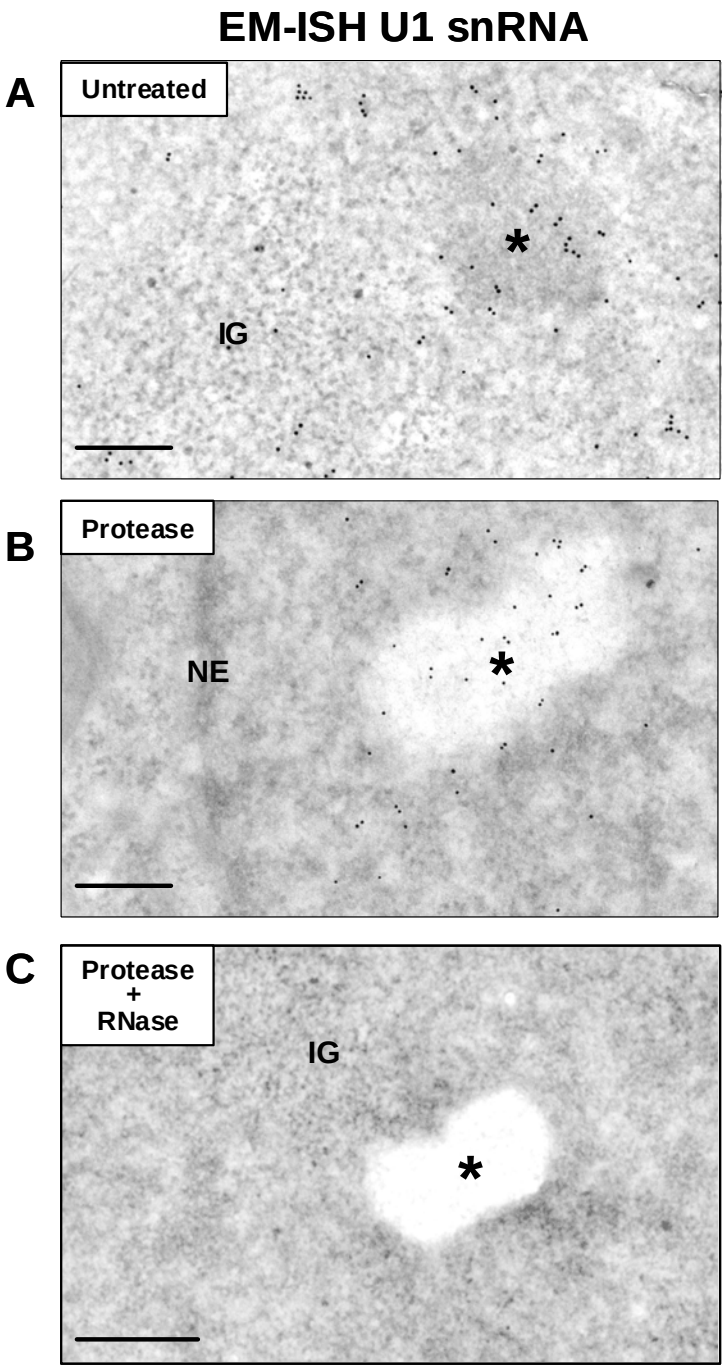
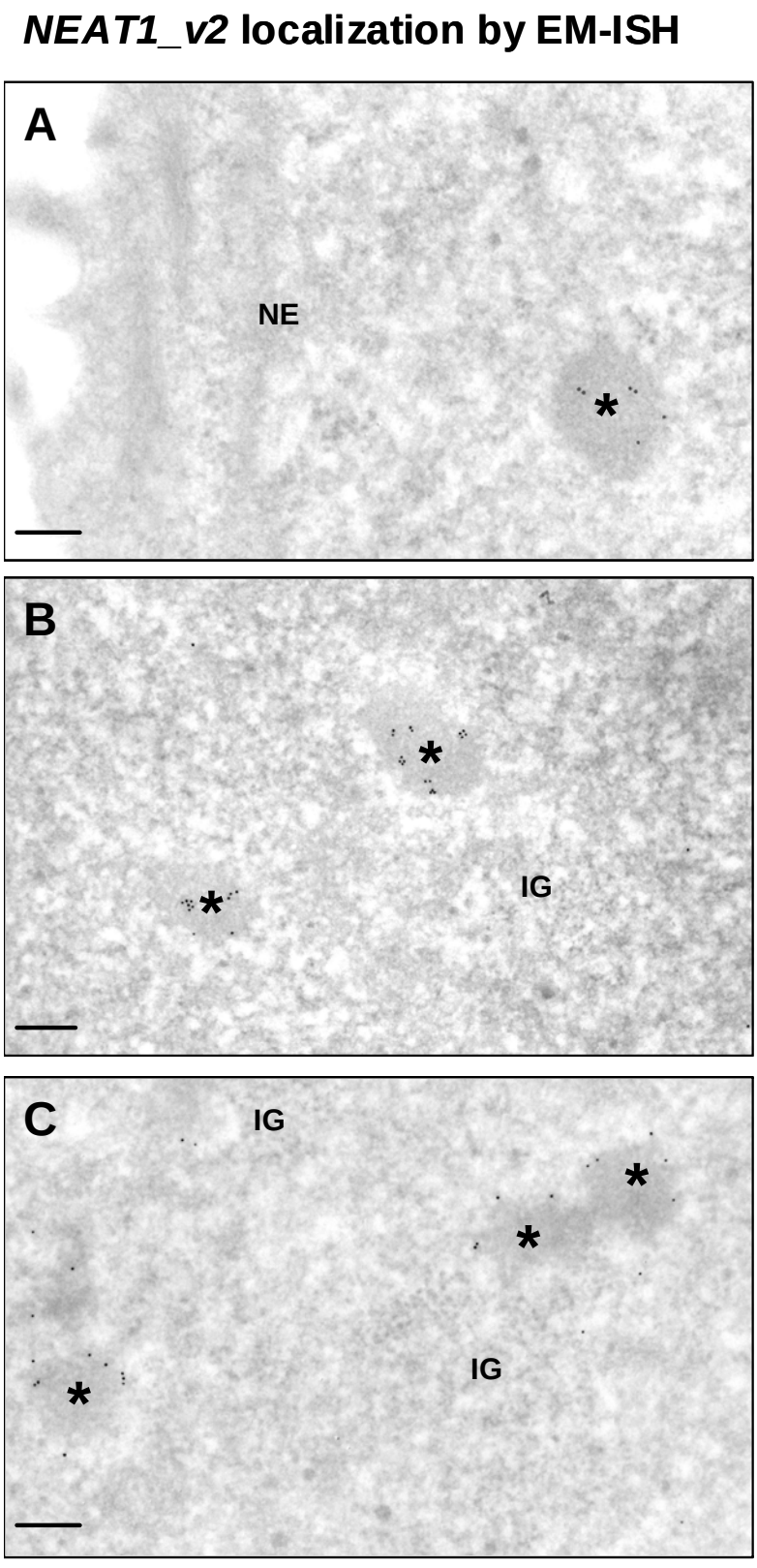
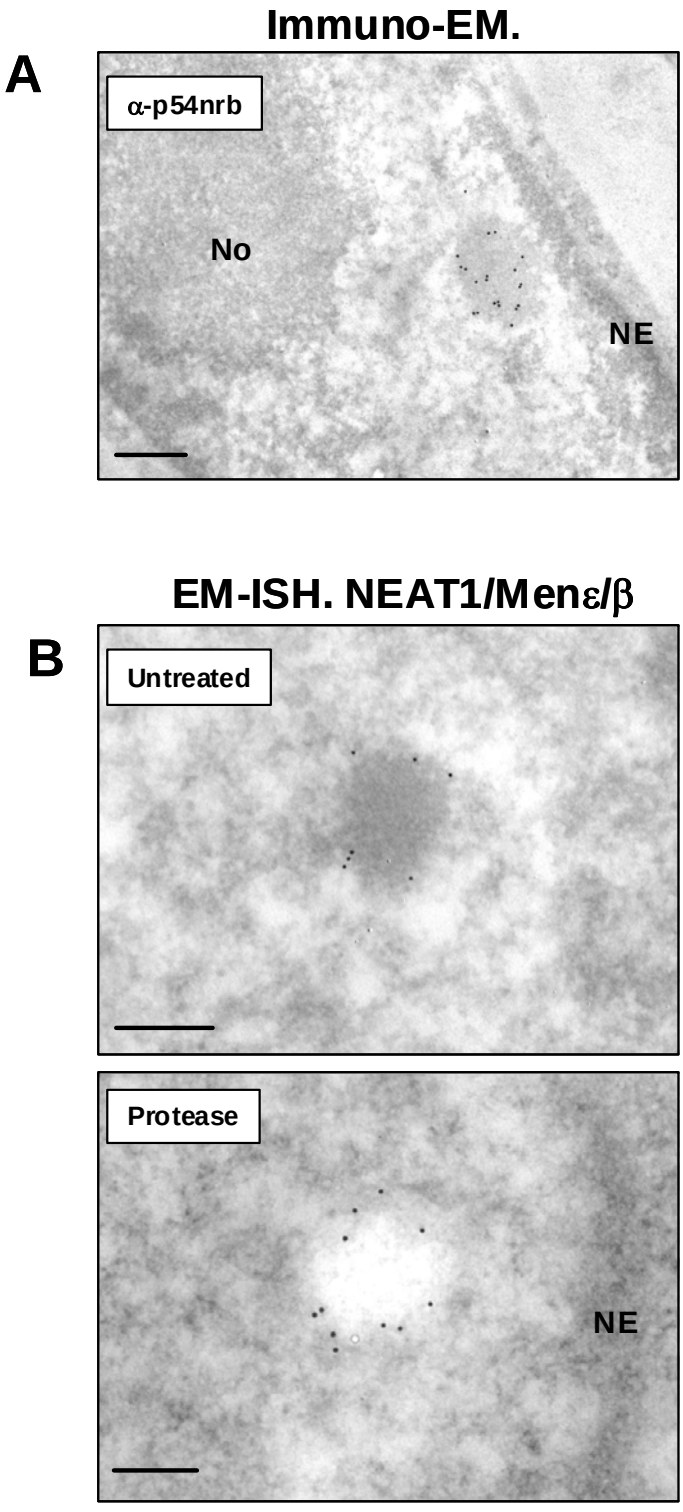
Supplemental Fig S1.



