StreptaClick–HRP Multiplex IHC kit

Size:

Large 500 µl (200 stainings, 100 µL/staining)

Small 170 µl (70 stainings, 100 µL/staining)

Kit content and Storage:

StreptaClick–HRP (antibody labeling reagent):	-20°C
Biotin block buffer:	+4°C
HRP block buffer:	+4°C
3% H_2O_2:	+4°C

Not provided in the kit

- Tyramide fluorochromes
- Tyramide amplification buffer

This document contains protocols for (A) antibody click labeling with horseradish peroxidase (HRP), and (B) the use of the HRP-labeled antibodies for tyramide signal amplification (TSA) multiplex immunostaining.

Introduction

The StreptaClick–HRP Multiplex IHC kit provides a powerful method for multiplex immunohistochemistry using tyramide signal amplification (TSA) on frozen tissue sections. The method is based on horseradish peroxidase (HRP) that with click chemistry is attached to biotinylated antibodies using a processed form of streptavidin conjugated with HRP (StreptaClick–HRP). The HRP–labeled biotinylated antibodies can then be used for multiple cycles of immunostainings where each fluorochrome is sequentially developed by TSA (TSA reagents are not provided). The kit contains a HRP block buffer optimized for preserving the morphology of frozen tissue sections. The HRP block buffer rapidly quenches the HRP enzyme at room temperature after each TSA cycle, and allows sequential multiplex IHC of up to six antibodies in one day.

Applications

Single and multiplex immunofluorescence staining of frozen tissue sections using TSA to develop fluorescent color(s).

Before you begin

If the antibody is biotinylated 'in house' using a biotinylation kit, excess free biotin must be removed before use (e.g. by a spin column).

Do not use dry milk in the immunostaining buffer. It may contain free biotin that can quench StreptaClick–HRP during the antibody labeling step. If desired, dry milk can be added after the antibody labeling reaction.

Dilute the biotinylated antibody with your immunostaining buffer of choice (e.g. PBS with 0.5% bovine serum albumin) before mixing with StreptaClick–HRP. Pre-diluting to a working concentration avoids HRP quenching by sodium azide that is often used as a preservative in antibody stock solutions.

The antibody labeling reaction is not affected by BSA or other stabilizing proteins that may be present in antibody preparations.

The ratio between biotinylated antibody and StreptaClick–HRP is important for optimal HRP labeling (Table 1). Make sure that you know the approximate antibody stock concentration. To avoid pipetting errors, use intermediate dilution if using less than 1 µl of the antibody stock solution.

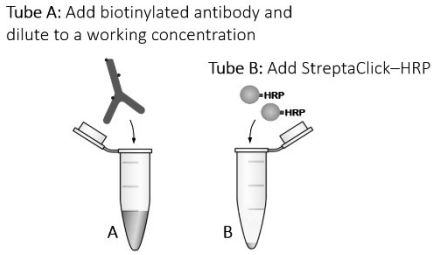
Table 1. Volume of StreptaClick–HRP and Biotin Block buffer for each µL antibody (stock solution)

Antibody stock concentration	Antibody (µl)	StreptaClick-HRP (µl)	Biotin block buffer (µl)
1 mg/mL	1 µL	20 µL	20 µL
0.5 mg/mL	1 µL	10 µL	10 µL
0.1 mg/mL	1 µL	2 µL	2 µL

The antibody labeling is performed at room temperature (RT). Multiple biotinylated antibodies can be labeled with HRP in parallel. Store the HRP-labeled antibodies at +4°C, and use them for TSA immunostaining within 8 hours.

(A) HRP labeling protocol

The HRP labeling protocol attaches HRP to biotinylated antibodies that will be used for TSA immunostaining.

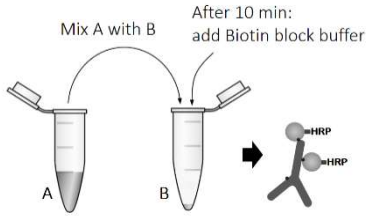


1. Put two tubes of the same size in a rack (e.g. 1.5 ml microfuge tubes).

2. In the first tube (Tube A), add the desired amount of biotinylated antibody to be used for TSA immunostaining. Avoid pipetting volumes of <1 µl.

3. Dilute the antibody with immunostaining buffer of choice to the working concentration that will be used in the TSA immunostaining. As a guidance, use a 1:500-1:1500 dilution from a 1 mg/ml antibody stock solution.

