic human kidney, which was transformed with sheared human adenovirus type 5 DNA. The adenoviral genes expressed in this cell line allow the cells to produce very high levels of recombinant proteins. Invitrogen offers several variants of the 293 cell line, including those adapted for high-density suspension culture in serum-free media.

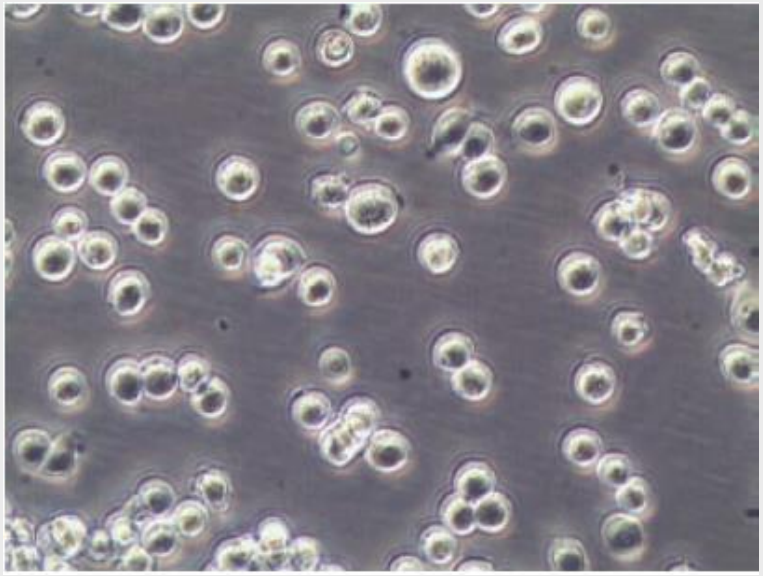
Note that adherent mammalian cultures should be passaged when they are in the log phase, before they reach confluence





The phase contrast images show the morphology of healthy 293 cells in adherent culture at 80% confluency



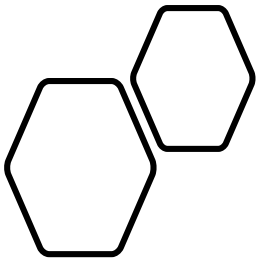


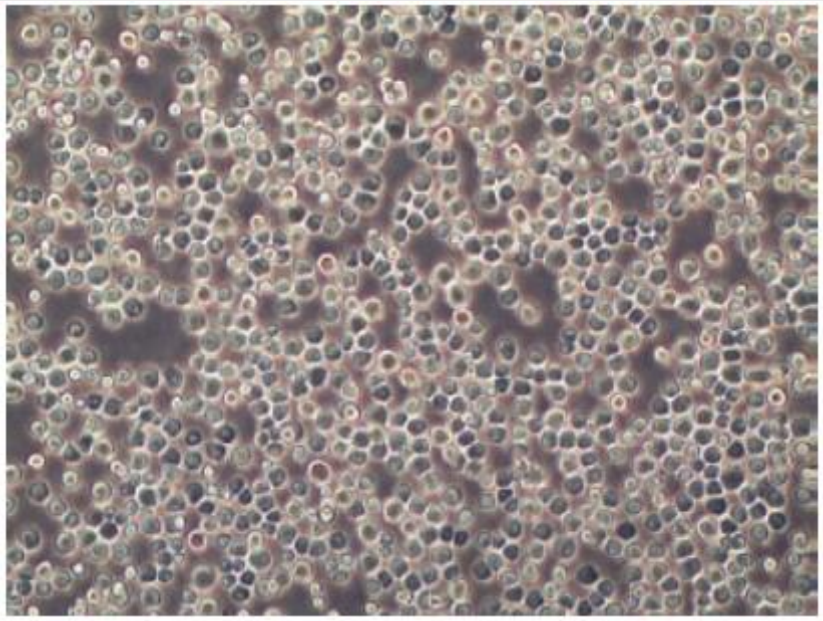
The phase contrast images show the morphology of healthy 293 cells in suspension culture

