

Product Catalogue Number FP-233 For Diagnostic Use Only – DUO

[IGH/CCND1]; [IGH/MAF]; [IGH/MAFB]; [IGH/FGFR3]

Gene Fusion Probe Detection Kit

[Product Name] [IGH/CCND1] / [IGH/MAF] / [IGH/MAFB] / [IGH/FGFR3] Gene Fusion Probe Detection Kit (Fluorescence In Situ Hybridization Method).

[Intended Usage]

This reagent performs in situ hybridization staining based on the conventional staining to provide physicians with auxiliary information for diagnosis. The test results are for clinical reference only and should not be used as the sole basis for clinical diagnosis. Clinician should make comprehensive judgment on test results based on the patient's condition, drug indications, treatment response, and other laboratory test indicators.

[Detection Principle]

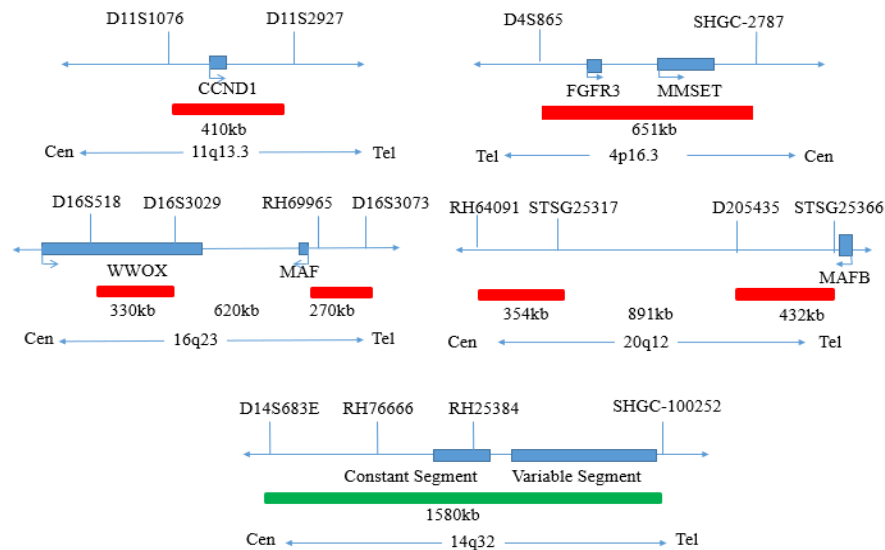
Fluorescence in situ hybridization is a technique for direct observation of specific nucleic acids in cells in vitro. According to the principle of base complementary pairing, specific probes are complementary to the target sequence in the cell. Because the probe is fluorescent, under appropriate excitation light, the hybridization probe and target sequence can be clearly observed under the fluorescence microscope.

[Product Main Components]

The kit consists of [IGH/CCND1] / [IGH/MAF] / [IGH/MAFB] / [IGH/FGFR3] dual color probe as shown in Table 1.

Table 1 Kit composition

Catalogue Number	Component name	Specifications	Quantity	Main components
FP-233-1	CCND1/IGH dual color probe	100µL/Tube	1	CCND1 orange probe ; IGH green probe
FP-233-2	MAF/IGH dual color probe	100µL/Tube	1	MAF orange probe ; IGH green probe
FP-233-3	MAFB/IGH dual color probe	100µL/Tube	1	MAFB orange probe ; IGH green probe
FP-233-4	FGFR3/IGH dual color probe	100µL/Tube	1	FGFR3 orange probe ; IGH green probe



[Storage conditions & Validity]

Keep sealed away from light at $-20^{\circ}\text{C}\pm 5^{\circ}\text{C}$. The product is valid for 12 months. Avoid unnecessary repeated freezing and thawing that should not exceed 10 times. After opening, within 24 hours for short-term preservation, keep sealed at $2-8^{\circ}\text{C}$ in dark. For long-term preservation after opening, keep the lid sealed at $-20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ away from light.

[Applicable Instruments]

Fluorescence microscopy imaging systems, including fluorescence microscopy and filter sets suitable for DAPI (367/452), Green (495/517), and Orange (547/565).

