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Areas of Investigation with Respect to Reserve and Resilience

• **Population Studied**
  
  Population-based cohort (50-90+ years) in Olmsted County, MN

• **Methods**
  
  PET (Amyloid, Tau, FDG) & MRI (structural, DTI, CVD)

  We investigate mechanisms through which risk factors (vascular health, lifestyle enrichment, genetics, sleep etc.) in the population impact brain across the life span
Concepts Used

• **Resilience to AD** ➔ Coping with pathology.
  
  *Better-than-expected cognitive performance in relation to the degree of AD pathology*

• **Resistance to AD** ➔ Avoiding pathology.
  
  *Absence or lower than expected levels of AD pathology*

• **Brain Reserve** ➔ Neurobiological capital which captures individual variation in structural characteristics of the brain.
  
  *E.g. Anesthesia exposure/surgery or vascular risk factors can lower the brain reserve (DTI, FDG-PET, MRI)*
Resilience Pathways in Cognitive Aging

**Concept:** Resilience

**Measures:** DTI, amyloid PET, longitudinal brain and cognitive decline (5 years)

**Operational definition:** Pathways or processes that help cope with pathologies – explain higher cognitive performance at the same level of pathology

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**Resilience Pathway 1 (Brain Reserve):**
Higher Education/Occupation is associated with better systemic vascular health later in life which contributes to greater white matter integrity on DTI

**Resilience Pathway 2:**
Low vs. High Genu FA in a 75 year old APOE4 carrier with and without amyloidosis

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**Graph:**
Age (years) vs. Cognition

- Low Amyloid, High Genu FA
- High Amyloid, High Genu FA
- Low Amyloid, Low Genu FA
- High Amyloid, Low Genu FA

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**Legend:**
- Genu FA (DTI)
- Education/Occupation
- Systemic Vascular Health
- Resilience Pathway 1
- Resilience Pathway 2
- Amyloid
- Brain Shrinkage
- Cognitive Decline