BIOCARE MEDICAL

# TRIDENT FISH™ | Organ / Disease


Dive into *in situ* hybridization (ISH) with Biocare's new TRIDENT FISH™ probes. Updated sequence-specific probes with superior labeling technology are available for cancer and disease states – yielding clear results with less ambiguity. Patent-pending del-TECT™ probe design virtually eliminates error due to the truncation artifact in FFPE tissues giving you more confidence in less time.

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## Prostate

With disease panels like PTEN, TMPRSS2/ERG and Androgen Receptor (AR), more informative disease stratification is possible.[1] MYC amplification and NKX31 allelic loss are significant predictors of prostate cancer progression and aggressiveness.[2,3] The novel tumor suppressor PHLPP1 is deleted as frequently as PTEN in prostate cancer, and may represent a therapeutic target for suppressing oncogenic pathways.[4]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| PTEN del-TECT™ Four Color | PTEN | | PFR 7032 A |
| ERG (21q22) Break Apart (Red/Green) | ERG (BA) | | PFR 7011 A |
| TMPRSS2/ERG del-TECT™ Four Color | ERG (BA) | | PFR 7049 A |
| AR (Xq12) Red + Copy Control Xp11.21 Green | AR | | PFR 7004 A |
| NKX/MYC del-TECT™ Four Color | NKX3.1 | | PFR 7030 A |
| MYC (8q24) Orange | MYC | | PFA 7293 V |
| MYC (8q24) Orange + Copy Control 8 Green | MYC | | PFR 7027 A |
| MYC (8q24) Break Apart (Orange/Green) | MYC | | PFR 7026 A |
| PHLPP1 (18q21) Red + Copy Control 18 Green | PHLPP1 | | PFR 7035 A |

## Lung

Recently, the ALK-EML4 fusion gene has been shown to be an important biomarker for ALK tyrosine kinase inhibitor (crizotinib) treatment in NSCLC[5], and Biocare's unique ALK-EML4 Tri-Color allows detection of ALK break-apart and EML4 fusion in the same test. Patients with either ROS1 rearrangement or MET amplification have also been shown to respond to crizotinib treatment.[6,7] Other small molecule kinase inhibitors have shown activity against RET break apart mutants.[8]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| ALK/EML4 Tri-Color | ALK/EML4 | | PFR 7000 A |
| ALK/EML del-TECT™ Four Color | ALK/EML4 | | PFR 7001 A |
| ALK (2p23.2) Break Apart (Orange/Green) | ALK (BA) | | PFR 7002 A |
| ALK (2p23.2) Break Apart (Red/Green) | ALK (BA) | | PFR 7003 A |
| ROS1 (6q22) Break Apart (Orange/Green) | ROS1 | | PFR 7038 A |
| RET (10q11.21) Break Apart (Orange/Green) | RET | | PFR 7039 A |
| MET (7q31) Orange + Copy Control 7 Green | MET | | PFR 7028 A |

## Melanoma

Cytogenetic abnormalities in RREB1, MYB, and CCND1 loci detected by FISH are sensitive and specific markers of malignancy valuable for differentiating between benign and malignant melanocytic lesions.[9] CDKN2A is frequently deleted in melanoma of all primary subtypes[10], and loss of both CDKN2A and CCND1 correlate with poor responses to inhibitor therapy.[11]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| RREB1 (6p25) Orange | RREB1 | | PFA 7299 V |
| RREB1 (6p25) Orange + Copy Control 6q11.1 Green | RREB1 | | PFR 7037 A |
| Copy Control 6q11.1 Green | Copy Control 6 | | PFA 7178 V |
| Copy Control 6q11.1 Aqua | Copy Control 6 | | PFA 7179 V |
| MYB (6q23) Red/ 6q21 Green | MYB | | PFR 7025 A |
| CCND1 (11q13) Orange | CCND1 | | PFA 7260 V |
| CCND1 (11q13) Orange + Copy Control 11 Green | CCND1 | | PFR 7006 A |
| CDKN2A (p16) Orange | CDKN2A | | PFA 7264 V |
| CDKN2A (9p21.3) Orange + Copy Control 9 Green | CDKN2A | | PFR 7008 A |
| CDKN2A del-TECT™ Four Color | CDKN2A | | PFR 7007 A |

## Cervical

Amplification of TERC appears to be an important associated genetic event in the progression of cervical dysplasia to invasive cancer.[12] 5p15.2 is another locus which displays significant amplification in association with progression to aggressive disease.[13] Increases in genes at and near 20q13 have been specifically associated with cervical cancer progression to higher grade lesions.[14]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| TERC (3q26.2) Red | TERC (3q26) | | PFA 7305 V |
| 5p15.2 Green | 5p15.2 | | PFA 7250 V |
| 5p15.2 Red | 5p15.2 | | PFA 7251 V |
| 20q13.2 Orange | 20q13 (ZNF217) | | PFA 7255 V |
| TERC (3q26.2) Red/ 5p15.2 Green/ 20q13.2 Orange/ CC 10 Aqua | 3q26/5p15.2/20q13/CC10 | | PFR 7043 A |

