# Indigenous South American Tsimane Demonstrate the Lowest Levels of Coronary Atherosclerosis

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on behalf of

**Horus Team and the Tsimane Health and Life History Project Team**
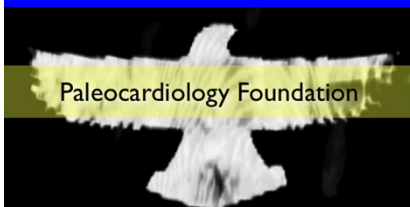
Background

- Coronary artery disease (CAD) is associated with a modern lifestyle and traditional CV risk factors may explain up to 90% of the *PAR* for MI.

- However, atherosclerosis is seen in ancient humans and it is not known to what extent people living a pre-modern lifestyle developed atherosclerosis.

Question

- **What is the burden of coronary atherosclerosis in a population with an active subsistence lifestyle, resembling an era before sedentary urbanization and economic specialization, but with high inflammation from parasites and pathogens?**
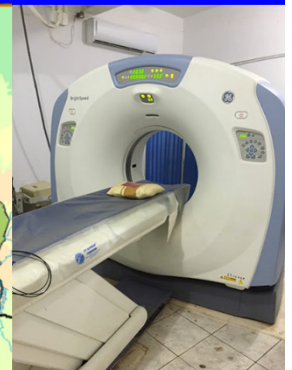
Methods

- We examined the Tsimane, a forager-horticulturalist population of the Bolivian Amazon.

- The study was US IRB approved and locally by the Tsimane councils, villages and individuals

- Extensive baseline clinical and laboratory data were acquired as part of the THLHP

- A representative sample of adults

- > 40 y (n=705) underwent non-contrast CT scanning for CACS
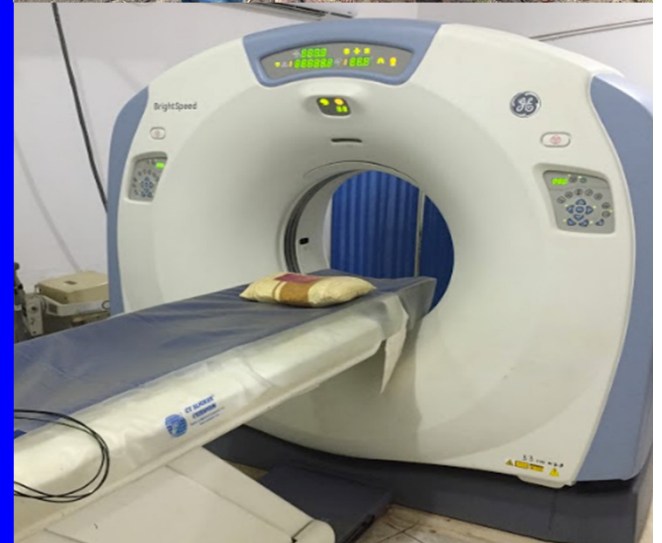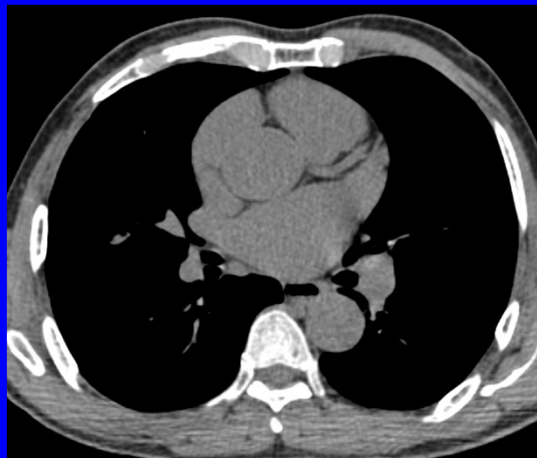
Tsimane People of Bolivia

