

# Neuronal Mass Dynamics Laboratory

Biomedical Engineering | Florida International University

## Wistar NMD Rat Template Set

The **NMD rat template set** is, to our knowledge, the only set rat atlases and tools that allow for several neuroimaging processing:

1. Unbiased normalization to a Minimum Deformation (MD) Space, allowing:
  - a. Unbiased voxel-based
  - b. Unbiased deformation-based Morphometry
2. Labeling individual rats cortices in 96 Region of Interests (ROI), furnishing:
  - a. ROI-based morphometry
  - b. ROI-based fMRI interpretation
  - c. ROI-based cortico-cortical DTI tractography
3. Normalization to the stereotaxic Paxinos & Watson (PW) Space, making possible:
  - a. Straightforward interpretation of any analysis in coordinates of the PW space
  - b. Stereotaxic guidance for surgery and intracranial recordings

If you use this template set, cite as: “Valdés-Hernández PA, Sumiyoshi A, Nonaka H, Haga R, Aubert-Vásquez E, Ogawa T, Iturria-Medina Y, Riera JJ, Kawashima R. An in vivo MRI template set for morphometry, tissue segmentation, and fMRI localization in rats. *Frontiers in neuroinformatics*. 2011;5.”

The NMD Template Set contains the files listed in the following Table:

<b>File</b>	<b>Description</b>	<b>Possible Applications</b>
head-nmdrat30.nii brain-nmdrat30.nii	T2-weighted average head and skull-stripped brain in the MD space	Visualization and standard unbiased normalization to MD Space
mask-nmdrat30.nii	Binary brain segmentation in the MD space	Masking in Morphometry, fMRI and DTI analysis and Visualization
atlas-nmdrat30.nii atlas-nmdrat30.txt	Segmentation and labels of 96 (48 each hemispheres) cortical structures of the Paxinos & Watson atlas in the MD space	Individual cortical ROI segmentation (labeling) via inverse warping, useful

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gray-nmdrat30.nii white-nmdrat30.nii csf-nmdrat30.nii	Probabilistic gray matter, white matter and cerebrospinal fluid segmentations in the MD space	Morphometry and normalization to the MD space, e.g. via “unified segmentation”
head-nmdrat30-P&W.nii brain-nmdrat30-P&W.nii	T2-weighted average head and skull-stripped brain in the PW space	Visualization and standard (biased) normalization to PW Space
mask-nmdrat30-P&W.nii	Binary brain segmentation in the PW space	Masking in fMRI and Visualization
atlas-nmdrat30-P&W.nii	Segmentation of 96 (48 each hemispheres) cortical structures of the Paxinos & Watson atlas in the PW space	ROI-based identification of cortical structures in normalized results, such as fMRI
gray-nmdrat30-P&W.nii white-nmdrat30-P&W.nii csf-nmdrat30-P&W.nii	Probabilistic gray matter, white matter and cerebrospinal fluid segmentations in the PW space	Normalization (biased) to the PW space, e.g. via “unified segmentation”
convertPW_MD.m MD2PW.mat PW2MD.mat	MATLAB code and transformations to convert coordinates and warp images using SPM12 between the MD and PW spaces (type 'help convertPW_MD' for more)	Transform any analyses, such as unbiased morphometric results, fMRI, among others to be interpreted in the PW space. This can aid coregistering individual MRI measurements (such as fMRI or EEG) to stereotaxic coordinates to better locate sites of surgical and intracranial recordings in the stereotaxic devices.