



冰冻切片荧光探针原位杂交 (FISH) + 免疫荧光 (IF) 实验报告

1. 实验器材及试剂

1.1. 实验器材

名称	厂家	型号
冰冻切片机	Thermo	Cryotome E
载玻片	Servicebio	
盖玻片	江苏世泰实验器材有限公司	10212432C
无酶离心管	Servicebio	EP-150-M
摇床(钟摆式)	Servicebio	TSY-B
涡旋混匀器	Servicebio	MV-100
移液枪	Dragon	KE0003087/KA0056573
免疫组化笔	Servicebio	G6100
冰箱	青岛海尔股份有限公司	BCD-192TGN
正置荧光显微镜	日本尼康	NIKON ECLIPSE CI
成像系统	日本尼康	NIKON DS-U3
恒温箱	LABOTERY	GSP-70
高压灭菌锅	松下健康医疗	MLS-3751L-PC

1.2. 主要实验试剂

试剂	厂家	货号	稀释比
DEPC	Amresco	E174	
4%多聚甲醛 (DEPC 水)	Servicebio	G1113	
OCT 包埋剂	Servicebio	G6059-110ML	
无水乙醇	国药集团化学试剂有限公司	100092683	
二甲苯	国药集团化学试剂有限公司	10023418	
蔗糖	Servicebio	G5031	
PBS	Servicebio	G0002	
20×SSC 洗脱液	Servicebio	G3016-4	
BSA	Servicebio	G5001	
蛋白酶 K	Servicebio	G1234	
DAPI	Servicebio	G1012	
抗荧光淬灭封片剂	Servicebio	G1401	

地址: 湖北省武汉市高新区高新二路 388 号生物医药加速器 C22 栋 5 楼 网址: <http://www.servicebio.cn>
电话: 4006-027-178

Add: 5th Floor, C22 Building, Biopark, No. 388 Gaoxin 2nd Road, East Lake High-tech Developing Zone, Wuhan, Hubei, China, 430079 Website: <http://www.servicebio.com> Tel: 027-5111-3188



2. 冰冻切片荧光探针原位杂交+免疫荧光实验步骤

2.1. 组织固定: 组织取出洗净后立即放入 4%多聚甲醛 (DEPC 水配制) 固定 12h 以上。

2.2. 脱水: 固定后组织放入 15%蔗糖溶液中 8h, 后换 30%蔗糖溶液中过夜。

2.3. 冰冻切片固定: 冰冻切片室温晾干, 置于 4%多聚甲醛 (DEPC) 固定 10min, 于 PBS (PH7.4) 中在脱色摇床上晃动洗涤 3 次, 每次 5min。

2.4. 消化: 根据组织固定时间长短, 切片于修复液中修复, 修复条件_____, 自然冷却。基因笔画圈, 根据不同组织不同指标特性, 滴加蛋白酶 K (20ug/ml) 37°消化 1-5min。纯水冲洗后 PBS 洗 3 次×5min。

2.5. 预杂交: 滴加预杂交液, 37°C 孵育 1h。

2.6. 杂交: 倾去预杂交液, 滴加含探针____杂交液, 浓度____。恒温箱____度杂交过夜。

2.7. 杂交后洗涤: 洗去杂交液, 2×SSC, 37°C 洗 10min, 1×SSC, 37°C 洗 2×5min, 0.5×SSC 室温洗 10min。若非特异杂交体较多, 可以增加甲酰胺洗涤。

2.8. 滴加封闭液: 滴加封闭血清____。室温 30min。

2.9. 孵育一抗: 滴加一抗_____, PBS 稀释比____。4°过夜。后 PBS 洗 3×5min。

2.10. 孵育二抗: 滴加相应二抗_____, 室温孵育 50min。后 PBS 洗 3×5min。

2.11. DAPI 复染核: 切片滴加 DAPI 染液, 避光孵育 8min, 冲洗后滴加抗荧光淬灭封片剂封片。

2.12. 镜检拍照: 切片于尼康正置荧光显微镜下观察并采集图像。(紫外激发波长 330-380nm, 发射波长 420nm, 发蓝光; FAM(488)绿光激发波长 465-495nm, 发射波长 515-555 nm, 发绿光; CY3 红光激发波长 510-560, 发射波长 590nm, 发红光。)

3. 冰冻切片荧光探针原位杂交+免疫荧光实验结果判读

DAPI 染出来的细胞核在紫外的激发下为蓝色, 阳性表达为相应荧光素标记的荧光。FAM(488) 为绿光, cy3 为红光。mRNA 原位杂交显示结果理论为胞浆阳性, 少数核阳性属正常。micRNA 与 lncRNA 不同指标表达定位不同。免疫荧光结果根据不同指标, 定位不同。根据表达量不同荧光亮度有强弱。

