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# MRI pulse sequences for neuroimaging research

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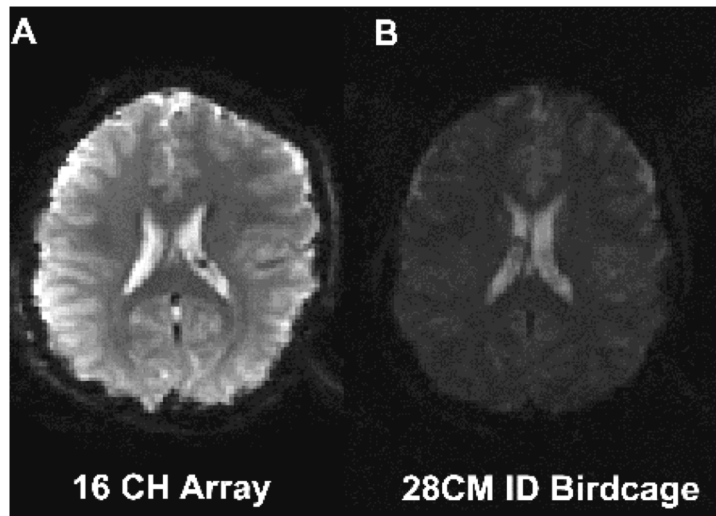
parallel imaging &  
simultaneous multi-slice imaging



