IN BRIEF

PROTEIN METABOLISM

Length matters

One of the functions of polyubiquitin chains is to target proteins for degradation via the 26S proteasome. Recent reports have shown that monoubiquitylation can also serve as a signal for proteolysis. Here, Ciechanover and colleagues find that proteins up to 150 amino acids long can be targeted for degradation by monoubiquitylation, whereas longer proteins need to be polyubiquitylated to become substrates for the ubiquitin–proteasome system. The authors fused a single ubiquitin residue, which in some cases was modified so that polyubiquitylation could not occur, to proteins of different lengths, including haemaglutinin repeats and truncated versions of GFP and dihydrofolate reductase. Fragments shorter than 150 residues were degraded in each case, whereas longer fragments were stable when monoubiquitylated but degraded when polyubiquitylation was allowed. Importantly, the authors showed that monoubiquitylation also targets small endogenous proteins for degradation.

ORIGINAL RESEARCH PAPER Shabek N. *et al.* The size of the proteasomal substrate determines whether its degradation will be mediated by mono- or polyubiquitylation. *Mol. Cell* 16 Aug 2012 (doi:10.1016/j.molcel.2012.07.011)

DNA DAMAGE RESPONSE

Rapid response

Recognition of DNA damage activates a signalling cascade involving post-translational modifications that result in cell cycle arrest and DNA repair initiation. In response to DNA double-strand breaks, histone H2AX is quickly phosphorylated at Ser139 (pSer139) and is thought to be progressively dephosphorylated at Tyr142, resulting in a temporal switch from a diphosphorylated (pSer139 and pTyr142) to a monophosphorylated (pSer139) state. Here, the authors provide evidence that diphosphorylated H2AX (diγH2AX) exists *in vivo* in the early stages of DNA damage repair, and that the DNA damage response protein microcephalin (MCPH1) directly interacts with both diγH2AX and γH2AX. The authors speculate that MCPH1 is recruited to sites of damage as an early response to DNA double-strand breaks, and that progressive dephosphorylation of pTyr142 enhances the interaction between γH2AX and MCPH1, which could result in the recruitment of other repair factors.

ORIGINAL RESEARCH PAPER Singh, N. *et al.* Dual recognition of phosphoserine and phosphotyrosine in histone variant H2A.X by DNA damage response protein MCPH1. *Proc. Natl Acad. Sci. USA* **109**, 14381–14386 (2012)

MEMBRANE TRAFFICKING

A new transport carrier

There is much interest in defining the secretory transport vesicles that sort cargo at the Golgi for trafficking to different regions of the plasma membrane. Wakana *et al.* have found a new class of transport carrier that forms in the *trans*-Golgi network (TGN) and then targets the cell surface in HeLa cells. These carriers, which they term CARTS (carriers of the TGN to the cell surface), require protein kinase D for their biogenesis and myosin II for their movement. They carry a specific set of cargo proteins and are distinct from previously characterized carriers that transport large cargo such as the VSV-G glycoprotein. Characterization of CARTS should therefore provide new understanding of cargo sorting for transport to the cell surface from the Golgi.

ORIGINAL RESEARCH PAPER Wakana, Y. *et al.* A new class of carriers that transport selective cargo from the *trans* Golgi network to the cell surface. *EMBO J.* 21 Aug 2012 (doi:10.1038/emboj.2012.235)