**Downstream**

**Placement of the division plane**

Signalling from the PARs regulates the position of the mitotic spindle, which leads to a cell size asymmetry following cytokinesis. This is carried out predominantly by PKC-3, which phosphorylates <> LIN-5. This results in decreased microtubule pulling forces in the anterior, where PKC-3 is highest, leading to a shift in the position of the mitotic spindle towards the posterior. PAR-2 also has a direct effect on spindle pulling forces through an unknown mechanism, independently of aPARs, which may contribute to placement of the division plane (Rodrigues).

**Segregation of fate determinants**

As well as differing in size, the two daughter cells differ in a number of cytoplasmic components which define cell fate during development, which is also set up by signalling from the PARs. Immediately downstream of the PARs is MEX-5, which is organised into a cytoplasmic gradient of MEX-5 in response to asymmetry of PAR-1. PAR-1 phosphorylates MEX-5 (Griffin), which increases its mobility. Working against the action of a uniform phosphatase, PP2A, this leads to an asymmetry in MEX mobility, which leads to accumulation at the anterior where mobility is lowest. <Computer models, Griffin>.

This MEX gradient then sets up a P granule asymmetry by regulating growth and dissolution of phase-separated P-granule droplets (Brangwynne). These granules dominate in the posterior, so are inherited by the P1 cell after cell division. The granules contain fate determinants which are responsible for specifying germ-line fate in the P lineage.

Whilst PAR-2 plays an important role in promoting correct cortical localisation of PAR-1, this appears dispensable for proper segregation of fate determinants in in the zygote. Whilst absent from the cortex in these conditions, PAR-1 is still able to maintain a cytoplasmic concentration and activity gradient (mechanism?), meaning that MEX-5 and P-granule asymmetry are largely intact. Notably, however, localisation of fate determinants is impaired at later stages in the embryo in these conditions. Thus, a primary function of the PAR-1/PAR-2 interaction may be to ensure that PAR-1 is segregated and enriched through the germ line, so that downstream signalling can continue in, and be restricted to, the developing P-lineage.