注: 上述涉及到的所有试剂, 仪器等在 RNA 原位杂交实验时都需使用 DEPC 处理后的 RNase free 环境。

附表 1 探针信息



Frozen Tissue–fluorescence Probe-FISH and Immunofluorescence Protocol

1. Apparatus and Reagents

1.1 Apparatus

Name	Producer	Model
Frozen slicer	Thermo	Cryotome E
Glass slide	Servicebio	
Coverslip	Citotest	10212432C
Enzyme-free centrifuge tubes	Servicebio	EP-150-M
Shaker	Servicebio	TSY-B
Vortex	Servicebio	MV-100
Pipettor	Dragon	KE0003087/KA0056573
Liquid Blocker PAP Pen	Servicebio	G6100
Refrigerator	HAIER	BCD-192TGN
Microscopy	Nikon	NIKON ECLIPSE CI
Imaging system	Nikon	NIKON DS-U3
Incubator	LABOTERY	GSP-70
autoclave	PANASONIC	MLS-3751L-PC

1.2 Major reagents

Reagent	Manufacturer	Article Number
DEPC	Amresco	E174
4% of paraformaldehyde (DEPC water)	Servicebio	G1113
OCT embedding agent	Servicebio	G6059-110ML
Ethanol	SCRC	100092683
Xylene	SCRC	10023418
Sucrose	Servicebio	G5031
PBS	Servicebio	G0002
20×SSC solution	Servicebio	G3016-4
BSA	Servicebio	G5001
Proteinase K	Servicebio	G1234

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DAPI	Servicebio	G1012
Anti-fluorescence quenching sealing tablets	Servicebio	G1401
First antibody		
Second antibody		

2. The Steps of the Experiment

- 2.1. **Tissue fixation:** Tissue was washed and fixed with 4% paraformaldehyde for 12 h or more.
- 2.2. **Tissue dehydration:** Transfer tissue to 15% sucrose solution for 8 h and were subsequently to a 30% sucrose solution overnight.
- 2.3. **Frozen section fixation:** The frozen sections were dried at room temperature, fixed in 4% paraformaldehyde (DEPC) for 10 min, and shaken on the shaker in PBS (pH 7.4) three times for 5 min each.
- 2.4. **Digestion:** Mark the objective tissue with liquid blocker pen, according to the characteristics of different tissues and different indicators, add proteinase K (20 ug/ml) to cover tissues and incubate at 37°C for ____ minutes. Washed with sterilized water and then washed three times with PBS for 5 min each time.
- 2.5. **Prehybridization:** Add hybridization buffer onto specimen and incubate at 37°C for 1h.
- 2.6. **Hybridization:** Remove the pre-hybridization solution, add the _____ probe hybridization solution with concentration of _____, and incubate the section in a humidity chamber and hybridize overnight at ____°C.
- 2.7. **Washing:** Remove the hybridization solution. Wash sections in 2×SSC for 10 min at 37°C , 1×SSC two times for 5 min each at 37°C, and 0.5×SSC for 10 min at room temperature. Formamide washing can be added if there are more non-specific hybrids.
- 2.8 **Blocking:** Add blocking serum to the section and incubate at room temperature for 30 min.
- 2.9 **Incubate first antibody:** PBS solution containing a _____dilution of primary antibody were added and incubated at 4°C overnight. Samples were then washed with PBS three times for 5 min each at RT.
- 2.10 **Incubate second antibody:** After washing, the section was incubated for 50 min with second antibody at RT. Samples were then washed with PBS three times for 5 min each at RT.
- 2.11. **Stain cell nuclei (counter stain):** Incubate with DAPI for 8min in the dark, and then mounting with anti-fluorescence quenching sealing tablets.
- 2.12. **Microscopic examination and photography :** To take photos with positive fluorescence microscope. DAPI glows blue by UV excitation wavelength 330-380 nm and emission wavelength 420 nm; FAM glows green by excitation wavelength 465-495 nm and emission wavelength 515-555 nm; CY3 glows red by excitation wavelength 510-560 nm and emission wavelength 590



nm.

3. Interpretation of the Results

The nuclear stained by DAPI were blue under ultraviolet excitation, and the positive expression was a kind of fluorescence labeled by corresponding luciferin. FAM (488) appears green, cy3 appears red. The results of mRNA in situ hybridization were cytoplasmic positive and a few nuclear positive were normal. MicRNA and lncRNA were expressed differently. According to the expression, Different fluorescence brightness is strong or weak.

Note: All reagents, instrument need RNase free.

Attached table 1 probe information.