Supplemental figure 1. TXNRD1_v1 does not induce filopodia. A) MCF7 cells were transfected over night with TXNRD1_v1–GFP and stained for actin (red), tubulin (magenta) and DNA (blue), which did not provoke cell membrane protrusions. In B), a magnification of the area indicated by the white box in A), is showing partial colocalization of TXNRD1_v1-GFP with actin.
**Supplemental figure 2.** Myristoylation sites in the v3(GRX) domain. Underlined is the consensus sequence for a potential myristoylation site as detected by Prosite ([http://au.expasy.org/prosite/](http://au.expasy.org/prosite/)). In green, is the sequence analyzed by the NMT myristoylation predictor ([http://mendel.imp.ac.at/myristate/SUPLpredictor.htm](http://mendel.imp.ac.at/myristate/SUPLpredictor.htm)) which apart from the tentative myristoylation site also analyzes the adjacent amino acids to confirm whether their characteristics mimic those from already known myristoylated proteins. In this way it can be better assessed whether the protein in question is a good candidate to be recognized and able to bind to myristoylCoA:protein N-myristoyltransferase, the enzyme responsible for the myristoylation reaction and thereby provide more stringent predictions.

**Supplemental figure 3.** ClustalW sequence alignment of the v3(GRX) (GrxDom) against the Glutaredoxin 2. Sequences are colored using Clustalx to highlight identical and similar amino acids.
**Movie1.** Two HEK293 cells 16 hours post transfection expressing TXNRD1_v3-GFP. A z-stack was acquired every minute for one hour. The z stacks were deconvolved and assembled into a movie.

**Movie2.** A close-up of Movie 1 after 3D reconstruction showing the filament forming properties of TXNRD1_v3.

**Movie3.** A HEK293 cell six hours post transfection with TXNRD1_v3-GFP. A z-stack was acquired every minute for one hour. The z-stacks were deconvolved and an area showing the filopodia formation was 3D reconstructed and assembled into a movie.

**Movie4.** A Fluorescence Recovery After Photobleaching (FRAP) experiment of an MCF7 cell transfected with the Grx domain of TXNRD_v3 coupled to GFP. A spot in the membrane was bleached and the recovery was followed for one minute with an image captured every two seconds.

**Movie5.** A close up of an MCF7 cell 16 hours post transfection with TXNRD1_v3-GFP. The cell was treated with 50 µM Cytochalasin B and then followed with a z-stack acquired every nine seconds. Images were deconvolved and a restricted area shown in Fig. 5A was 3D reconstructed and assembled into a movie.

**Movie6.** A close up of a HEK293 cell transfected with actin-CFP (red) and and TXNRD1_v3-GFP (green). The movie depicts the plasma membrane and part of the cytoplasm, followed for one hour with an image obtained every minute.