

**Fucose (FucAz) Modified Glycoprotein Assay Kit (FACS/Microscopy, Green Fluorescence) (BN00819)**  
(Catalog #BN00819; 100 assays; Store at -20°C)

**I. Introduction:**

Glycans are vital components of glycoproteins, glycolipids, and proteoglycans in all domains of life. Glycosylation occurs co- or post-translationally on >50% of eukaryotic proteins resulting in membrane-associated, intracellular, or secreted glycoproteins that are crucial in cellular processes, protein bioactivity and metabolic turnover. Glycoproteins are grouped by the type of carbohydrate and amino acid linkage site. Fucose is found in glycoproteins and glycolipids present in vertebrates, invertebrates, plants, and bacteria. It is often a terminal sugar in glycans participating in cell–cell signaling and migration implicated in physiological and pathological processes such as fertilization, embryogenesis, lymphocyte trafficking, immune responses, and cancer metastasis. Most target proteins undergoing fucosylation are secretory or membrane proteins on the cell surface. Fucosylation is one of the most important modifications involved in cancer and inflammation. Several types of biomarkers containing fucose are linked to cancer e.g. alpha-fetoprotein (AFP) is used in the diagnosis of hepatocellular carcinoma and surface glycosphingolipid Globo H is an epitope found on the cell surface of breast, prostate, and ovarian cancers. Since glycoproteins are not directly encoded in the genome, methods of their characterization and analyses are of great interest. Thus, Assay Genie offers Fucose (FucAz) Modified Glycoprotein Assay Kit, a highly specific, simple and robust method for labeling and detection of fucosylated proteins within cells. We use fucose analog that is fed directly into the cells, processed via fucose salvage pathway and incorporated into the glycoproteins. Followed by click reaction with alkyne-containing dye, this system offers a powerful method for imaging the localization, trafficking, and dynamics of glycans, or detection by FACS for quantitative studies. Fucose-labeled glycoproteins can be directly detected in 1D or 2D gels using the appropriate excitation sources, or enriched by immunoprecipitation with biotin-alkyne or antibodies prior to proteomic analysis. We provide sufficient materials for 100 assays in a 96-well plate format.

**II. Applications:**

- Identification, characterization and profiling of fucose-modified targets
- Metabolic Tagging of fucosylated biomolecules
- Imaging the localization, trafficking, and dynamics of fucose-modified glycans
- Detection and quantification of biosynthesis, subcellular localization and turnover of fucose-modified glycans
- Screening for genotoxic compounds and effectors of fucosylation in proliferating cells
- Evaluating effects of anti-cancer drugs on fucose-modified biomolecules

**III. Sample Type:**

- Suspension or adherent cell cultures

**IV. Kit Contents:**

Components	BN00819	Cap Code	Part Number
Wash Buffer (10X)	25 ml	NM	BN00819-1
Fixative Solution	10 ml	WM	BN00819-2
Permeabilization Buffer (10X)	25 ml	NM/Blue	BN00819-3
FucAz Label (1000X)	10 µl	Clear	BN00819-4
Copper Reagent (100X)	100 µl	Blue	BN00819-5
Fluorescent Alkyne (100X)	100 µl	Green	BN00819-6
Reducing Agent (20X)	500 µl	Yellow	BN00819-7
Total DNA Stain (1000X)	20 µl	Blue	BN00819-8

**V. User Supplied Reagents and Equipment:**

- Tissue culture vessels and appropriate culturing media; flow cytometry vessels
- Phosphate Buffered Saline (PBS, pH 7.4)
- Sterile 0.1% Gelatin Solution (optional, only required for adhering suspension cells to the surface)
- Flow cytometer equipped with laser capable of excitation at 488 and 530/590 nm emission filters respectively
- Fluorescence microscope capable of excitation and emission at 440/490 and 540/580 nm respectively

**VI. Storage Conditions and Reagent Preparation:**

Upon arrival, store the entire kit at -20°C protected from light. Briefly centrifuge small vials prior to opening. Read the entire protocol before performing the assay.

- **10X Wash Buffer and 10X Permeabilization Buffers:** Dilute the 10X stocks 1:10 in sterile water, mix well. Store at 4 °C.
- **Fixative Solution:** Ready to use, after opening store at 4°C, protected from light.
- **Remaining components:** Store at -20°C protected from light. While in use, keep on ice and minimize light exposure.

**VII. Assay Protocol:**

**Notes:**

This assay was developed with HeLa (adherent) and Jurkat (suspension) cells and can be modified for any cell line. The protocol below refers to a 96-well tissue culture plate format and assay volume is 100 µl; adjust volumes accordingly for other plate formats. Growth conditions, cell number per well and other factors may affect the incorporation rate of the FucAz Label; therefore optimize the assay for your cell type. We suggest an initial test of several FucAz Label concentrations to find best conditions for your experimental design. Avoid stressing the cells by washes or temperature changes prior to incubation with FucAz Label. All steps should be carried out at room temperature (RT) unless otherwise specified; equilibrate all buffers to RT prior to the experiment