4. To the second tube (Tube B), add the appropriate amount of StreptaClick–HRP according to Table 1.

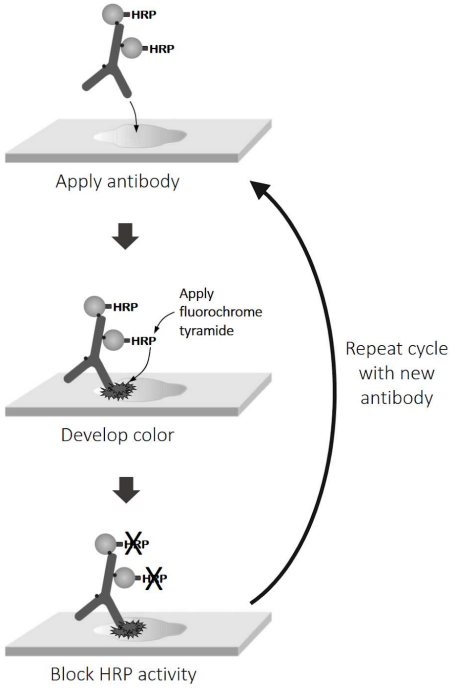


5. Transfer all antibody solution from the first tube to the second tube and mix immediately by pipetting up and down. Avoid bubbles.

6. After 10 minutes or more, add Biotin block buffer according to Table 1 and mix. The Biotin block buffer immediately inactivates any remains of active StreptClick–HRP. The biotinylated antibody is now labeled with HRP and ready to be used for TSA immunostaining.

(B) TSA immunostaining protocol

The HRP-labeled antibodies can be used for multiplex TSA immunostaining. The protocol does not use heat treatment between cycles, which allows TSA multiplex immunostaining on frozen tissue sections. Each staining cycle contains three main procedures – Antibody incubation, Color development, and HRP block.



1. Prepare your tissue sections for immunostaining according to standard protocols. There is no need for avidin/biotin blocking.

2. Block endogenous peroxidases with the provided HRP block buffer. Add 1 µl 3% H_2O_2 to each 100 µl of HRP block buffer and apply to the tissue sections. Incubate for 12 minutes at RT. The HRP block buffer/H_2O_2 will also be used in step 5 and can be stored at +4°C in the dark for 8 hours.

3. Apply HRP-labeled antibody to your tissue sections and incubate 30-45 minutes at RT. Wash x3 in PBS.

4. Dilute tyramide fluorochrome in tyramide amplification buffer and apply to your samples. Tyramide reagents are not provided in the kit. Incubate 10 minutes at RT and wash x2 in water or PBS.

5. Apply HRP block buffer/H_2O_2 to the tissue sections and incubate for 12 minutes at RT. This step is only needed when another immunostaining cycle will be performed. Wash x3 in PBS.

6. Repeat steps 3-5 with the next HRP-labeled antibody.

7. Wash, mount, and analyze under a fluorescence microscope.

Trouble shooting guide

Weak/No signals

- Check that your biotinylated antibody works using a two-step immunostaining with the StreptaClick–HRP; 1) Incubate tissue section with the biotinylated antibody. 2) Wash and incubate tissue sections with StreptaClick–HRP alone diluted 1:20 in PBS. Wash and develop color with TSA.

- The ratio between biotinylated antibody and StreptaClick–HRP is important. Check the concentration of the antibody. If you do not know the exact concentration, test different amounts of labeling reagent during antibody labeling.

- It is important to first prepare an antibody working solution before mixing with StreptaClick–HRP. Pre-diluting to a working concentration avoids HRP quenching by sodium azide that is often used as a preservative in antibody stock solutions.

- Increase the amount of antibody used during the immunostaining step.

- Increase the amount of tyramide fluorochrome during the color developing step. Twice the amount of tyramide fluorochrome can improve the signal significantly.

- The HRP block buffer may not have been washed away properly before adding the next HRP–labeled antibody to the sample.

- Some antibodies have biotin conjugated near the antigen-binding site, resulting in sterical hindrance when attaching the HRP to the antibody. Using less StreptaClick–HRP during the labeling step may help.

- Do not use dry milk in the immunostaining buffer, since it may contain free biotin that quenches the StreptaClick–HRP. If desired, dry milk can be added after the antibody labeling reaction.

Cross-over signal from other antibodies

- The biotin block step may be incomplete. Check that the Biotin block buffer is properly added before applying HRP-labeled antibodies to the tissue.

- The HRP block step may be incomplete. Check that H_2O_2 is properly added to the HRP block buffer. Prolong the incubation time to 15-18 min.