



BioPress™ Culture Plates

Product Information Sheet

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BioPress™ culture plates are 35 mm 6-well plates with 1) flexible silicone elastomer well bottoms, 2) acrylic pistons and 3) foam sample holders (Fig. 1). BioPress™ culture plates can be used with stationary platens (Fig. 1) and the Flexcell® Compression System to apply an unconfined compression to cells in 3D culture or a tissue explant. BioPress™ plates are placed in a compression baseplate with a clamping system. When positive air pressure is applied, the silicone elastomer membrane is pushed upward compressing the sample between the piston and the platen. For more information, see the BioPress™ product webpage at <http://www.flexcellint.com/BioPress.htm>.

SAMPLE PREPARATION FOR BIOPRESS™ CULTURE PLATES

In preparing a 3D culture or tissue explant sample, be sure that the sample thickness is no less than 1000 μm and no greater than 3 mm (0.118"). The thickness of the compressed foam is 350 μm ; therefore, thinner samples will not be compressed. A sample thickness of 1000 μm or more will ensure compressibility. The maximum chamber height is 3.1 mm (0.122"); therefore, samples with a thickness greater than 3 mm (0.118") will be preloaded when the platens are inserted into the wells of the culture plates. The sample diameter should be equal to or less than the inner diameter of the foam sample holder in the chamber, which is 5 mm (0.200"). If the user wishes to use a larger sample, they can remove the sample holder and place the sample within the larger ring that normally contains the sample holder. This will allow a sample diameter of up to 13 mm (0.525").



Figure 1. A BioPress™ culture plate with six 35 mm wells with acrylic pistons adhered to the silicone elastomer well bottom, foam sample holders (far left), and stationary platens (left of plate).

Three-Dimensional Cell Samples

Cells should be cultured according to your laboratory's established protocol for primary cultures or continuous cell lines in the medium of choice. In general:

1. Release cells from their substrates with 0.05% trypsin, trypsin-EDTA, 0.05% bacterial collagenase, or other means.
2. Add serum containing media to the cells to neutralize the trypsin or collagenase.
3. Count cells and determine the number of cells needed for the three-dimensional culture. Three sample methods are described below. *NOTE: Cell seeding density will vary depending on cell type. We recommend testing cell seeding densities to determine the best cell number for your application and cell type.*

Tissue Explant Samples

1. Prepare tissue according to the laboratory's established protocol.
2. If applicable, cut a 1-3 mm thick sample of the tissue explant.
3. Using a 5 mm trephine punch (or similar tool), cut out a 5 mm diameter disc of tissue.
4. Place sample in the inner ring of the sample holder as described in the next section, *Sample Placement into a BioPress™ Culture Plate*.

Sheet Punch of a Cell-Seeded Hydrogel:

1. Prepare hydrogel (Collagel®, agarose, gelatin, alginate, etc.) according to the manufacturer's or laboratory's established protocol.
2. Suspend cells in the hydrogel at $1 \times 10^4 - 1 \times 10^5$ cells/ml.
3. Allow hydrogel to polymerize in a sheet or plug that is 1-3 mm thick.
4. Using a 5 mm trephine punch (or similar tool), cut out a 5 mm diameter disc of the cell-seeded hydrogel.
5. Place sample in the inner ring of the sample holder as described in the next section, *Sample Placement into a BioPress™ Culture Plate*.

Direct-Placement of a Cell-Seeded Hydrogel:

1. Prepare hydrogel (Collagel®, agarose, gelatin, alginate, etc.) according to the manufacturer's or laboratory's established protocol.
2. Suspend cells in the hydrogel at $1 \times 10^4 - 1 \times 10^5$ cells/ml.



3. Pipette cell-hydrogel suspension into the foam sample holder of the BioPress™ culture plate.
4. Allow the hydrogel to polymerize.

Pellet Culture:

1. Using primary cultures or cell line, prepare a suspension of $5 \times 10^5 - 5 \times 10^6$ cells.
2. Spin at 10,000 x g for 5 minutes.
3. Carefully transfer cell pellet to the center of the sample holder as described in the next section, *Sample Placement into a BioPress™ Culture Plate*.