[Sample requirements]

1. Take 1-3ml of heparin sodium anticoagulant bone marrow cells.
2. Sample preservation: Fresh bone marrow specimen without fixation (preserved at $2-8^{\circ}\text{C}$ for no more than 24 hours). After fixation, the cell suspension can be preserved at $-20\pm 5^{\circ}\text{C}$ for no more than 12 months; the prepared cell slide can be preserved at $-20\pm 5^{\circ}\text{C}$ for no more than 1 month. When the storage temperature of the sample is too high or too low, the cell suspension is volatilized excessively or polluted, the sample cannot be used for detection.

[Test method]

Related reagents

① 20×SSC, pH 5.3±0.2

Weigh 176g of sodium chloride and 88g of sodium citrate, dissolve in 800mL of deionized water, adjust the pH to 5.3 ± 0.2 at room temperature, and complete to 1 L with deionized water. High-pressure steam sterilization, stored at $2-8^{\circ}\text{C}$, the solution shelf life is of 6 months. Discard if the reagent appears cloudy (turbid) or contaminated.

② 2×SSC, pH 7.0±0.2

Take 100mL of the above 20×SSC, dilute with 800mL deionized water, mix, adjust the pH to 7.0 ± 0.2 at room temperature, complete to 1L with deionized water, stored at $2-8^{\circ}\text{C}$, the shelf life is of 6 months. Discard if the reagent appears cloudy (turbid) or contaminated.

③ Ethanol Solution: 70% ethanol, 85% ethanol

Dilute 700ml of ethanol with deionized water to 1L. The shelf life is of 6 months. Discard if the reagent appears cloudy (turbid) or contaminated.

④ 0.3% NP-40/0.4×SSC solution, pH 7.0-7.5

Take 0.6mL NP-40 and 4mL 20×SSC, add 150mL deionized water, mix, adjust the pH to 7.0-7.5 at room temperature, with deionized water complete to a volume of 200mL. Stored at $2-8^{\circ}\text{C}$, the shelf life is of 6 months. Discard if the reagent appears cloudy (turbid) or contaminated.

⑤ Fixation solution (methanol: glacial acetic acid = 3:1)

Prepare a ready to use fixation solution by mixing thoroughly 30ml of methanol and 10ml of glacial acetic acid.

⑥ 0.075M KCl solution

Weigh 2.8g of potassium chloride, dissolve in 400mL of deionized water and complete to 500mL with deionized water. Stored at room temperature, the solution shelf life is of 6 months. Discard if the reagent appears cloudy (turbid) or contaminated.

⑦ Diamidinyl phenylindole (DAPI) counterstain

Use commercially available anti-quenching DAPI counterstain.

[Instructions]

1. Sample pre-hybridization processing

- ① Sample collection: take 1-3mL of heparin sodium anticoagulant bone marrow cells.
- ② Cell harvesting: the uncultured marrow cells or the cultured marrow cell samples were aspirated to a 15mL centrifuged tube at the bottom of the tip, and centrifuged at 500g for 5min. The supernatant was carefully aspirated and discarded, leaving about 500 μL of residual liquid to suspend the cells again.
- ③ Cell washing: add 5ml of 1×PBS buffer solution, blow and mix up the heavy suspension cell precipitation, centrifugate 500g for 5min, carefully suck and discard the supernatant, and leave about 500 μL of residual solution to heavy suspension cell; repeat once.
- ④ Cell hypotonic: add 10ml of hypotonic solution to each tube (37°C warm bath in advance), and water bath at 37°C hypotonic for 20min.

- ⑤ Cell pre fixation: add 1ml (10% volume) of fixed solution to the cell suspension after hypotonic treatment, gently blow and mix, centrifugate 500g immediately for 5min, remove the supernatant, and leave about 500 μ L of residual solution for cell suspension.
- ⑥ Cell fixation: slowly add 10ml of the fixed solution to the cell suspension, leave it at room temperature for 10min to fix the cell, centrifugate 500g for 5min, and leave about 500 μ L of the residual solution to re suspend the cell; repeat once (or fix the cell several times until the cell is precipitated, washed and cleaned).
- ⑦ Preparation of cell suspension: after the last centrifugation of cell fixation, the supernatant is sucked off, and a proper amount of fixed solution is added to make cell suspension with appropriate concentration.
- ⑧ Preparation: take 3-10 μ L cell suspension drop to slide, aging at 56°C for 0.5h.