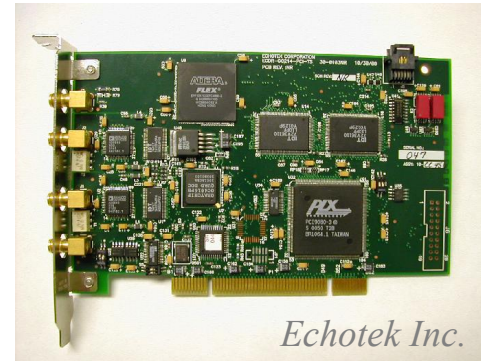
# RF technology



*de Zwart et al., NIH*

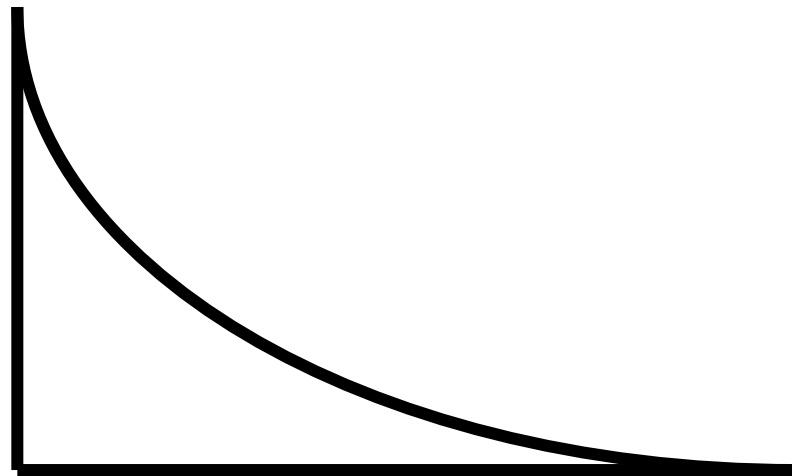


*J. Bodurka, FMRI, NIH*

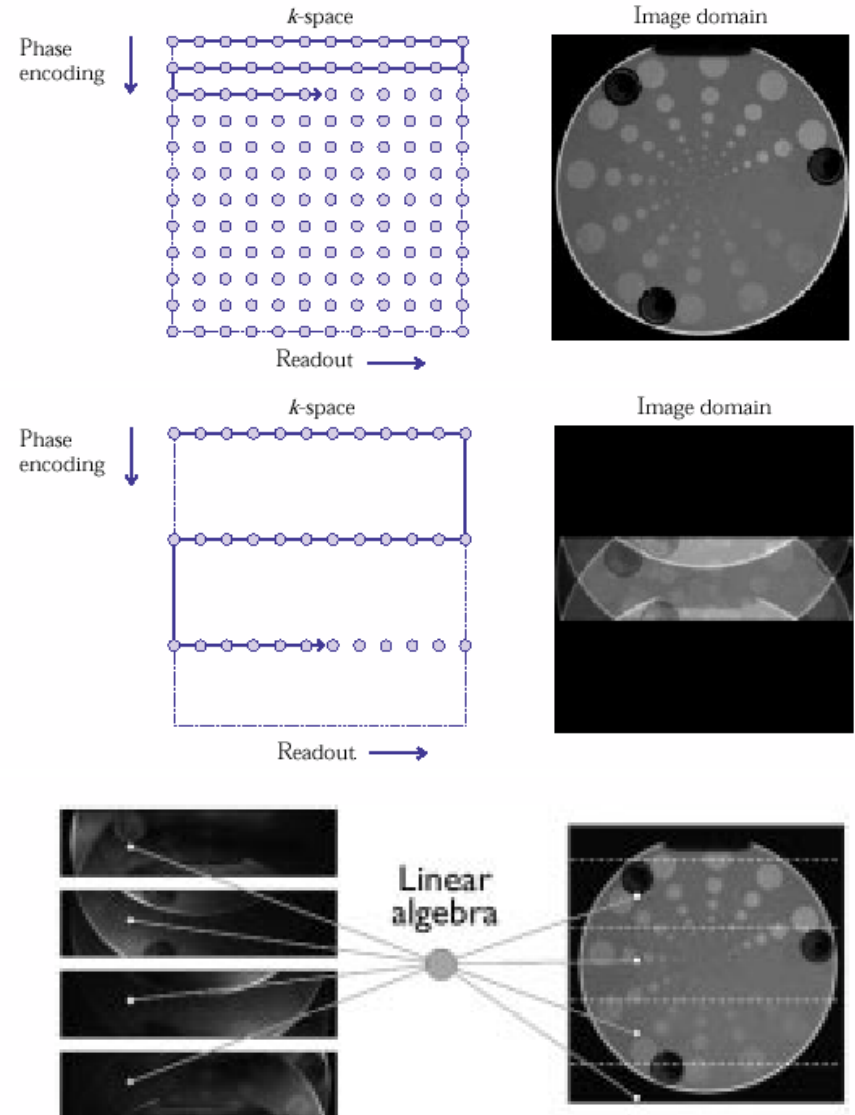
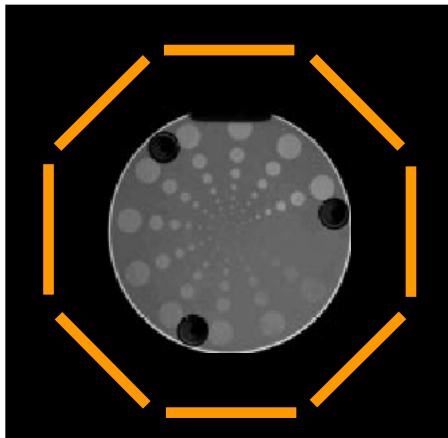


