# Immunoprecipitation Protocol

**BioLegend, Inc.**

## Abstract

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## Guidelines

**Application Notes:**
Immunoprecipitation is a procedure by which proteins or peptides that react specifically with an antibody are removed from solution and examined for quantity or physical characteristics. Immunoprecipitation can also be used to “enrich”a protein population prior to Western Blotting. For example, one can perform immunoprecipitation with a pan-specific antibody against a protein of interest followed by Western blotting with a modification-specific antibody (such as a
phospho-specific antibody or an acetylation-specific antibody).

**Tips:**

1. The choice of lysis buffer depends on the location of the protein (membrane, cytosolic, nuclear).

2. Immunoprecipitates allowed to incubate overnight may have a higher background than ones processed for shorter periods of time due to time-dependent aggregation or denaturation of cellular proteins.

3. Always use an isotype-matched irrelevant control antibody (monoclonal) or same-species serum from a non-immunized animal to remove non-specific antibody binding in cellular lysates.

**Solutions and Reagents:**

**1X Cell Lysis Buffer:**

| | |
|---|---|
| 25 mM Tris-HCl, pH 7.5 | 1 µg/ml aprotinin |
| 150 mM NaCl | 1 mM $Na_3PO_4$ |
| 0.1% Triton X-100 | 1 mM PMSF |
| 2 mM EDTA | 5 mM NaF |
| 1 µg/ml leupeptin | 3 mM $Na_4P_2O_4$ |

**5X SDS sample Buffer:**

312.5 mM Tris-HCl (pH 6.8) 10% SDS (w/v)

250 mM DTT

50% Glycerol

0.05% Bromophenol Blue (w/v)

Use at 1X

**10X SDS Running Buffer:**

Dissolve 144 g of Glycine, 30 g of Tris base and 10 g SDS in 800 ml of distilled H2O.

Add distilled H2O to 1 liter

Use at 1X

**Transfer Buffer:**

2.25 g Tris base

10.5 g Glycine 1 g SDS

200 ml Methanol

Add distilled water to 1.0 L

## Protocol

Preparation of antibody-protein G agarose beads

**Step 1.**

Wash protein G agarose beads with cell lysis buffer by pulsing in a microcentrifuge tube (two minutes at 5,000 rpm).

DURATION
00:02:00

Preparation of antibody-protein G agarose beads

**Step 2.**

Aspirate and discard supernatant.

Preparation of antibody-protein G agarose beads

**Step 3.**

Wash the beads with celllysis buffer (1/3).

Preparation of antibody-protein G agarose beads

**Step 4.**

Wash the beads with celllysis buffer (2/3).

Preparation of antibody-protein G agarose beads

**Step 5.**

Wash the beads with celllysis buffer (3/3).

Preparation of antibody-protein G agarose beads

**Step 6.**

Adjust antibody concentration to 5-10 µg/ml in PBS and transfer 500 µl of diluted antibody to 5-10 µl of agarose beads for each sample.

Preparation of antibody-protein G agarose beads

**Step 7.**

Place the antibody-protein G agarose mix on a shaker and rotate at 4°C for one hour.

DURATION

01:00:00

Preparation of antibody-protein G agarose beads

**Step 8.**

Spin down the protein G beads for two minutes at 5,000 rpm and wash the antibody-beads three times with cell lysis buffer.

DURATION

00:02:00

Preparation of cell extract

**Step 9.**

Collect cells and centrifuge at 1200 rpm for 5 minutes at 4°C.

DURATION

00:05:00

Preparation of cell extract

**Step 10.**

Discard the supernatant and immediately add 800 µl of ice-cold lysis buffer to the cells and vortex, then incubate for 30 minutes on ice.

DURATION
00:30:00

Preparation of cell extract

**Step 11.**

Freeze and thaw the samples with dry ice for two more cycles or sonicate for 15 seconds to ensure the full release of the proteins from the cells.

DURATION
00:00:15

Preparation of cell extract

**Step 12.**

Spin lysates at 14,000 rpm in a pre-cooled centrifuge for 10 minutes and keep the supernatant.

DURATION
00:10:00

Immunoprecipitation

**Step 13.**

Adjust the protein concentration of the supernatant to 1-2 mg/ml with lysis buffer.

Immunoprecipitation

**Step 14.**

Mix 100-500 µl of cell extract with antibody-protein G agarose and rotate the samples at 4°C for about two hours.

DURATION
02:00:00

Immunoprecipitation

**Step 15.**

Collect the agarose beads by pulsing in a microcentrifuge tube (two minutes at 5,000 rpm, 4°C).

DURATION
00:02:00

Immunoprecipitation

**Step 16.**

Aspirate and discard the supernatant.

Immunoprecipitation

**Step 17.**

Wash the beads with ice-cold cell lysis buffer (1/3).

Immunoprecipitation

**Step 18.**

Wash the beads with ice-cold cell lysis buffer (2/3).

Immunoprecipitation

**Step 19.**

Wash the beads with ice-cold cell lysis buffer (3/3).

Immunoprecipitation

**Step 20.**

After the final wash, remove the supernatant and add 20 µl of 2X SDS sample buffer.

Immunoprecipitation

**Step 21.**

Boil for 5 minutes at 95°C.

DURATION

00:05:00

Immunoprecipitation

**Step 22.**

Spin down the beads at maximum speed in a microcentrifuge for 5 minutes at room temperature.

DURATION

00:05:00

Immunoprecipitation

**Step 23.**

Carefully pipette off the supernatant.

Immunoprecipitation

**Step 24.**

Load 30 µl of sample in each well of a 1.5 mm thick gel. Run the gel according tomanufacturer's recommendations and continue with immunoblotting using BioLegend's Western Blotting protocol (alternately, radiolabeled proteins prepared from target cells can beused to directly visualize the immunoprecipitated protein).