

# The Nuclear Envelope in Gene Expression & Genome Organisation

- *C. elegans* models for human laminopathies

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# The NE in development and disease

Cohen-Fix & Askjaer *Genetics* 2017  
Nuclear scale

Mutations in  
ubiquitously



## TFG 2023: C. elegans as model for human laminopathies

### Scientific objectives:

- *Effects of BAF-1(G12T) on gene expression in specific tissues?*
  - *Decreased stress resistance in baf-1(G12T) mutants?*
  - *Interaction of BAF-1 with vesicular trafficking?*

### Training objectives:

- Molecular cloning
- Genome engineering
  - Genetics
- High-resolution light microscopy

Interested in  
 knowing more?  
 joining us?



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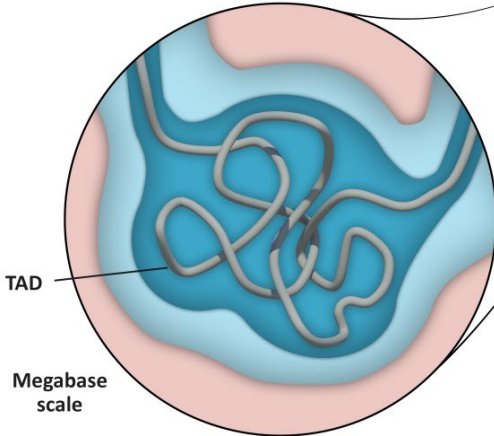
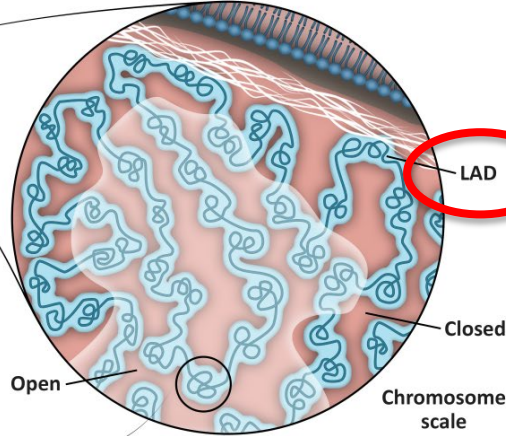
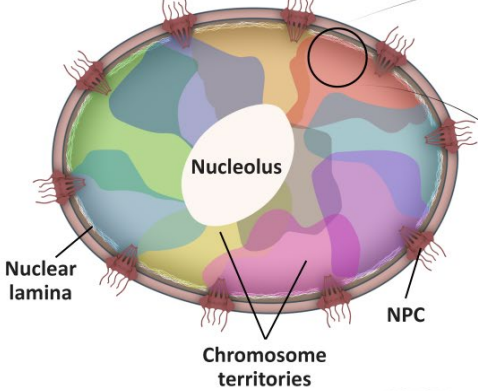
The following slides provide background and examples of recent achievements



