Abstract: Bilaterality is a major body plan in metazoan phyla. Cells either of the left or right side of bilaterians rarely cross the midline body plane throughout life as evidenced by a naturally occurring mutation, condition of Gynandroph. It has been a longstanding mystery how this evolutionally conserved ipsilaterality in the Bilaterians. We show that a caspase-3 dependent programmed death plays a crucial role for the ipsilaterality in the amniotes. Using the developing chick embryo as a model, we found that cell death along the midline of the primitive streak, a conduit of amniote gastrulation, prevents contralateral cellular ingression. Suppression of Caspase-3 removes the midline cell death program and allows gastrulation cells to ingress into the contralateral side of the body. These results highlight an active role of cell death to establish a barrier that underlie the morphogenetic organization of patterning in avians.

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