Supplementary Methods

In vivo imaging
Labeling of lateral line nerve and two-color time-lapse analysis was carried out as described previously\textsuperscript{14}.

In situ hybridisation and immunohistochemistry
In situ hybridisation was carried out using full-length CXCR4b probe following a standard zebrafish protocol. Axonal stainings were carried using a monclonal anti-acetylated tubulin antibody (Sigma) with an Alexa Fluor 546 goat anti-mouse conjugate (Molecular Probes). Both antibodies were used at a 1:500 dilution.

Zebrafish transplantation
CXCR4b/ody\textsuperscript{J\textsuperscript{1049}} homozygous embryos, generated by inbreeding homozygous adults, were injected with the lineage tracer Alexa-647 Dextran (Molecular Probes). The lateral line nerve H2AGFP transgenic host embryos were ablated by injection with Ngn1 morpholino, used at a concentration of 500 \textmu M. Transplantation was carried out using standard method for zebrafish blastula-stage transplants.