

# Medical Image Generation and Analysis using Bayesian Generative Models

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## Accurate diagnosis and prognosis through AI

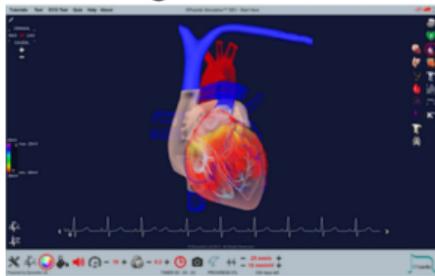


## AI to augment humans

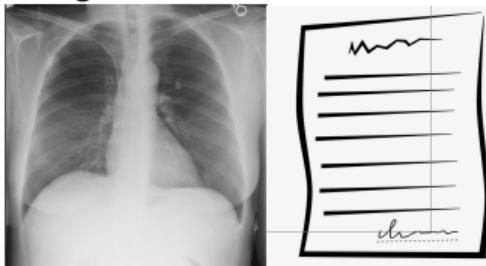


## Future work

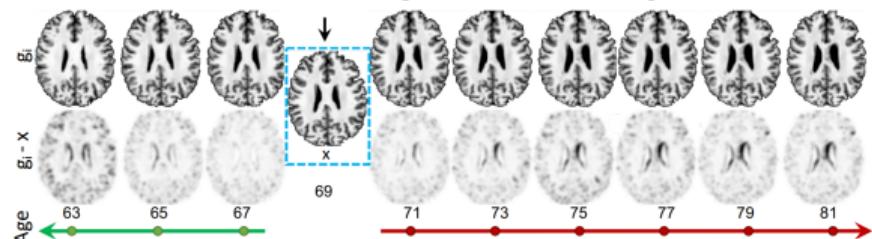
### Biological simulators



### Multimodal modelling images + text + structural data



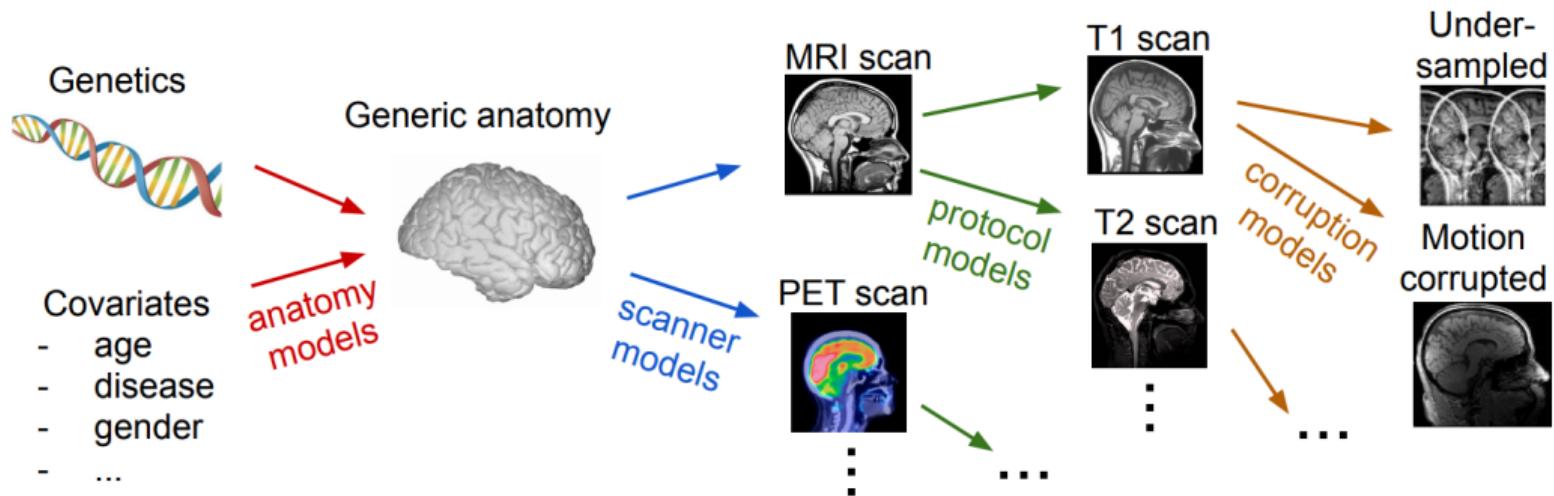
### Disease Progression Modelling



## Future work: Brain tissue and anatomy simulator

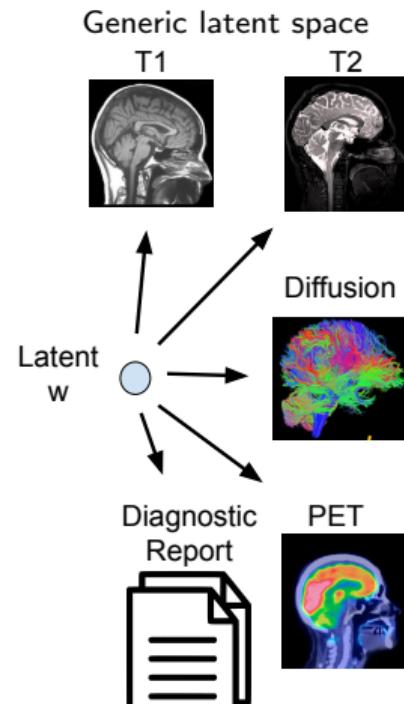
Simulator for brain anatomy from genetics:

- ▶ Using deep generative models
