**Supplementary Figures:**

**Supplementary Figure S1. Dose-dependent cell death in response to either $PR_{20}HA$ or $PR_{20}BAH$, related to Figure 1**

U2OS cells were seeded in 96 well plates at the density of 3,000 cells/well. After overnight incubation, cells were treated with indicated concentration of $PR_{20}HA$ or $PR_{20}BAH$. After 72 hours cells were lysed and viability was measured as described previously (Kwon et al., 2014).

**Supplementary Figure S2. Melting of pre-gelation mCherry:FUS polymeric fibers by varying concentrations of 1,6-hexanediol, related to Figure 2**

**Supplementary Figure S3. Effects of 1,6-hexanediol on co-immunoprecipitation of cellular proteins with flag-tagged $PR_{100}$, related to Figure 4**

3xFlag:$PR_{100}$ expression was either induced with doxycycline (+) or without (-). The right two lanes show proteins co-precipitated with 3xFlag:$PR_{100}$ in the presence or absence of 6% 1,6-hexanediol.

**Supplementary Figure S4. Disease mutations provoke stabilized polymers of hnRNP LC domains, related to Figure 4**

(A) Electron micrographs of polymeric fibers formed from GFP fused to the native LC domains of hnRNPA2, hnRNPA1 and hnRNPDL, or mutated variants bearing D-to-V (hnRNPA2), D-to-V (hnRNPA1) or D-to-N (hnRNPDL) mutations.

(B) SDD-AGE gel analysis of cross-$\beta$ fibers depicted in (A). Ascending triangles reflect incubation for 15 min at 37$^{o}$C in buffer supplemented with SDS concentrations ranging from 0 (left lane of each gel) to 0.1%, 0.5%, 1% or 2%. GFP signals were detected on a fluorescence scanning imager.

**Supplemental Figure S5. Electron microscope images, X-ray diffraction images and SDD-AGE assays of mCherry fusions to the head domains of five intermediate filament proteins, related to Figure 5**

(A) Electron microscope images of polymeric forms of the yeast Sup35 protein and fusion proteins linking the low complexity head domains of the heavy, medium and light neurofilament isoforms and vimentin to mCherry, and the head domain of peripherin to GFP.

(B) X-ray diffraction patterns of hydrogels formed from the five indicated intermediate filament proteins.

(C) SDD-AGE assays of the stability of polymeric fibers made from the yeast Sup35 protein and the head domains of the five indicated intermediate filament proteins. Ascending SDS concentrations went from 0% to 0.1%, 0.5%, 1% or 2% (left to right).

**Supplemental Figure S6. Polymeric fibers formed from low complexity domains derived from intermediate filament head domains in response to the indicated aliphatic alcohols, and electron microscope images of intermediate filaments, related to Figures 5 and 6**

(A) Time-dependent melting of mCherry:NFH, mCherry:NFM, mCherry:NFL and mCherry:peripherin head domain polymers in suspension with 15% of indicated aliphatic alcohols as measured by light scattering at 395 nm (n=2 or 3, data are presented as means $\pm$ SD. Note that error bars for most of the data points are smaller than the symbols).

(B) Electron microscope images of F-actin filaments and microtubules exposed to 1,6-hexanediol for indicated times. Scale bar = 1 μm.

(C) Electron microscope images of F-actin filaments and microtubules exposed to GFP:$PR_{20}$. Scale bar = 500 nm.

(D) Electron microscope image of "tailless" vimentin intermediate filaments exposed to GFP:$PR_{20}$.

**Supplemental Table S1. The list of proteins that are UV cross-linked to the $PR_{20}$BAH peptide, related to Figure 1A**

**Supplemental Table S2. The list of proteins that are immunoprecipitated with 3xFlag:$PR_{20}$ expressed *in vivo*, related to Figure 1B**

The list shows spectra count of proteins immunoprecipitated by the 3xFlag:$PR_{100}$ conditionally expressed in U2OS cells. The expression of 3xFlag:$PR_{100}$ was either induced with doxycycline (SC #2) or not (SC #1).

**Supplemental Table S3. The list of proteins that are common in the both tables S1 and S2, related to Figure 1C**

**Supplemental Table S4. The measured hydrophobicity of various aliphatic alcohols, related to Figure 2**

**Supplemental Video S1. Melting of mCherry:FUS LC hydrogels by 1,6-HD, related to Figure 2A**
Hydrogel droplets of mCherry:FUS LC were incubated with the gelation buffer alone (left) or 15% 1,6-HD in the gelation buffer (right) at 37C˚. mCherry signals were scanned by a confocal fluorescent microscope at every 2 min for 6 hrs. Scanned images were sequentially combined to make the video by QuickTime Player Pro (Apple, USA).