MOVIE LEGENDS

- **Movie S1**. CARMIL2-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2-GFP (left), with tdTomato (right) as a control for cytoplasmic volume, from Figure 1D. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S2**. CARMIL2 C-Term-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 C-Term-GFP (left), with tdTomato (right) as a control for cytoplasmic volume, from Figure 1D. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S3**. CARMIL2 27-aa-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 27-aa-GFP (left), with tdTomato (right) as a control for cytoplasmic volume, from Figure 1D. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S4**. GFP localization at the leading edge, as a negative control. Movie depicts the leading edge of the cell expressing GFP (left), with tdTomato (right) as a control for cytoplasmic volume, from Figure 1D. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S5**. CARMIL2 Δ 11-aa-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 Δ 11-aa-GFP (left), with tdTomato (right) as a control for cytoplasmic volume. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S6**. CARMIL2 GGG-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 GGG-GFP (left), with tdTomato (right) as a control for cytoplasmic volume. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S7**. CARMIL2 EEE-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 EEE-GFP (left), with tdTomato (right) as a control for cytoplasmic volume. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S8**. CARMIL2 C-Term $\Delta 11$ -aa-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 C-Term $\Delta 11$ -aa-GFP (left), with tdTomato (right) as a control for cytoplasmic volume. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S9.** CARMIL2 C-Term GGG-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 C-Term GGG-GFP (left), with tdTomato (right) as a control for cytoplasmic volume. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S10**. CARMIL2 C-Term EEE-GFP localization at the leading edge. Movie depicts the leading edge of the cell expressing CARMIL2 C-Term EEE-GFP (left), with tdTomato (right) as a control for cytoplasmic volume. Images were captured every 6 s. Movie is designed to play at 7 frames/s.
- **Movie S11.** Untreated cell migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.
- **Movie S12.** Cell infected with scramble sequence shRNA control migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.
- **Movie S13.** CARMIL2-depleted cell migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.

Movie S14. CARMIL2-depleted and shRNA-resistant wild-type CARMIL2 expression-rescue cell migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.

Movie S15. CARMIL2-depleted and shRNA-resistant CARMIL2 Δ11-aa expression-rescue cell migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.

Movie S16. CARMIL2-depleted and shRNA-resistant CARMIL2 GGG expression-rescue cell migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.

Movie S17. CARMIL2-depleted and shRNA-resistant CARMIL2 EEE expression-rescue cell migrating over one hour. Images were captured every 60 s. Movie is designed to play at 7 frames/s.