# The NE in development and disease

Cohen-Fix & Askjaer *Genetics* 2017

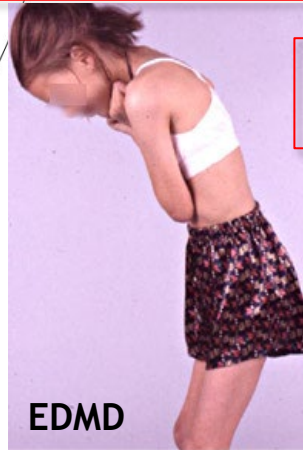
Nuclear scale



Mutations in ubiquitously expressed NE proteins



Emery-Dreifuss Muscular Dystrophy



Leukodystrophy

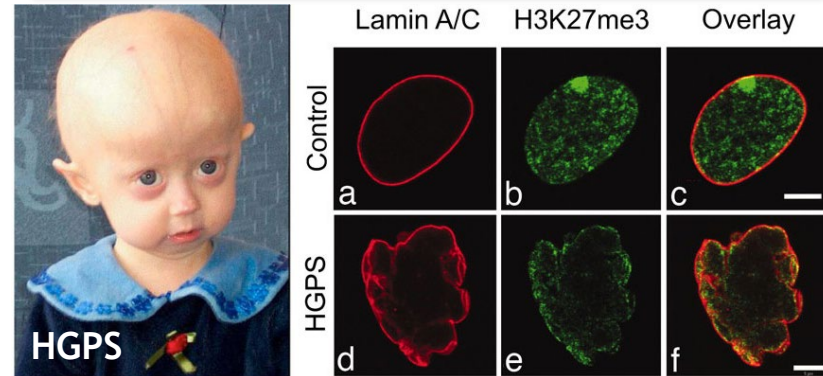
Familial partial lipodystrophy

Buschke-Ollendorf syndrome

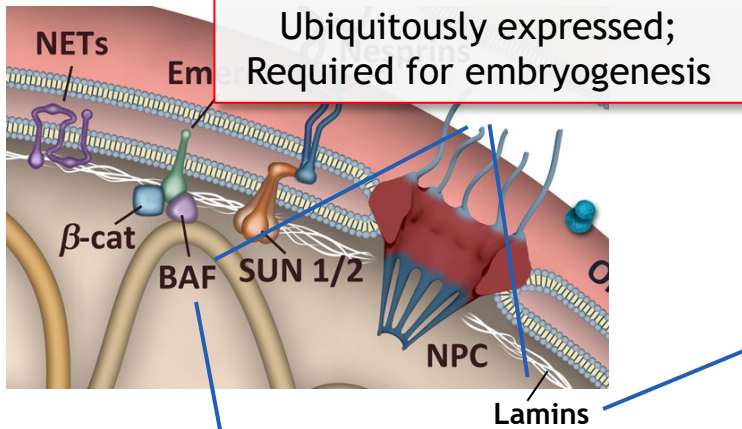
Hutchinson-Gilford Progeria Syndrome

- Gene transcription
- DNA replication
- DNA repair

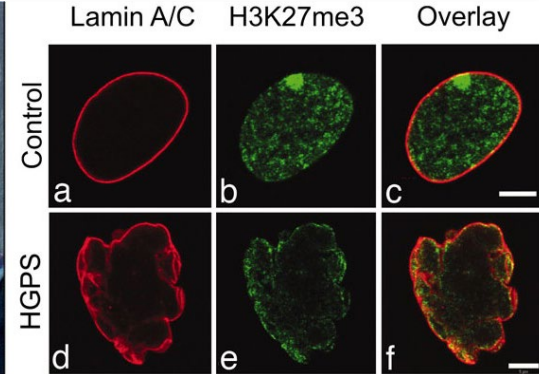
➤ Laminopathies, cancer, etc.