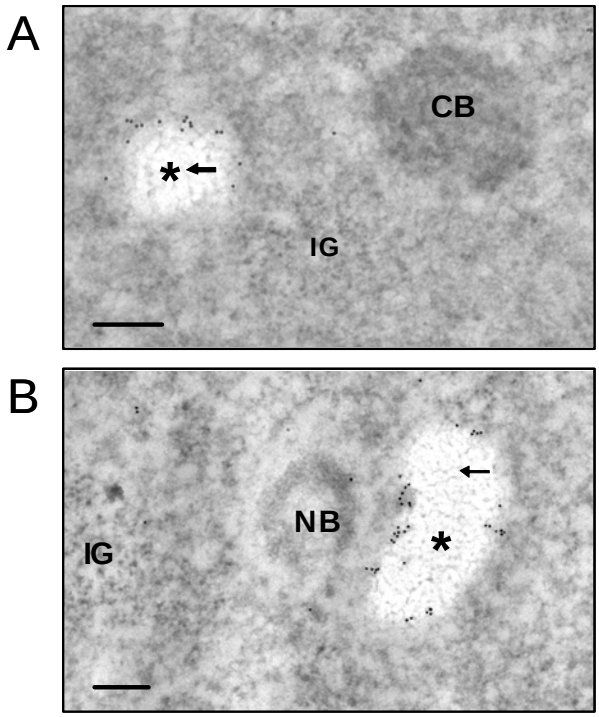
Supplemental Fig S2.