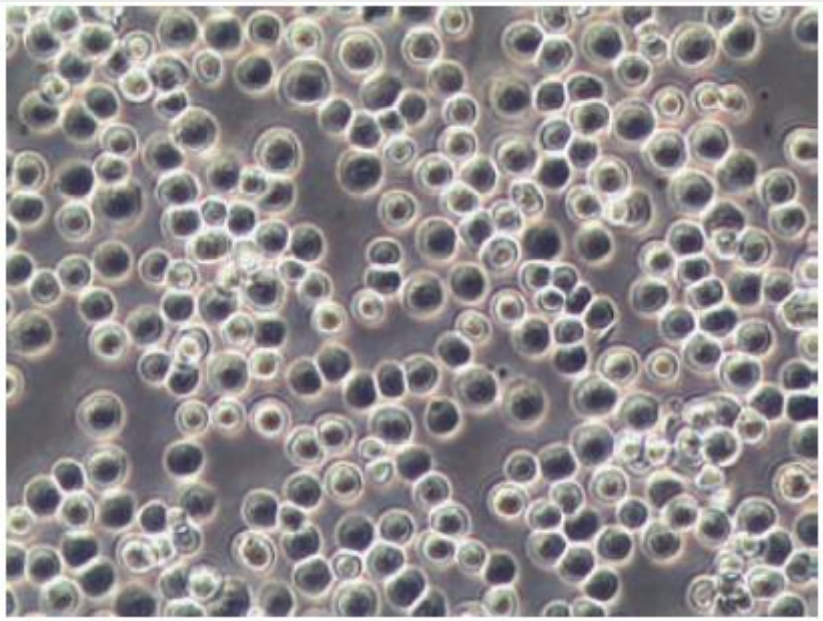
# Insect Cells

## Morphology of Sf21 Cells

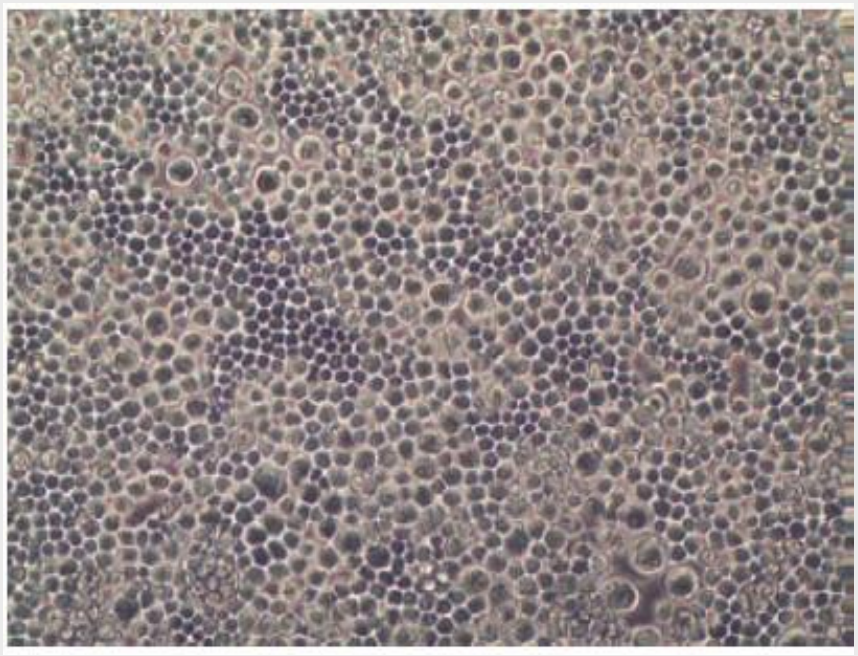
Sf21 cells (IPLB-Sf21-AE) are ovarian cells isolated from Spodoptera frugiperda (Fall Armyworm). They are spherical in shape with unequal sizes, and have a somewhat granular appearance. Sf21 cells can be thawed and used directly in suspension culture for rapid expansion of cell stocks, propagation of baculovirus stocks, and production of recombinant proteins. Because Sf21 cells attach firmly to surfaces, they can be used as a monolayer for transfection or plaque assay applications.