- ▶ Accounting for distributions shifts
- ▶ Following causal principles



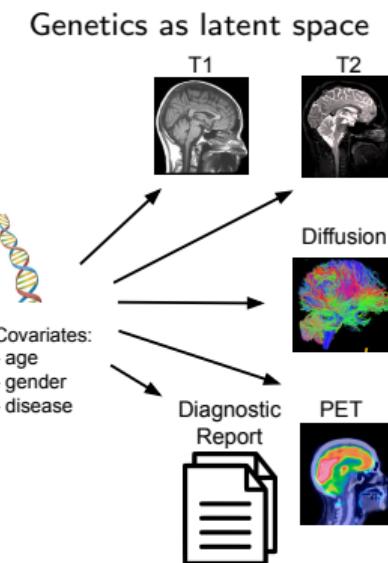
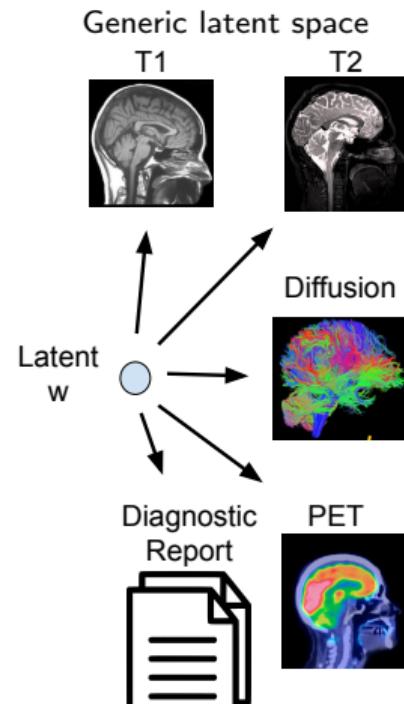
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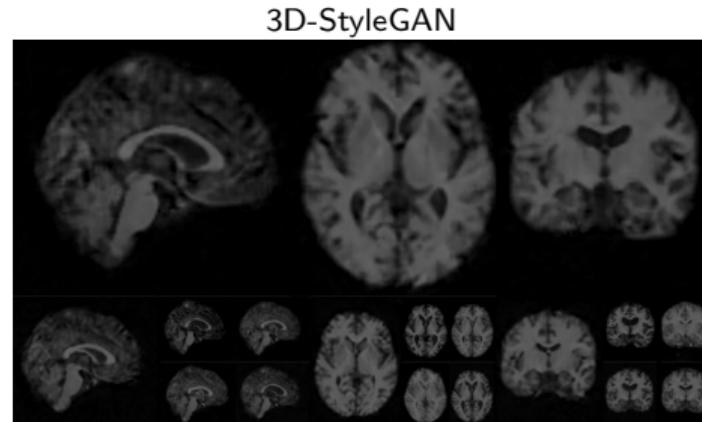
# Multimodal modelling

- Modalities: scan contrasts (T1/T2), Diffusion imaging, PET, diagnostic report
- Later on, replace latent with genetics and covariates



# Disease Progression Modelling

- ▶ Current models mostly work with features extracted from scans (low dimensionality)
- ▶ Aim: make models work with raw, 3D scans
- ▶ First build a good 3D brain scan generator
- ▶ Then estimate progression over time



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