# Nuclear organisation in (premature) ageing

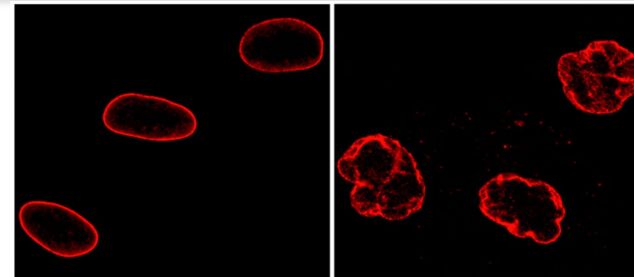


## Hutchinson-Gilford Progeria Syndrome



Shumaker et al, PNAS 2006

## Normal human ageing

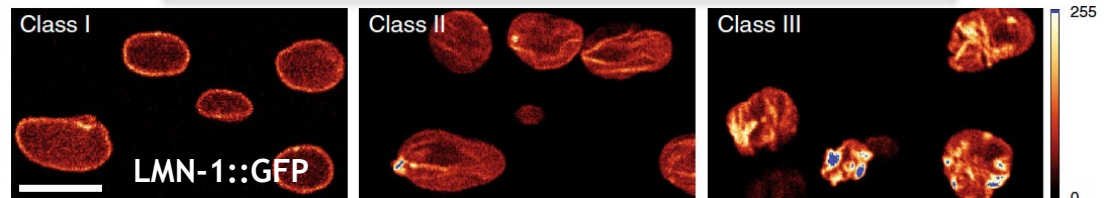


9-year old

96-year old

Scaffidi & Misteli, Science 2006

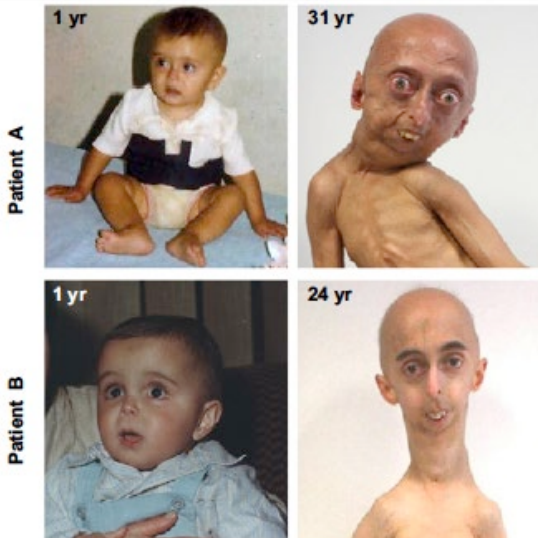
## Normal *C. elegans* ageing



Time

Pérez-Jiménez et al, Biogerontology 2014

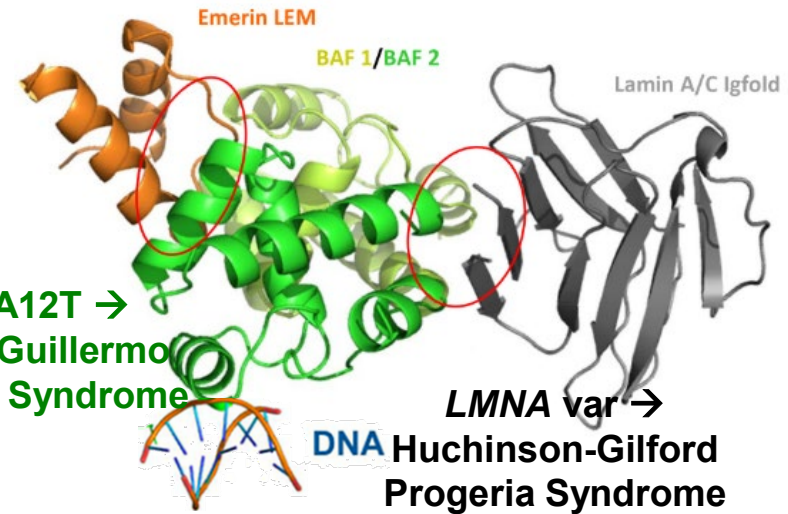
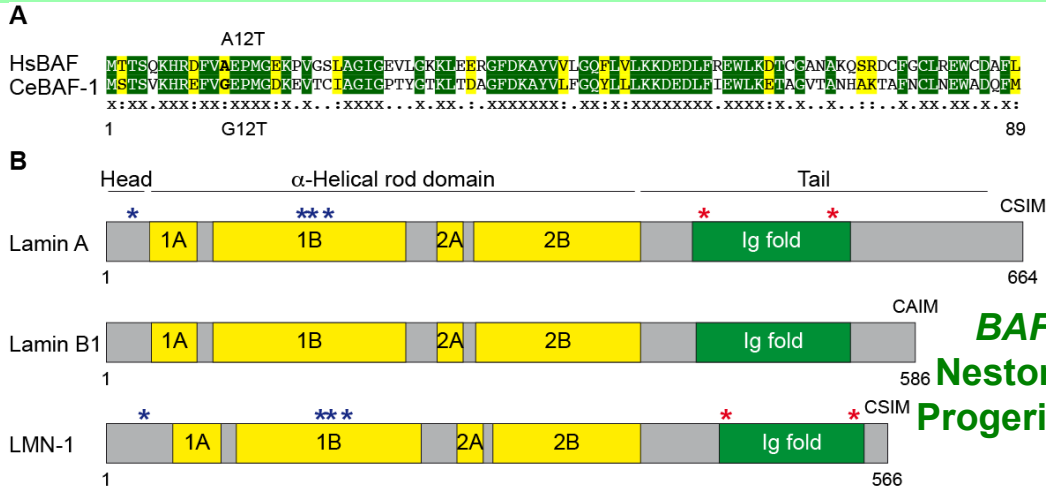
## Néstor-Guillermo Progeria Syndrome