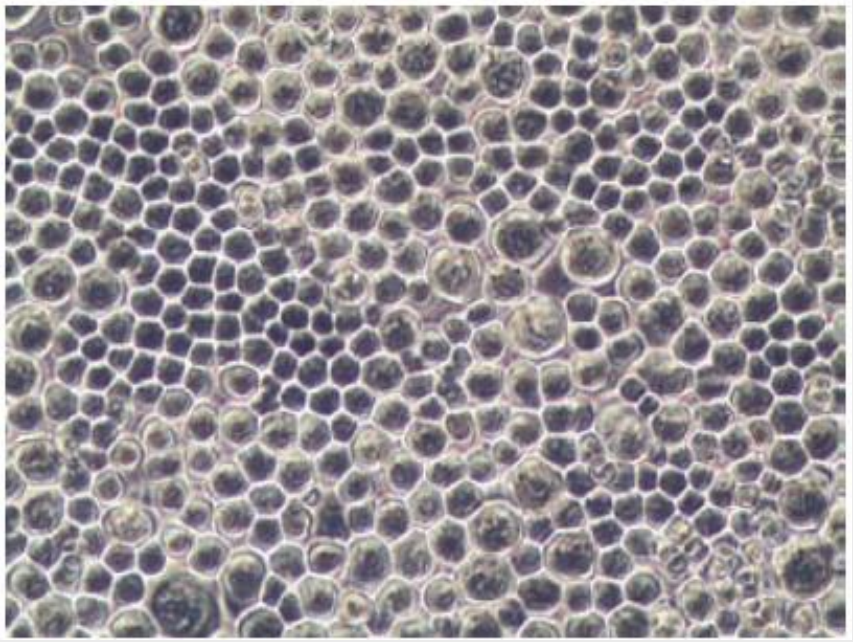


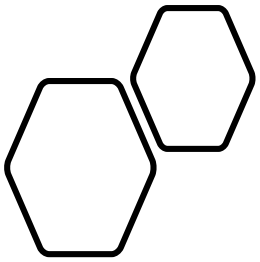




The images below show the morphology of healthy Sf21 insect cells in suspension culture (Figure 3.3) and

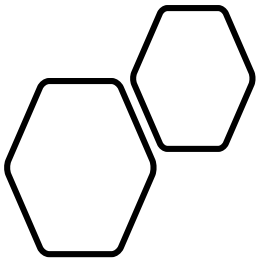




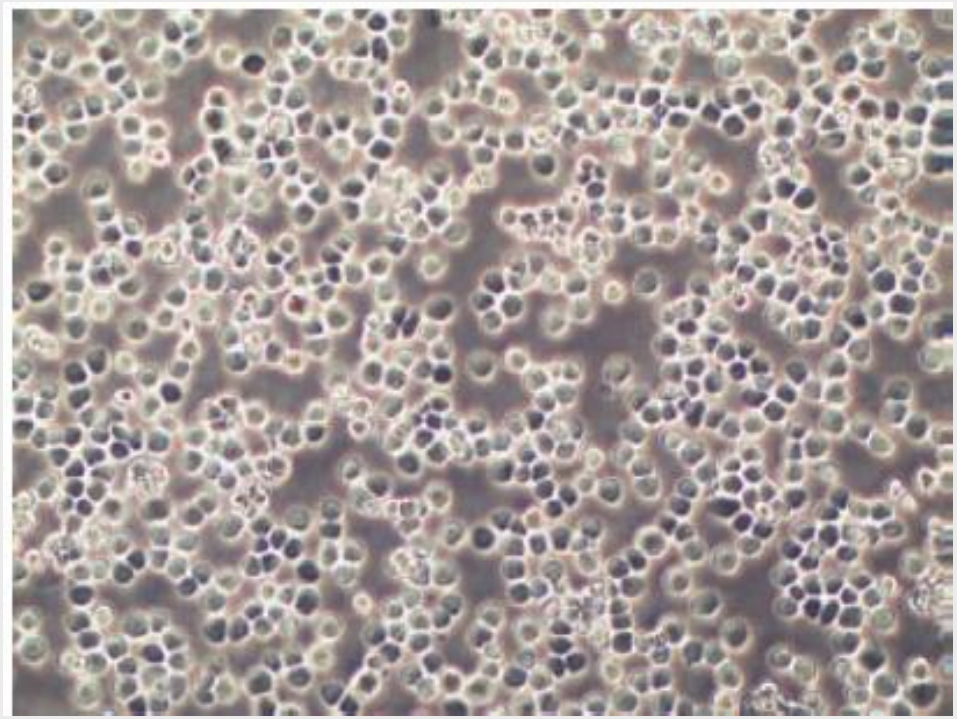


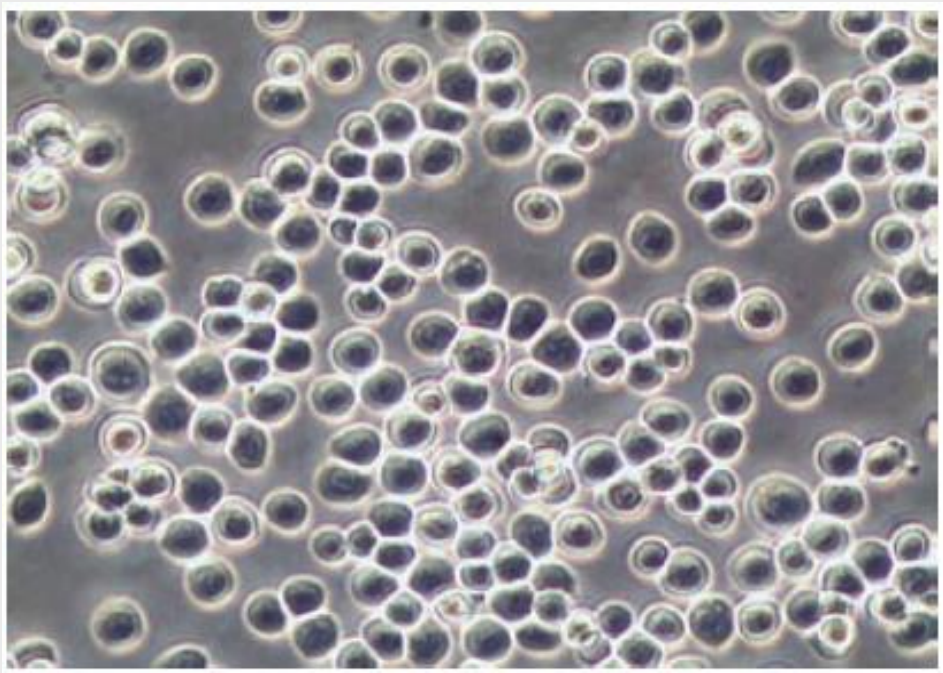
in adherent culture at confluency . Note that insect cells should be sub cultured when they reach confluency (see When to Subculture in the Method