**1. Labeling with FucAz Label:**

- a. Seed the cell suspension of desired density directly into tissue culture vessels, or on coverslips for high resolution microscopy. **To immobilize suspension cells for microscopy:** add 100  $\mu$ l of 0.1% gelatin solution into each well of a tissue culture plate, tilt the plate to cover the entire well surface and place it in a tissue culture hood for 1 hour. Gently remove the gelatin solution and seed your cells. Allow the cells to recover overnight before the treatment.
- b. Next day, remove the media, and replace it with fresh aliquots containing 1X FucAz Label. Include appropriate controls. **Negative control** -cells not exposed to the 1X FucAz Label or treatment, **positive control** -cells incubated with 1X FucAz Label only. *Do not add the FucAz Label into the **negative control** cells.*
- c. Add treatments and incubate the cells for additional 1-3 days in a 37°C incubator, or for the period of time required by your experimental protocol. For analysis of trafficking and dynamics of cellular glycans take samples during incubation. Do not remove the drug-containing media while incubating with 1X FucAz Label to avoid potential reversibility of drug action on label incorporation.
- d. Terminate the experiment, remove the media and rinse the cells once with 100  $\mu$ l of PBS, discard the supernatant. Always pellet the **suspension cells** at 300 x g for 5 min throughout the entire protocol. **For immobilized suspension cells:** Centrifuge the plate at 300 x g (or the lowest centrifuge setting) for 5 minutes to gently deposit the cells onto the surface. Tilt the plate and **gently** remove the media with a pipette tip. It is important to avoid excessive centrifugation speeds, which can damage the cells. *Make note of the place that is used, and perform subsequent aspirations from the same place.* Proceed to the Fixation and Permeabilization.

## 2. Fixation and Permeabilization:

**For adherent and suspension cells:** Add 100  $\mu$ l of Fixative Solution per well and incubate the cells for 15 min at RT protected from light. Remove the fixative and wash the cells twice with 100  $\mu$ l of 1X Wash Buffer. Remove the wash and add 100  $\mu$ l of 1X Permeabilization Buffer per well, incubate the cells for 10 min at RT. Remove the Permeabilization Buffer and replace it with a 20  $\mu$ l of fresh aliquot. Proceed to reaction and total DNA staining.

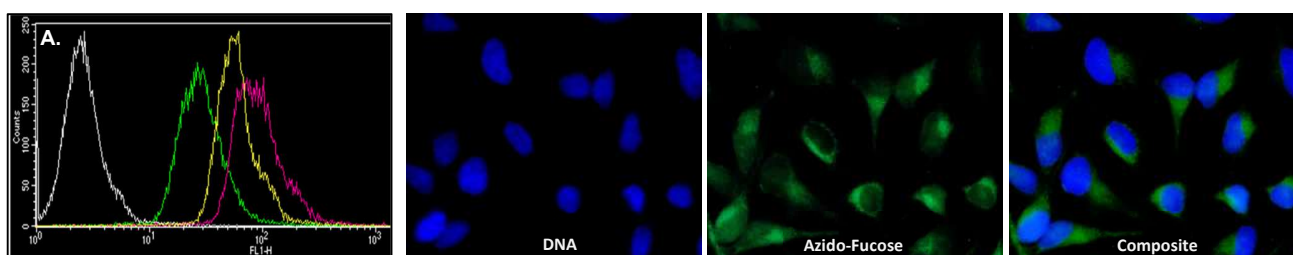
## 3. FucAz reaction and total DNA staining:

- a. **Reaction cocktail:** Prepare 1X reaction cocktail according to the table below. Volumes should be multiplied by number of samples and reagents added in the exact order. Use the reaction cocktail within 15 minutes of preparation. *Cells should be protected from light during, and following the reaction and DNA staining.*

	Amount per Reaction
PBS	93 $\mu$ l
Copper Reagent (100X)	1 $\mu$ l
Fluorescent Alkyne (100X)	1 $\mu$ l
Reducing Agent (20X)	5 $\mu$ l

- b. **Reaction:** Add 100  $\mu$ l of 1X Reaction cocktail to each sample and incubate the cells for 30 min at room temperature protected from light. Remove the reaction cocktail and wash cells three times in 100  $\mu$ l of Wash Buffer. Remove the wash and suspend the cells in 100  $\mu$ l of PBS. Proceed to DNA staining. If no DNA staining is desired, proceed to Microscopic or FACS analysis. **DNA staining:** Prepare 1X dilution of Total DNA Stain and add 100  $\mu$ l per well. Incubate the cells for 20 minutes at room temperature, or refrigerate at 4 °C protected from light. Remove the stain solution and replace with 100  $\mu$ l of PBS.

4. **Fluorescence Microscope analysis:** Examine labeled glycoproteins using FITC filter and UV laser for total DNA staining. **FACS analysis:** Harvest the adherent cells by preferred method; wash with 100  $\mu$ l of PBS. Re-suspend the cell pellets in 100  $\mu$ l of ice-cold PBS and transfer the cell suspension into flow cytometry vessels. Analyze samples in FL-1 channel for signal generated by labeled glycoproteins.



**Figure:** Analysis of metabolic labeling of FucAz labeled glycans in proliferating cells. **A.** Jurkat cells ( $1 \times 10^6$  cells/ml) were cultured in presence of 1X FucAz Label for 72 hours at 37°C. Modified glycoproteins were detected according to the kit protocol and green fluorescence was analyzed by FACS (FL-1 channel). Negative control (**white line**), Background control (**green line**), Positive control - fluorescence corresponding to fucosylated glycoproteins (**pink line**), Tunicamycin-induced suppression of fucosylation (**yellow line**). **B.** Fluorescence Microscope images of subcellular localization (**middle panel**) of Fucosylated glycoproteins in fixed HeLa cells. Nuclear staining (**left panel**) and composite image (**right panel**).

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