subcellular distribution of this kinase is controlled or how its activity in the nucleus is regulated. In addition, other cooperating factors may be required. Twist, for example, is another transcription factor recently shown to induce EMT and metastasis[12]. Interestingly, Twist induces expression of Snail during *Drosophila* mesoderm induction and, although *snail* mRNA levels did not change after introducing Twist into human mammary epithelial cells, Snail protein levels were not examined[12]. Finally, other Snail-family members, such as Slug and Scratch, may also contribute to EMT induction[5].

Snail is a major contributor to EMTs, but it is not the only one and its relationship with Twist and other Snail family members is going to be a major focus of interest. Numerous studies suggest that loss of E-cadherin is necessary, although not sufficient, to induce EMT and metastasis. In agreement with this, Zhou *et al.* find that re-expression of E-cadherin in the Snail-6SA-expressing MCF-7 cells blocks the increased cell motility[8]. Others, however, have reported that re-expression of E-cadherin does not revert the EMT phenotype[12,13]. It is likely, therefore, that combinations of signalling pathways are required to induce EMT and metastasis, and that other factors essential for EMT remain to be identified[14]. The work by Zhou *et al.* adds another level of complexity to this process, but it also raises some new and exciting ideas about the regulation of EMT by growth factors, with the hope that this might lead to a better understanding of the transition to a metastatic phenotype during tumorigenesis. □

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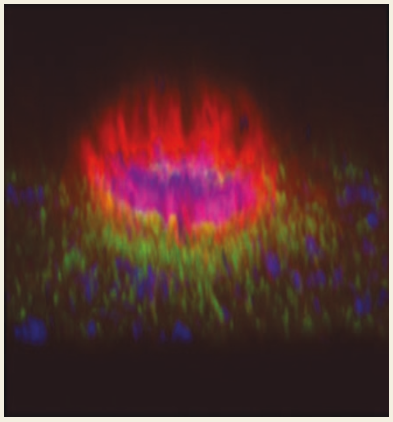
Crossing the tracks

Classically, we have learnt that kinesin and dynein move along microtubules, whereas myosin binds to actin. But in more recent times, the need for crosstalk between the two cytoskeletons in many cellular processes has become increasingly apparent, and the finding now that Myo10 may bind to microtubules as well as actin offers yet another mechanism by which this crosstalk can occur.

Weber *et al.*, in a recent issue of *Nature* (**431,** 325–329; 2004), first reasoned that Myo10 may be a microtubule–F-actin linker on the basis of its primary structure: in its carboxyl terminus there is a MyTH4 domain, which mediates interactions with microtubules in other systems. This suggested that Myo10 might directly associate not only with actin, but also with microtubules. Indeed, Myo10 co-sedimented with microtubules in *Xenopus* egg extracts, and colocalized with microtubules independently of F-actin. Furthermore, it colocalized with meiotic spindle microtubules specifically at the interface between the spindle and the cortex. Deletion analysis confirmed that the MyTH4–FERM domain of Myo10 was essential for the interaction with microtubules.

When Weber *et al.* expressed the Myo10 tail domain, which functions as a dominant negative, they observed displacement of the oocyte nucleus from its characteristic asymmetric localization in the animal hemisphere to the cortex. This phenomenon was not the result of microtubule depolymerization and could be reproduced by the addition of anti-Myo10 antibodies. Thus, Myo10 is required for microtubule-dependent asymmetric anchoring of the oocyte nucleus.

Next, the authors tried to understand the basis of the phenotypes they observed in the oocyte — rotation failure, abnormal spindle structure and multiple microtubule organizing centres (MTOCs). These effects are all similar to those that occur after actin depolymerization during meiotic maturation; however, no actin disassembly was observed. Instead, there was a concentration of F-actin in aggregates on or near to spindles or abortive



Meiotic spindles viewed from inside of the cell, slightly to the side. Blue, actin; green, myosin; red, microtubules.

MTOCs, indicating that Myo10 is essential for proper F-actin–meiotic-spindle interactions. Together, these data suggest that this actin-based motor functions to link the microtubule and F-actin cytoskeletons.

As Weber *et al.* highlight, Myo10 could function in nuclear anchoring by binding to phosphoinositides through its PH domain and by binding to actin and microtubules; alternatively, the motor activity of Myo10 could function in the transport of microtubule-associated spindle components. In either case, this highlights a previously unappreciated function for a myosin in microtubule-based spindle function. Furthermore, as similar MyTH4–FERM domains are present in other myosins, this may be a more general function of other unconventional myosins.

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