# Morphology of Sf9 Cells

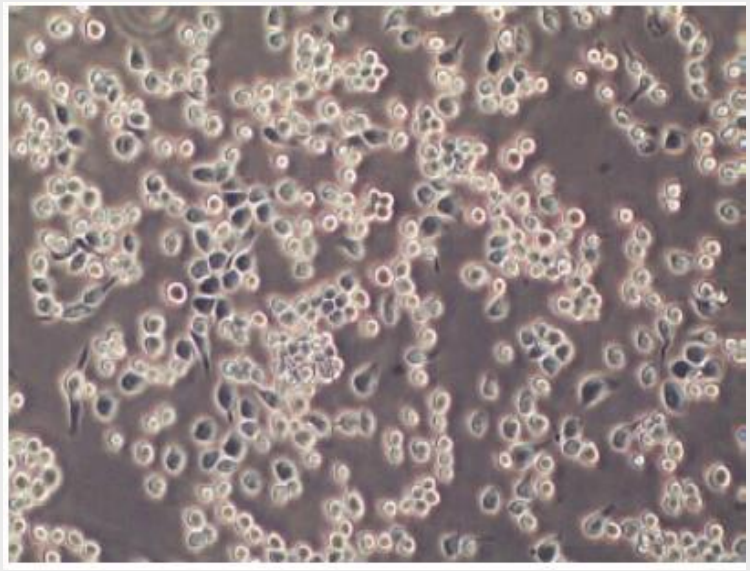


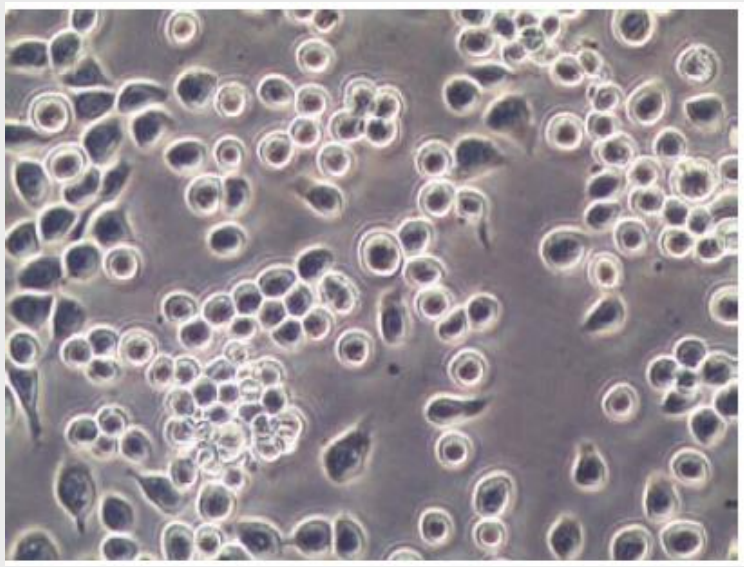
The Sf9 insect cell line is a clonal isolate derived from the parental Spodoptera frugiperda cell line IPLB-Sf-21-AE, and it is a suitable host for expression of recombinant proteins from baculovirus expression systems (e.g., Invitrogen’s Bac-to-Bac® and Bac-N-Blue™ Expression Systems). Although insect cells have been historically cultured in stationary systems utilizing T-flasks and serum-supplemented basal medium, insect cells are generally not anchorage dependent and can easily be maintained in suspension culture..





The images in this slid show the morphology of healthy Sf9 insect cells in suspension and





adherent cultures. Sf9 cells attach firmly to surfaces, and their small, regular size makes them exceptional for the formation of monolayers and plaques

# Thank you