2. Slides pretreatment

- ① The slides were rinsed twice in 2xSSC solution at room temperature for 5min each time.
- ② Dehydration: the cell drops were placed in 70% ethanol, 85% ethanol and 100% ethanol for 2 minutes respectively and then dried naturally.

3. Denaturation and Hybridization

The following operations need to be carried out in the darkroom.

- ① Take out the probe, leave it at room temperature for 5min, turn it upside down with force, mix it well, and then centrifuge it for a short time (no vortex instrument vibration). Take 10 μ L of it and drop it into the cell drop hybridization area, immediately cover the cover glass of 22mm \times 22mm. The probe should be evenly expanded under the cover glass without bubbles, and seal the edge with rubber glue (the edge must be completely sealed to prevent the dry piece from affecting the test results in the hybridization process).
- ② The cell drops were placed on the hybridizer and denatured at 88°C for 2min (the hybridizer should be preheated to 88°C) and hybridized at 45°C for 2-16 hours.

4. Washing

The following operations need to be carried out in the darkroom.

- ① Carefully remove the sealing glue around the cover glass with tweezers to avoid sticking or moving the cover glass, immerse the sample in 2xSSC for about 5s, take it out, gently push a corner of the cover glass to the edge of the slide with tweezers, and gently remove the cover glass with tweezers;
- ② Place the sample at 2xSSC room temperature for 1 min;
- ③ Take out the sample and immerse it in 0.3%NP-40/0.4xSSC solution preheated at 68°C for 2min;
- ④ Take out the sample and immerse it in deionized water preheated at 37°C in advance for 1min; dry it naturally in the dark environment.

5. Dyeing





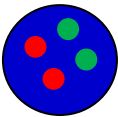
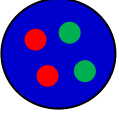
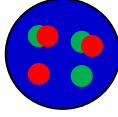
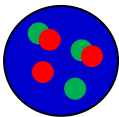




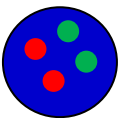
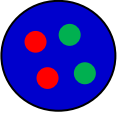
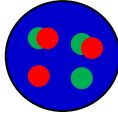
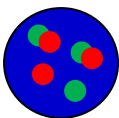
The following operations should be performed in a darkroom

10 μ L DAPI compound dye is dropped in the hybridization area of the glass slide and immediately covered. The suitable filter is selected for glass slide observation under the fluorescence microscope.

6. FISH results observation

Place the stained sections under a fluorescence microscope and the cells area is first confirmed under a low magnification objective (10 \times); under magnification objective (40 \times) a uniform cells distribution is observed; then the nucleus size uniformity, nuclear boundary integrity, DAPI staining uniformity, no nuclei overlapping, cells clear signal are observed in the high magnification objective (60 \times , 100 \times).

[Common Signal Type Interpretation]

 CCND1 signal  IGH signal		 MAF signal  IGH signal	
	Negative: 2 Orange 2 Green		Negative: 2 Orange 2 Green
	Positive: 1 Orange 1 Green 2 fusions (Orange & Green)		Positive: 1 Orange 1 Green 2 fusions (Orange & Green)
 MAFB signal  IGH signal		 FGFR3 signal  IGH signal	
	Negative: 2 Orange 2 Green		Negative: 2 Orange 2 Green
	Positive: 1 Orange 1 Green 2 fusions (Orange & Green)		Positive: 1 Orange 1 Green 2 fusions (Orange & Green)

[Limitations]

1. The results of this kit will be affected by various factors of the sample itself, as well as restrictions such as enzyme digestion time, hybridization temperature and time, operating environment, and limitations of current molecular biology techniques, which may result in erroneous interpretation results.
2. User must understand the potential errors and accuracy limitations that may exist during the testing process.

[Precautions]

1. Please read this manual carefully before testing. The testing personnel should have professional technical training. The signal counting personnel must be able to observe and discern orange, red and green signals.
2. When testing clinical samples, the test will not provide test results when the hybridization signal is difficult to count and the sample is not sufficient for repeated retests, or the amount of cells is not sufficient for analysis.
3. The DAPI counterstaining agent used in this experiment is potentially toxic or carcinogenic. It is recommended to operate under a fume hood. Wear mask and gloves to avoid direct contact.
4. All chemicals are potentially dangerous. Avoid direct contact. Used kits are clinical waste and should be disposed off properly.

[Manuscript version and approval date]

Manual version: V1.0

Approval date: 29 October 2019