ADRD Research Brain Donation in the COVID-19 Era: The UW Experience

C. Dirk Keene, MD, PhD
Nancy and Buster Alvord Endowed Chair in Neuropathology
Associate Director and Precision NP Core Leader, UW ADRC

UNIVERSITY of WASHINGTON
UW NP Core: Timeline for COVID-19 Outbreak

26 cases
Avg PMI 14.7 hours

(13 cohort rapids avg PMI 6.6 hours)

1/21
First case identified in WA

2/29
First death in WA

3/3
Started screening questionnaire

Jan | Feb | March | April

*Chart to scale for how long each month has felt
COVID-19 Screening Questions for Potential Donors

- Clinical history of COVID-19 diagnosis
- Suspected COVID-19 diagnosis
- Exposure to COVID-19 positive person
- COVID-19 infections in care facility where decedent was located near/at time of death
- Symptoms of coronavirus infection (from CDC)
  > Cough
  > Shortness of breath or difficulty breathing
  > At least two of the following:
    • Fever
    • Chills
    • Repeated shaking with chills
    • Muscle pain
    • Headache
    • Sore throat
    • New loss of taste or smell

UW NP Core: Timeline for COVID-19 Outbreak

- **1/21**: First case identified in WA
- **2/29**: First death in WA
- **3/3**: Started screening questionnaire
- **3/22**: Donor screened neg
  - Screen missed COVID-19 in facility
- **3/23**: Started testing all subjects for SARS-CoV-2
- **3/26**: Same donor tested positive

**Cases and Average PMI**
- **26 cases**
  - Avg PMI 14.7 hours
  - (13 cohort rapids avg PMI 6.6 hours)
- **7 cases**
  - All screened negative
  - Avg PMI 14.3 hours
  - (2 rapids avg PMI 9.4 hours)
- **8 cases**
  - All tested negative
  - Average PMI 94.2 hours
  - (0 rapid autopsies)

*Chart to scale for how long each month has felt*
Draft Conditions Necessary In Absence of COVID-19 Diagnosis

- **Rapid SARS-CoV-2 Testing**
- **Engineering controls**
  - Airborne infection isolation room (AIIR) with negative pressure air flow (minimum of 6 air changes per hour (ACH) or 12 ACH for renovated or new structures with air exhausted directly outside)
  - HEPA/ULPA vacuum manifold, vacuum tent/shroud or equivalent intervention for oscillating saws
- **Appropriate PPE and personnel trained to don and doff PPE**
  - PAPRs with HEPA filtered respirator (N95 alone deemed insufficient at UW during aerosolizing procedures)
  - Double surgical gloves
  - Fluid resistant/impermeable gown
  - Waterproof apron
  - Faceshield
  - Surgical scrubs
  - Boot covers.
- **Institutional permission** to perform COVID-19-positive human tissue research (includes designation of essential research designation in Stay at Home states)
- **Staff able** to come to worksite safely (avoid public transportation, other settings where social distancing is impossible, etc.)
- **Staff willing/permited** to perform brain procurement/dissection on COVID-19 positive cases
- **SARS-CoV-2 testing** to confirm infection status (and protocols to inform studies/LNOK of results)
- **Fixation of whole brain or**
- **Safety mechanisms for fresh/frozen tissue collection, storage, and distribution.**
- **Protocols for storage and distribution of fresh/frozen tissue from SARS-CoV-2 positive donors**
Specific NP Core Activities for Consideration
UW NP Core: Timeline for COVID-19 Outbreak

1/21 First case identified in WA
2/29 First death in WA
3/3 Started screening questionnaire
3/22 & 3/26 Subject screened neg, tested positive
3/23 Started testing all subjects for SARS-CoV-2
4/21 First rapid COVID test (positive)
4/23 Operational for positive cases (4/21 case performed)
4/27 First rapid autopsy without prior test at KCME (neg test)

*Chart to scale for how long each month has felt
Key Elements of UW NP Core Approach In COVID-19 Era

> Essential resources
  – Equipment, PPE, and test reagents are always **prioritized for patient care**
  – PPE are **strictly conserved** along CDC-recommended reuse, decontamination and disinfection guidelines

> Safety protocols (always vetted and approved by UW EHS)
  – Buddy system for brain removals
  – Isolation suite and PAPRs for all cases for brain removal
  – HEPA/ULPA vacuum for aerosols due to oscillating saw
  – N95 and appropriate PPE for all fresh tissue dissection
  – Droplet/splash protection for fixed tissue
  – SARS-CoV-2 testing on all cases
  – Continue to adapt with new knowledge around COVID-19
What Does the New Normal Look Like for NP Cores?

> Ultimately need to know risk and effectively limit it through:
  > – Widespread immunization/immunity to SARS-CoV-2
  > – Effective therapeutic interventions for COVID-19 infection
  > – Data on risk of infectivity of autopsy procedures
> Institutional permission to perform COVID-19-positive human tissue research
> Rapid SARS-CoV-2 testing and protocols to inform studies/LNOK of results
> Staff willing/permitted to perform brain procurement/dissection on COVID-19 positive cases
> Engineering controls
  > – Airborne infection isolation room (AIIR) with negative pressure air flow (minimum of 6 air changes per hour (ACH) or 12 ACH for renovated or new structures with air exhausted directly outside
  > – Vacuum manifold or equivalent intervention for oscillating saws
> PPE availability and appropriate use for COVID-19 positive vs. negative cases
> IgG/IgM testing to identify those exposed/cleared of infection
> Protocols for storage and distribution of frozen and fresh tissue from SARS-CoV-2 positive donors
It Takes a Village

- Departments of Pathology and Laboratory Medicine
  - Leadership, Faculty, and Staff
- King County Medical Examiner
- Snohomish County Medical Examiner
- UW Environmental Health and Safety
- VA Puget Sound Medical Center
  - Leadership, Faculty, and Staff
- UW Autopsy and After Death Services

- UW ADRC
- UW NP Core
  - Desiree Marshall, MD
  - Caitlin Latimer, MD, PhD
  - Christine Mac Donald, PhD
  - Erica Melief, PhD
  - Angela Wilson
  - Amanda Keen
  - Lisa Keene
  - Katie Kern
  - Kim Howard
  - So many others