*Nova Medical*

# Parallel imaging

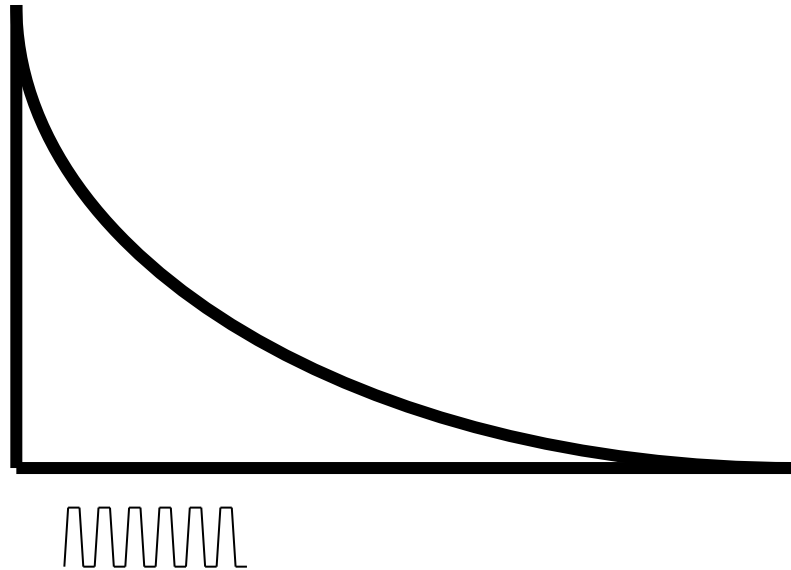


≈ 5 to 30 ms

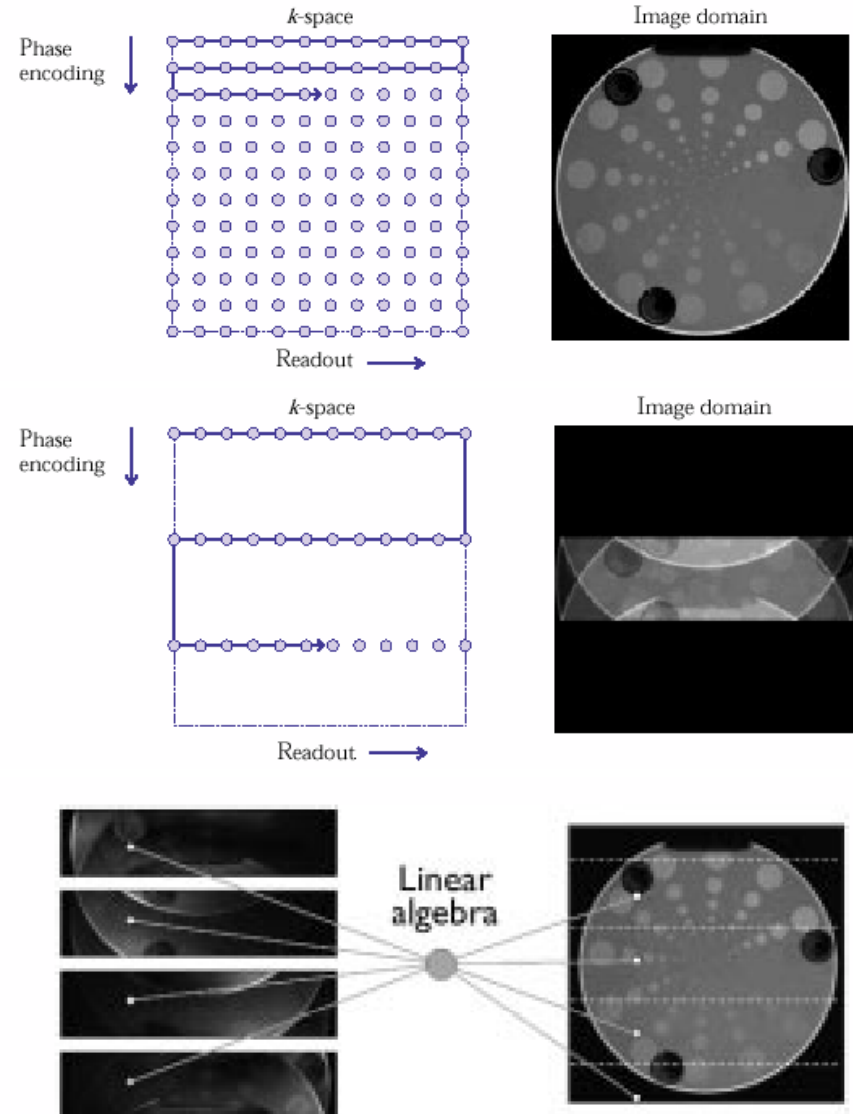


Pruessmann, et al.

# Parallel imaging



- **Imaging time:**  $\downarrow R$
- **Distortions:**  $\downarrow R$
- **SNR:**  $\downarrow \sqrt{R}$



Pruessmann, et al.



# Simultaneous Multi-Slice (SMS) imaging

(a.k.a. Multiband)