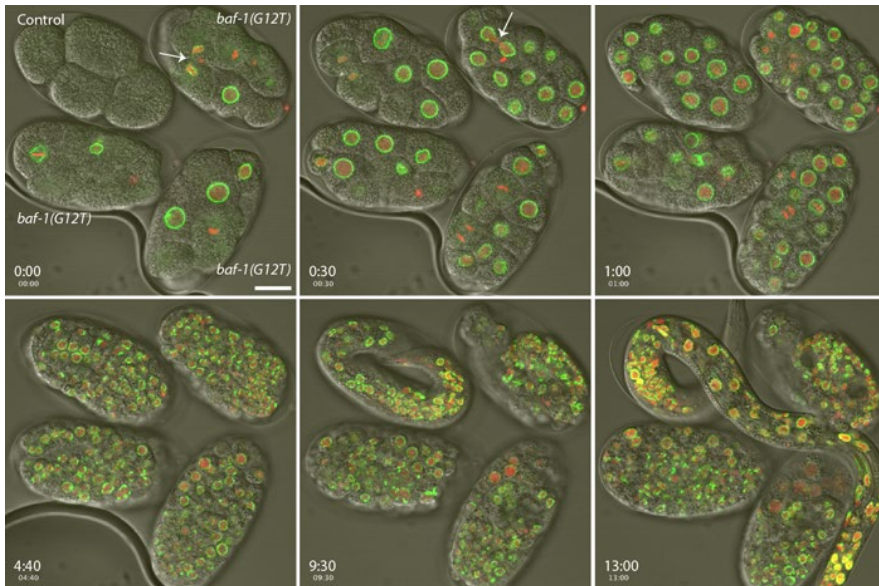
Puente et al. Am J Hum Genet 2011



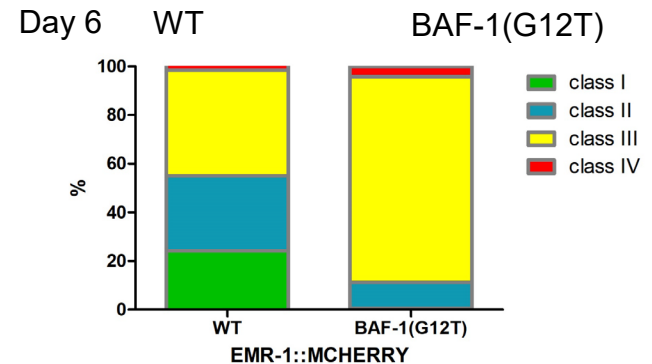
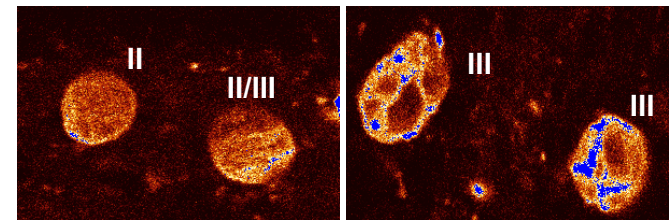
# C. elegans as model for progeria syndromes



BAF-1 G12T mutants are hypersensitive to lamin perturbation



BAF-1 G12T accelerates ageing-related deterioration in nuclear morphology



# *C. elegans* as model for progeria syndromes





bioRxiv posts many COVID19-related papers. A reminder: they have not been formally peer-reviewed and should not guide health-related behavior or be reported in the press as conclusive.

New Results

 [Follow this preprint](#)

## **A multiparametric anti-aging CRISPR screen uncovers a role for BAF in protein translation**

Sophia Y. Breusegem, Jack Houghton, Raquel Romero-Bueno, Adrián Fragoso-Luna, Katherine A. Kentistou, Ken K. Ong, Anne F. J. Janssen, Nicholas A. Bright, Christian G. Riedel, John R. B. Perry,  Peter Askjaer,  Delphine Larrieu

**doi:** <https://doi.org/10.1101/2022.10.07.509469>