tdTomato—Our Brightest Red Fluorescent Protein

An exceptional tool for imaging applications

- **Extremely bright**
- **Highly versatile**
- **Successful for *in vivo* imaging**

Clontech is now offering **tdTomato Vectors** encoding tandem dimer (td) Tomato, a red fluorescent protein developed in Dr. Roger Tsien's lab. It was derived from a monomeric mutant of DsRed, by several rounds of directed mutagenesis (1), and is detectable by DsRed antibodies (Figure 1).

Engineered for Brightness and Stability

tdTomato is a genetic fusion of two copies of the dTomato gene (2) which was specifically designed for low aggregation (1). Its tandem dimer structure plays an important role in the exceptional brightness of tdTomato (Table I). Its excitation and emission maxima occur at 554 nm and 581 nm, respectively (1). Because tdTomato forms an intramolecular dimer, it behaves like a monomer, and has been used successfully for N- and C- terminal fusions. It shows excellent photostability and its half-time ($t_{0.5}$) for maturation is one hour at 37°C (1).

Outstanding In Vivo Imaging

tdTomato's emission wavelength and brightness make it ideal for live animal imaging studies. In one xenograft mouse model of metastatic breast cancer, tdTomato was easily detected as deep as 1 cm below the surface, and extremely small lesions could be detected and tracked over time (3). A second model used tdTomato to quantify breast cancer tumor growth in response to target gene activation (4).

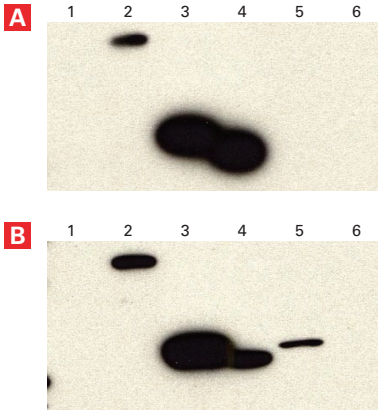

Figure 1. Western blot detection of tdTomato. HEK 293 cells were transiently transfected with mammalian expression vectors encoding the indicated fluorescent proteins, and lysates from the equivalent of 35,000 cells/well were analyzed by Western blot using either DsRed Monoclonal Antibody* (1:500; **Panel A**) or DsRed Polyclonal Antibody (1:1,000; **Panel B**). Lane 1: Control (untransfected cells). Lane 2: tdTomato. Lane 3: mCherry. Lane 4: DsRed-Express. Lane 5: DsRed-Monomer. Lane 6: ZsGreen1.

* Does not detect DsRed-Monomer

Transgenic mouse models have also been developed, including one where tdTomato was used as a reporter for Cre recombination. This model was also useful as a tool for cell lineage tracing, transplantation studies, and analysis of cell morphology *in vivo* (5). tdTomato has also been used very effectively in fusion protein applications (6) and as a promoter reporter (7).

The brightness, photostability, and established uses for tdTomato make it an ideal fluorescent protein for your next imaging application.

Product	Size	Cat. No.
ptdTomato Vector	20 µg	632531
ptdTomato-N1 Vector	20 µg	632532
ptdTomato-C1 Vector	20 µg	632533
pCMV-tdTomato Vector	20 µg	632534
pmCherry Vector	20 µg	632522
pmCherry-N1 Vector	20 µg	632523
pmCherry-C1 Vector	20 µg	632524
pmCherry-1 Vector	20 µg	632525
Living Colors DsRed Monoclonal Antibody	20 µl	632393
	200 µl	632392
Living Colors DsRed Polyclonal Antibody	100 µl	632496

Notice to Purchaser

Please see the CMV Sequence and Fruit Fluorescent Proteins licensing statements on page 25.

References

1. Shaner, N. C. *et al.* (2004) *Nature Biotechnol.* **22**(12):1567–1572.
2. Campbell, R. E. *et al.* (2002) *Proc. Natl. Acad. Sci. USA* **99**(12):7877–7882.
3. Winnard Jr., P. T. *et al.* (2006) *Neoplasia* **8**(10):796–806.
4. Johnstone, C. N. *et al.* (2008) *Mol. Cell Biol.* **28**(2):687–704.
5. Muzumdar, M. D. *et al.* (2007) *Genesis* **45**(9):593–605.
6. Bjørkøy, G. *et al.* (2005) *J. Cell Biol.* **171**(4):603–614.
7. Alandete-Saez, M. *et al.* (2008) *Mol. Plant* **1**(4):586–598.

Table I: Fluorescent Protein Properties[1]

Fluorescent Protein	Excitation Maximum (nm)	Emission Maximum (nm)	Extinction Coefficient Per Chain ($M^{-1}cm^{-1}$)	Fluorescence Quantum Yield	Brightness of Fully Mature Protein	Brightness (% of EGFP)	$t_{0.5}$ for Maturation at 37°C	$t_{0.5}$ for Bleach (sec)
tdTomato	554	581	138,000	0.69	95,220	283%	1 hr	70
mCherry	587	610	72,000	0.22	15,840	47%	15 min	68
EGFP	484	510	56,000	0.60	33,600	100%		115

1 Shaner, N. C. *et al.* (2004) *Nature Biotechnol.* **22**(12):1567–1572.