SAMPLE PLACEMENT INTO A BIOPRESS™ CULTURE PLATE

1. To prepare a sample for loading, use a pair of sterile forceps to place the tissue or gel sample into the center hole of the foam sample holder in the BioPress™ compression plate. Do this for the remainder of the wells. Add 3-4 ml of culture medium to each well.
2. Prepare all stationary platens by adjusting the center screw (Fig. 2) such that the screw bottom (part that touches the sample) is exactly flush with the bottom of the platen body. Use a pair of sterile forceps and the two holes at the adjustable center of the platen to turn the center screw.
3. Place a stationary platen into each well of the compression plate (Fig.2). Calculate the number of revolutions required to bring the bottom of the center screw to the point where it just touches the top of the sample by using the following equations:

- For sample height in **millimeters**, $x = (3.11-h) / 0.62$ where x is the number of 180 degree clockwise turns required for the center screw to touch the sample and h is the sample height in **millimeters**.
- For sample height in **inches**, $x = (0.122-h) / 0.025$ where x is the number of 180 degree clockwise turns required for the center screw to touch the sample and h is sample height in **inches**.

NOTE: If the sample height is larger than 3.11 mm (0.122"), 'x' in the above equations will be a negative number. In this case, the bottom of the center screw will compress the sample when it is flush with the bottom of the platen body as the platen is first inserted into the well. To compensate for this, the center screw can be turned counterclockwise 'x' number of turns; however, it should be noted that the sample will no longer be fully compressible, as the base of the sample holder will no longer be able to contact the base of the center screw.

4. Using sterile forceps, turn the center screw clockwise the number of turns required by the above appropriate equation. Be careful not to screw the center down too far as this will preload the sample and give inaccurate force readings. Add or remove fluid medium through any of the eight holes around the inner periphery of the platen.

For more information, on assembling the compression baseplate see the instructional video, *Compression Baseplate Assembly*, accessible on our website: <http://www.flexcellint.com/videos-instruct.htm#compressionsection>, or *Tech Report 111: Sample Preparation and Setup of BioPress™ Culture Plates and Compression Baseplate Assembly*, available at http://www.flexcellint.com/documents/111_CompressionBaseplateAssemblyTech.pdf.

ORDERING INFORMATION

BioPress™ culture plates (Cat. No. BF-3000C) are sold individually or by the case of 40. Each plate is sterile and individually packaged in a sealed bag. Flexcell® culture plates have a shelf life of 1 year when stored at room temperature or 4 °C in the dark or out of direct light. Additional stationary platens (Cat. No. BP-3000SP) and foam sample holders (Cat. No. BP-3000FSH) are sold in sets of six. Stationary platens are reusable and autoclavable.

Flexcell® compression devices and culture plates are protected by the following patents: US Patents 4,789,601 and 4,822,741 (International Patents DE3855631D1, DE3855631T2, EP0365536B1); US Patent 6,037,141.

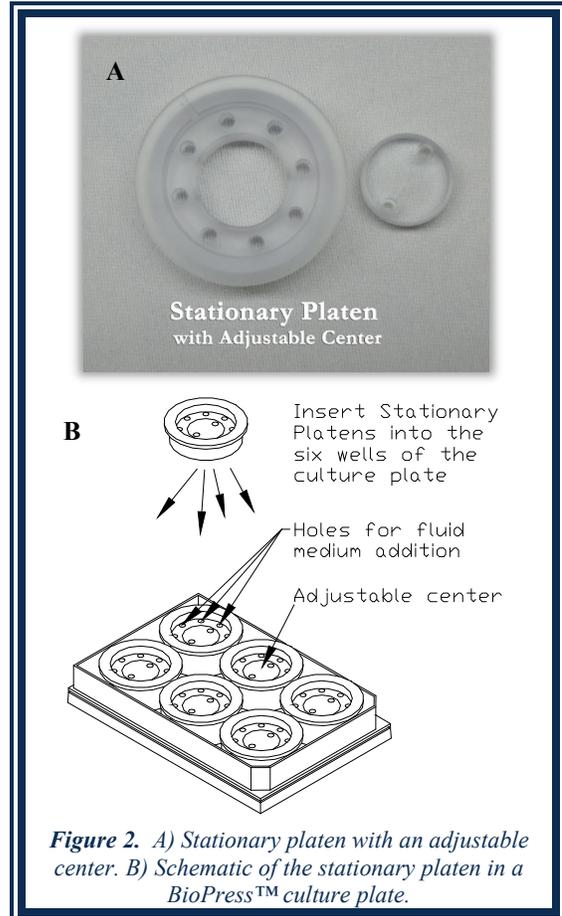


Figure 2. A) Stationary platen with an adjustable center. B) Schematic of the stationary platen in a BioPress™ culture plate.