Supplemental Fig S3.



Supplemental Fig S4.



Legends Supplemental Figures.

Fig. S1. Detection of the U1 snRNA within IGAZ/PSP by EM-ISH.

(**A**) Hybridization was carried out on untreated thin-sections of HeLa cells and confirms presence of the U1 snRNA in the nucleoplasm, the interchromatin granules (IG) and the IGAZ/PSP (star).

(**B**) Hybridization was performed following protease treatment of the thin sections. Notice low labelling of the cytoplasm and high labelling, including in its central part, of the bleached IGAZ/PSP (star). NE: Nuclear envelope.

(**C**) Protease and RNase treatments performed prior to hybridization result in no detection of U1 snRNA molecules over the IGAZ/PSP (star) and the interchromatin granules (IG), confirming specificity of RNA detection.

Bars: 200 nm.

Fig. S2. Specificity of the *NEAT1_v2* DNA probes.

NEAT1_v2 transcripts were detected by *in situ* hybridization with 3 different probes on untreated thin-sections of HeLa cells. Position of the D1, D2 and 3'end probes along the *NEAT1_v2* DNA sequence is shown in Fig.3A. Notice highly specific labelling of the IGAZ/PSP (stars) and low labelling of surrounding nucleoplasmic regions with the D1 in **(A)**, the D2 in **(B)** and the 3'-end probe in **(C)**.

Bars: 200 nm.

Fig. S3. Ultrastructure of IGAZ/PSP in mouse cells.

(**A**) Mouse IGAZ/PSP were analysed in Lowicryl-embedded NIH 3T3 cells by immunolabelling with a primary antibody directed against the human P54NRB/NONO peptide and a secondary antimouse antibody coupled to 10 nm gold particles. A highly specific labelling of a IGAZ/PSP is illustrated. No: Nucleolus; NE: Nuclear envelope.

(**B)** EM-ISH with a mouse-specific probe (nt 224-3082) targeting the 5'-ends of the mouse *NEAT1_v1* and NEAT1_*v2* (or Menε/β) transcripts on untreated (top) or protease-treated thin-sections (bottom). Notice peripheral labelling of the IGAZ/PSP in both cases. Following protease treatment, gold particles are concentrated into a narrow grey zone surrounding the bleached centre of the IGAZ/PSP.

Bars: 200 nm.

Fig. S4. Hyper-sensitivity of IGAZ/PSP towards protease treatment on thin sections of HeLa cells.

(**A**) and (**B**). Protease sensitivity of the IGAZ/PSP (star) is illustrated by bleaching as compared to the interchromatin granules (IG), the Coiled (Cajal) body (CB) in **(A)** and the nuclear body (NB) in

(B) which are well-contrasted after uranyl-acetate staining. As a result of protein digestion, a network of dense fibrils (arrows) is revealed within the IGAZ/PSP. These fibrils are not labelled by EM-ISH with the human NEAT1 5'-end probe in **(A)** and **(B)**. Bars: 200 nm.