

NEWS IN BRIEF

observed in cells only seconds after the start of incubation. “We believe, if one would endow the Construct I hybrid vesicles with specific receptor molecules, it should be possible to target them to specific cellular organelles,” says Vogel. Notably, the lipid-coated quantum dots did not appear to have substantial cytotoxic effects.

The Construct II hybrid vesicles, serving as ‘nanocontainers,’ can be filled with water-soluble cargo for delivery inside the cells. Even more interestingly, when the Construct II vesicles fuse with the plasma membrane of a live cell, the quantum dots integrate into the membrane. “Combining the delivery followed by membrane staining is, for instance, helpful for monitoring the events happening at the cell membrane while the cargo is inside,” explains Vogel. The researchers filled the nanocontainers with calcium chloride and incubated them with cells loaded with a fluorescent calcium indicator, to demonstrate that both an intracellular increase in calcium and quantum dot membrane staining could be imaged.

Vogel and his colleagues are quite excited about the nanobiotechnology applications that may become possible by using this intriguing method. For example, magnetic nanoparticles carried in the lipid bilayer of the hybrid vesicles could be delivered to cell membranes. Vogel explains that then by applying an external magnetic field, this could allow “cell sorting, selective isolation of plasma membranes, selective and local manipulation of certain microdomains within the plasma membrane where quantum dots would preferentially be inserted and thereby influence cellular signaling reactions, and the manipulation and isolation of cellular organelles.”

Allison Doerr

RESEARCH PAPERS

Gopalakrishnan, G. *et al.* Multifunctional lipid/quantum dot hybrid nanocontainers for controlled targeting of live cells. *Angew. Chem. Int. Ed.* **45**, 5478–5483 (2006).

G418, but both proved capable of partially restoring luciferase activity in transduced cell lines without apparent toxic effects. These compounds are still relatively new and poorly characterized from a toxicity perspective, but demonstrate the potential for identifying other effective small-molecule activators—although the authors note that the lack of G418 toxicity observed here should still encourage use of this approach in experimental settings.

This system appears to offer a surprisingly simple alternative for effective genetic control, minimally requiring only the insertion of a single terminator codon. Many elements still remain to be clarified for this system—for example, the effect of different terminator codons appears to be variable and context-dependent, and the potential effects of terminator codon insertion on target proteins are unclear. Nonetheless, Mulligan and colleagues believe that with further refinement, this could be a powerful tool for both research and gene-therapy applications. “It should be possible to achieve regulation in the context of virtually any expression vector,” they conclude, “and to provide for the regulation of expression of protein-coding sequences within the context of their normal, endogenous control elements.”

Michael Eisenstein

RESEARCH PAPERS

Murphy, G.J. *et al.* Exogenous control of mammalian gene expression via modulation of translational termination. *Nat. Med.* **12**, 1093–1099 (2006).

Yen, L. *et al.* Exogenous control of mammalian gene expression through modulation of RNA self-cleavage. *Nature* **431**, 471–476 (2004).

DRUG DISCOVERY

Three-hybrid for mammalian cells

As an extension of the yeast two-hybrid systems for detecting protein-protein interactions, yeast three-hybrid systems are used to screen for proteins that interact with a small molecule or vice versa. For drug discovery, however, it would be advantageous to perform these types of screens in mammalian cells. Caligiuri *et al.* now describe MASPIT, or mammalian small molecule-protein interaction trap, a mammalian three-hybrid system.

Caligiuri, M. *et al. Chem. Biol.* **13**, 711–722 (2006).

CHEMICAL BIOLOGY

A new tag-probe system for labeling proteins

Short peptide tag-fluorescent small molecule pairs such as the tetracysteine motif-FLAsH dye are indispensable for cell-biology applications. Ojida *et al.* report that an oligo-aspartate tag and a fluorescently labeled multinuclear zinc(II) complex can serve as a new system for labeling cell-surface proteins. Notably, the properties of the probe can be easily tuned to suit the application.

Ojida, A. *et al. J. Am. Chem. Soc.* **128**, 10452–10459 (2006).

CELL BIOLOGY

Multiplex measurements of neuronal signaling

Signal propagation through individual neurons is often studied using electrophysiology techniques. Patolsky *et al.* have now designed a cell culture-compatible field-effect transistor array of silicon nanowire for the multiplex arraying of neurons. This array facilitates highly sensitive, spatially resolved detection of neuronal signaling, with potential applications in drug discovery and testing.

Patolsky, F. *et al. Science* **313**, 1100–1104 (2006).

PROTEOMICS

Measuring the half-lives of proteins

Using a TAP-tagged yeast library and western blotting after inhibition of protein synthesis, Belle *et al.* have measured the half-lives of more than 3750 proteins in the yeast proteome. This was the final piece of the puzzle that has now allowed them to construct a quantitative model of protein metabolism, using previous large-scale measurements of mRNA levels, translation rates and protein abundances.

Belle, A. *et al. Proc. Natl. Acad. Sci. USA* **103**, 13004–13009 (2006).

IMAGING AND VISUALIZATION

Quadruplex molecular beacons

The hairpin-shaped molecular beacons are becoming increasingly important tools for highly sensitive and specific DNA and RNA detection. When closed, the fluorophore on one end of the molecular beacon is quenched by the quencher at the other end. When bound to a target sequence, however, the hairpin opens and fluorescence is restored. Bourdoncle *et al.* now demonstrate that molecular beacons employing a G-quadruplex motif can be constructed, which may give the user more control over their thermodynamic and kinetic properties.

Bourdoncle, A. *et al. J. Am. Chem. Soc.* **128**, 11094–11105 (2006).