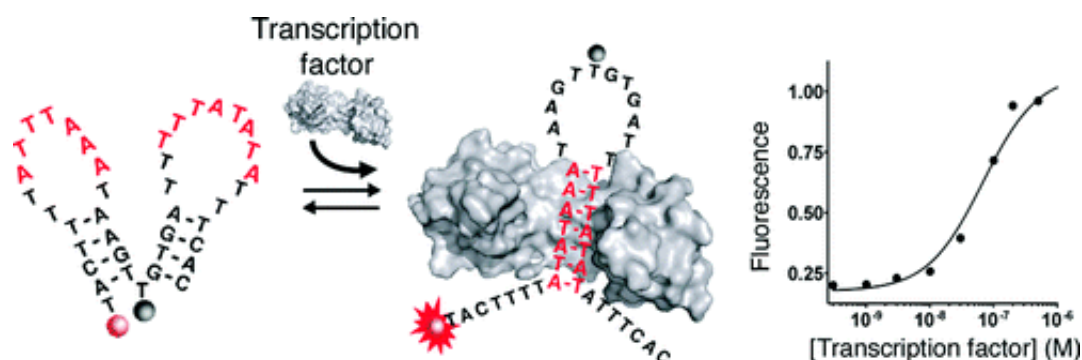


# 'TF beacons' may light path to new cancer tests and drugs

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Scientists are reporting development of a long-sought new way to detect the activity of proteins that bind to the DNA in genes, often controlling the activity of genes in ways that make cells do everything from growing normally to becoming cancerous. Their report appears in the *Journal of the American Chemical Society*.

Kevin Plaxco, Francesco Ricci and colleagues note that more than 10 percent of the 25,000-30,000 genes in the human body contain instructions for manufacturing these so-called DNA-binding proteins. Most of these proteins are master regulators called [transcription factors](#) (TFs). They start or stop the first step in the process in which gene's instructions are put into action. TFs bind to DNA and turn genes on or off. Understanding and measuring the activity of TFs is important

because they are involved in health and disease, with many linked to cancers, for instance. With existing ways of detecting the activity of TFs being slow and cumbersome, the scientists set out to overcome that barrier.

The scientists describe development and successful tests of fluorescent sensors that they term "transcription factor beacons." The beacons signal the activity and concentration of TFs directly in [biological samples](#) by switching from a dark state to a fluorescent state upon binding to their specific TF. Using TF Beacons is simpler and works faster than current methods, and the scientists say TF beacons may have multiple uses in diagnosing cancer, searching for new [cancer drugs](#) and other areas.

**More information:** Transcription Factor Beacons for the Quantitative Detection of DNA Binding Activity, *J. Am. Chem. Soc.*, 2011, 133 (35), pp 13836–13839. [DOI: 10.1021/ja204775k](https://doi.org/10.1021/ja204775k)

## Abstract

The development of convenient, real-time probes for monitoring protein function in biological samples represents an important challenge of the postgenomic era. In response, we introduce here “transcription factor beacons,” binding-activated fluorescent DNA probes that signal the presence of specific DNA-binding activities. As a proof of principle, we present beacons for the rapid, sensitive detection of three transcription factors (TATA Binding Protein, Myc-Max, and NF- $\kappa$ B), and measure binding activity directly in crude nuclear extracts.

Provided by American Chemical Society

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