**Anthropology 455: ALS-PDC in the Mariana Islands**

**A Little Baseball History**

Lou Gehrig, 2 May 1939
Amyotrophic Lateral Sclerosis (ALS)
June 2, 1941

**What is amyotrophic lateral sclerosis?**

- Lou Gehrig’s Disease
- ...a progressive wasting away of certain nerve cells of the brain and spinal column called motor neurons.
ALS Statistics

- 14 cases/day
- 40-70 year age range
- Approx. 30,000 living with ALS in U.S.
- Life Expectancy: 3-5 years

Cause of ALS

- Cause is unknown
- Mutations in the gene for SOD1 enzyme/familial ALS
- Glutamate connections
- Autoimmune responses
- Environmental factors
- Dietary deficiency
- Trauma

Treatment

- No cure
- Riluzole (Rilutek)
ALS-PD in the Mariana Islands

- Guam, 1945
- Amyotrophic lateral sclerosis (ALS)
- Alzheimer's disease
- Parkinson's Disease (PD)

Guam

- Lytico-Bodig
- Quinata clan
- Umatac

Parkinson-like Disorders in Western Pacific

25% deaths > 25 yrs.
Males more prone
100X more common in Guam (Chamorro)
Incidence Decreasing:
87/100,000 in 1950s
28/100,000 in early 1980s
**Lytic-Lythico (Chamorro)**

- “LYTICO” (“paralytico”) = amyotrophic lateral sclerosis (ALS).
- Guam: 420/100,000 as opposed to 6/100,000 elsewhere.

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**3 Types of ALS:**

- Sporadic
- Familial
- Guamanian

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**Symptoms of ALS**

- Muscle weakness
- Muscle fasciculation (twitching), spasticity (stiffness), clonus (shaking), or atrophy (shrinking)
- Exaggerated reflexes
ALS Symptoms

- trouble speaking, i.e., slurred or nasal speech
- trouble chewing or swallowing
- trouble breathing
- uncontrollable periods of laughing or crying

‘BODIG’

Parkinson’s disease coupled with Alzheimer’s disease: ‘Parkinson-Dementia Complex’ or PDC

Parkinson Dementia Complex Symptoms

- early onset
- slowness of voluntary motor activity, muscular rigidity, a marked stoop, slow speech and expressionlessness, forgetfulness, hand tremors: “pill rolling” and “guitar picking”, & severe progressive dementia
ALS & PDC Pathology

- neuronal loss
- neurofibrillary tangles

Guamanian ALS/PDC

- Amyotrophic Lateral Sclerosis/Parkinsonism-Dementia Complex of Guam
- Guamanian ALS indistinguishable from sporadic ALS
- Guamanian PDC similar to PD

Symptoms of Guamanian ALS/PDC

- wide spectrum of symptoms
- ALS muscle degeneration and weakening
- Parkinson-like tremor and catatonia as well as dementia
- late onset
- 25-40 years old
- neurofibrillary tangles (damaged nerve cells)
- loss of sense of smell
Stages and progress: Guamanian ALS/PDC

ALS symptoms: weakness in the arms and legs, clumsiness, and slurred speech, muscle stiffness, twitching, loss of motor control, death

Course of disease: 5 yrs.

Presence of dementia

Causes of Guamanian ALS/PD

- Mystery
- No generic link
- Not infectious
- Virus?
- Neurotoxins?
- Heavy metals?
- DNA defects
- Immune abnormalities etc.

High Incidence of ALS

- Guam
- Western New Guinea
- Kii peninsula of Japan
Cycads *Cyas circinalis*, "false sago palm"

- Traditional Chamorro diet
- Neurotransmitter glutamate/ALS?

Environmental Causes?

- Dietary Neurotoxins
- BMAA amino acid in cycad seed
- Flour made from false sago palm: fadang

India: Lathyrisim

- Chichpeas: *Lathyrus sativus, L. cicera, L. clymenum*
- Neurotoxin: BOAA
- Beta-N-oxalylamino-L-alanine
- Fatal motor neurone wasting like ALS
Cycads as Food

- Use and preparation of cycads in Guam
- Medicinal uses

Other Causes

- Cycad pollen (cycasin and BMAA)
- Zinc (galvanized metal buckets/cycad)

Heavy Metals

- Aluminum, lead, mercury
- Manganese
- Calcium and Magnesium Deficiency
Chicken & Bat Meat

Risk Factors-Treatment

- ALS not contagious
- Chamorro ancestry
- No cure
- Drug trials
- L-dopa for treating PD