

The study of chromosomes using traditional cytogenetic techniques requires cells that are actively dividing. Overview of cell culture and harvest Culture initiation → Culture maintenance → Cell harvest

- o Sterility
- o Living cells
- o Arrest division
- o Optimal temperature
- o Sterility
- o Swell cells
- o Optimal pH

Proper growth medium

- o Fix cells
- o Optimal humidity
- +– Mitotic stimulant
- o Prepare slide
- o Optimal time interval

Microbial inhibitors

- o Stain/band

The most critical requirement is that living cells capable of cell division be received by the laboratory. Specimens that contain spontaneously proliferating cells include bone marrow, lymph nodes, solid tumors tissue biopsies, amniotic fluids, and chorionic villi.

Specimen Collection and Handling Sample Requirements

Peripheral Blood Specimens

Peripheral blood samples should be collected in sterile syringes or vacuum tubes containing preservative-free sodium heparin. Metaphase chromosomes can be obtained from specimens that contain spontaneously dividing cells or ones that are cultured and chemically induced to divide in vitro. Specimen containers must be sterile and must be labeled with the patient's name and a second identifier. The laboratory may reject specimens that are improperly labeled or unlabeled. If there are not enough naturally dividing cells for a chromosome analysis, these specimen types may also be cultured in the laboratory without the aid of mitotic stimulants. The choice of specimen for chromosome analysis depends on clinical indications and whether the diagnosis is prenatal or postnatal. The manner in which the sample is collected and subsequently handled will greatly influence whether or not the cells will grow and divide, and the quality of the resulting metaphases. The individual details of culture initiation, maintenance, and cell harvest vary somewhat for the different sample types; however, the general steps and requirements are similar. Chromosomes are individually distinguishable under the light microscope only during cell division and are best examined during metaphase.

Bone marrow aspirates

Bone marrow aspirates should be collected in sterile syringes or vacuum tubes. It is not always practicable or possible to obtain a new sample, and in such cases, the laboratory should attempt to salvage the original specimen.

Bone Marrow Aspirates

The collection requirements for bone marrow samples are essentially the same as for peripheral blood. Peripheral blood lymphocytes usually require the addition of a mitotic stimulant. Vacuum tubes should be discarded if outdated. Temperature extremes must be avoided if samples are transported or stored. These are summarized below.