

**Supplementary Video 1.** Example of the rhythmicity on the non-deafferented compared to the deafferented side during stepping at 7 cm/s induced by ES (40 Hz at S1) plus quipazine (0.3 mg/kg) at 7 weeks after a complete spinal cord transection and unilateral deafferentation.

**Supplementary Video 2.** Example of movements induced by ES (40 Hz at S1) plus quipazine (0.3 mg/kg) at 7 weeks post-lesion observed on the non-deafferented and deafferented sides while the spinal rat is suspended above the treadmill (no foot contact) and after contact of the paw with the moving treadmill belt. Note that a slow rhythmic movement is present in the non-deafferented limb when the paw is not in contact with the treadmill belt. Effective plantar stepping with a regular periodicity on the non-deafferented side does not occur until several seconds after initial paw contact on the treadmill belt. On the deafferented side, no oscillatory movements occur when the rat is suspended and once contact is made with the treadmill belt, slow and intermittent oscillations occur after a significantly longer delay relative to the non-deafferented side. Note also that the movements of the deafferented limb are not representative of effective stepping.