## Gastric/Esophageal

The set of FISH probes consisting of MYC, CDKN2A (9p21), ERBB2 (HER-2), and 20q13.2 can provide high sensitivity and specificity for the detection of Barrett's associated neoplasia and allow for the differentiation between esophageal adenocarcinoma and high-grade dysplasia (EAC/HGD) or low-grade dysplasia and non-dysplasia (LGD/ND).[15]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| CDKN2A (p16) Orange | CDKN2A | | PFA 7264 V |
| CDKN2A (9p21.3) Orange + Copy Control 9 Green | CDKN2A | | PFR 7008 A |
| CDKN2A del-TECT™ Four Color | CDKN2A | | PFR 7007 A |
| MYC (8q24) Orange | MYC | | PFA 7293 V |
| MYC (8q24) Orange + Copy Control 8 Green | MYC | | PFR 7027 A |
| MYC (8q24) Break Apart (Orange/Green) | MYC | | PFR 7026 A |
| ERBB2 (17q12) Orange | ERBB2 (HER-2) | | PFA 7273 V |
| ERBB2 (17q12) Red | ERBB2 (HER-2) | | PFA 7274 V |
| ERBB2 (17q12) Orange + Copy Control 17 Green | ERBB2 (HER-2) | | PFR 7014 A |
| ERBB2 (17q12) Red + Copy Control 17 Green | ERBB2 (HER-2) | | PFR 7015 A |
| 20q13.2 Orange | 20q13 (ZNF217) | | PFA 7255 V |

## Bladder

Amplification at the 5p15.2 locus is strongly linked to high-grade, advanced-stage bladder tumors and rapid tumor cell proliferation in urinary cancer.[16] Cytogenetic analysis demonstrated that 5p might be involved in translocations and/or formation of isochromosomes in a substantial number of bladder tumors.[17] Gains at Chromosomes 3, 7, and 10 are seen more frequently in invasive urothelial tumors.[18]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| 5p15.2 Red | 5p15.2 | | CFA 7251 A |
| Copy Control 10 Green | Copy Control 10 | | CFA 7200 A |
| Copy Control 3 Aqua | Copy Control 3 | | CFA 7164 A |
| Copy Control 7 Orange | Copy Control 7 | | CFA 7187 A |

## Breast

Amplification of HER-2 has been demonstrated to predict poor clinical outcome in breast cancer patients, and is shown to be associated with resistance to certain chemotherapeutic agents.[19,20] Determining amplification of HER-2 is crucial in the guidance of treatment decisions for the use of HER-2-targeted therapies, and is becoming a standard recommendation in the pretreatment work-up of patients with invasive breast cancer.[21] Loss of PTEN may have prognostic significance in breast cancer, and was shown to be associated with poor clinical outcome in HER-2-positive disease.[22,23]

| Probe Name | Target | Colors | Catalog Number |
|---|---|---|---|
| ERBB2 (17q12) Orange | ERBB2 (HER-2) | | PFA 7273 V |
| ERBB2 (17q12) Red | ERBB2 (HER-2) | | PFA 7274 V |
| ERBB2 (17q12) Orange + Copy Control 17 Green | ERBB2 (HER-2) | | PFR 7014 A |
| ERBB2 (17q12) Red + Copy Control 17 Green | ERBB2 (HER-2) | | PFR 7015 A |
| PTEN del-TECT™ Four Color | PTEN | | PFR 7032 A |

## References

1. Lotan, *et al.* Mod Pathol. 2015 Jan;28(1):128-37 2. Kim, *et al.* Cancer Res. 2007 Sep 1;67(17):8229-39 3. Locke, *et al.* Clin Cancer Res. 2012 Jan 1;18(1):308-16 4. Newton AC, Trotman LC. Annu Rev Pharmacol Toxicol. 2014;54:537-58 5. Kwak, *et al.* N Engl J Med. 2010 Oct 28;363(18):1693-703 6. Shaw, *et al.* J Clin Oncol 2012;30:(suppl; abstr 7508) 7. Ou, *et al.* J Thorac Oncol 2011;6:942-6 8. De Falco, *et al.* J Clin Endocrinol Metab 2013;98:E811-9 9. Abásolo, *et al.* Clin Exp Dermatol. 2012 Dec;37(8):838-43 10. Kamb, *et al.* Science. 1994;264(5157):436-440 11. Nathanson, *et al.* Clin Cancer Res. 2013 Sep 1;19(17):4868-78 12. Hopman, *et al.* The Journal of Pathology 2007 210(4):412-9 13. Kudela, *et al.* Acta Obstet Gynecol Scand. 2014 93(10):997-1002 14. Scotto L, *et al.* Genes Chromosomes Cancer. 2008 47(9):755-65 15. Brankley, *et al.* J Mol Diagn. 2006 May;8(2):260-7 16. Zheng, *et al.* Am J Pathol. 2004 Jul;165(1):63-9 17. Sandberg AA, Berger CS. J Urol. 1994 Mar;151(3):545-60 18. Knowles MA. Int J Clin Oncol. 2008 Aug;13(4):287-97 19. Tandon AK, *et al.* J Clin Oncol. 1989 Aug;7(8):1120-8 20. Di Leo A, *et al.* Lancet Oncol. 2011 Nov;12(12):1134-42 21. Mendoza G, Portillo A, Olmos-Soto J. Oncol Lett. 2013 Jan;5(1):295-298 22. Neto JC, *et al.* Exp Mol Pathol. 2012 Feb;92(1):20-6 23. Stern H, *et al.* Clin Cancer Res. 2015 Feb 3. pii: clincanres.2993.2014. [Epub ahead of print]

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