6. Summary and conclusions

Nuclear myosin I is a monomeric actin-based molecular motor located in the nucleus which is involved in transcription. A very similar Myo1c, located mainly in the cytoplasm and plasma membrane, has important functions in many diverse physiological and biochemical processes. We aimed to extend our knowledge of the properties of NMI and its functions in nuclear metabolism. Our findings presented in this work can be summarized as follows:

1. **NMI is necessary for transcription by Pol I.** We have shown that NMI coimmunoprecipitates and co-purifies with both Pol I and was found by chromatin immunoprecipitation on the promoter of rDNA. RNAi knockdown of NMI or microinjections of anti-NMI antibodies decrease Pol I transcription in vivo. In an in vitro transcription system, anti-NMI antibodies inhibit transcription in a dose dependent manner, while addition of purified NMI increases transcription. NMI was shown to bind Pol I through the basal transcription factor TIF-IA which defines the initiation-competent subpopulation of Pol I and through which the rate of transcription initiation is regulated.
2. **Transcriptional activation leads to relocalization of NMI to the sites of active transcription.** We have shown, mainly by immunoelectron microscopy and statistical analysis that during the activation of lymphocytes the level of NMI increases and it is redistributed to the sites of active Pol I and Pol II transcription.
3. **The first two IQ domains are sufficient to direct the fusion constructs to the nucleus.** Using the set of truncated NMI mutants we identified the part of the molecule which was responsible for the NMI nuclear localization and shown it was the calmodulin-binding neck.
4. **NMI is expressed in all mouse tissues with highest expression in the lungs.** We have shown by immunofluorescence microscopy, western blot and qPCR that NMI is present in the nuclei of all mouse tissues except for the latest stadia of spermatogenesis and that the levels vary with the highest expression in lungs.
5. **The NMI N-terminal domain is identical in mammals and conserved in vertebrates.** We searched for the sequences similar to the NMI N-terminal domain in the expressed and genomic sequence databases and found it in all vertebrates where sufficient genomic data were available. Moreover, we confirmed the expression of this domain by RACE in selected species. We did not find a similar sequence in any more distant species than vertebrates.