Tsimane Characteristics

- N = 705 (age range 40-91y)
- Mean BMI − 24.1 ± 3.5
- Body fat % -- 22.1± 8.2
- Mean BP -- 116/73
- LDL-C -- 92.8 ± 27
- HDL-C -- 38.7 ± 0.7
- Trig -- 106.3 ± 44.3
- Mean FBS -- 78.5
- Minimal smoking
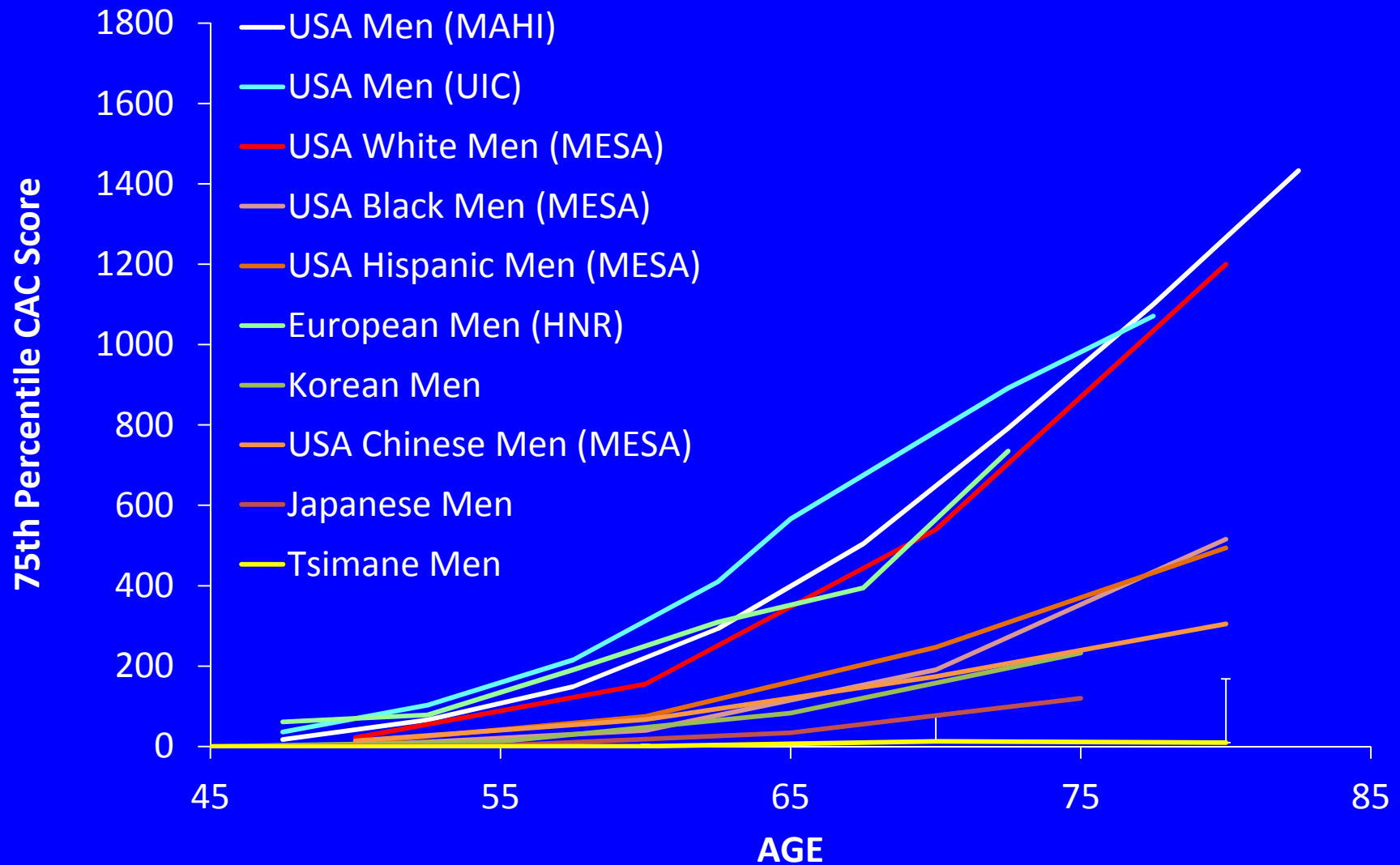
Proportion Above High Risk Cut Off

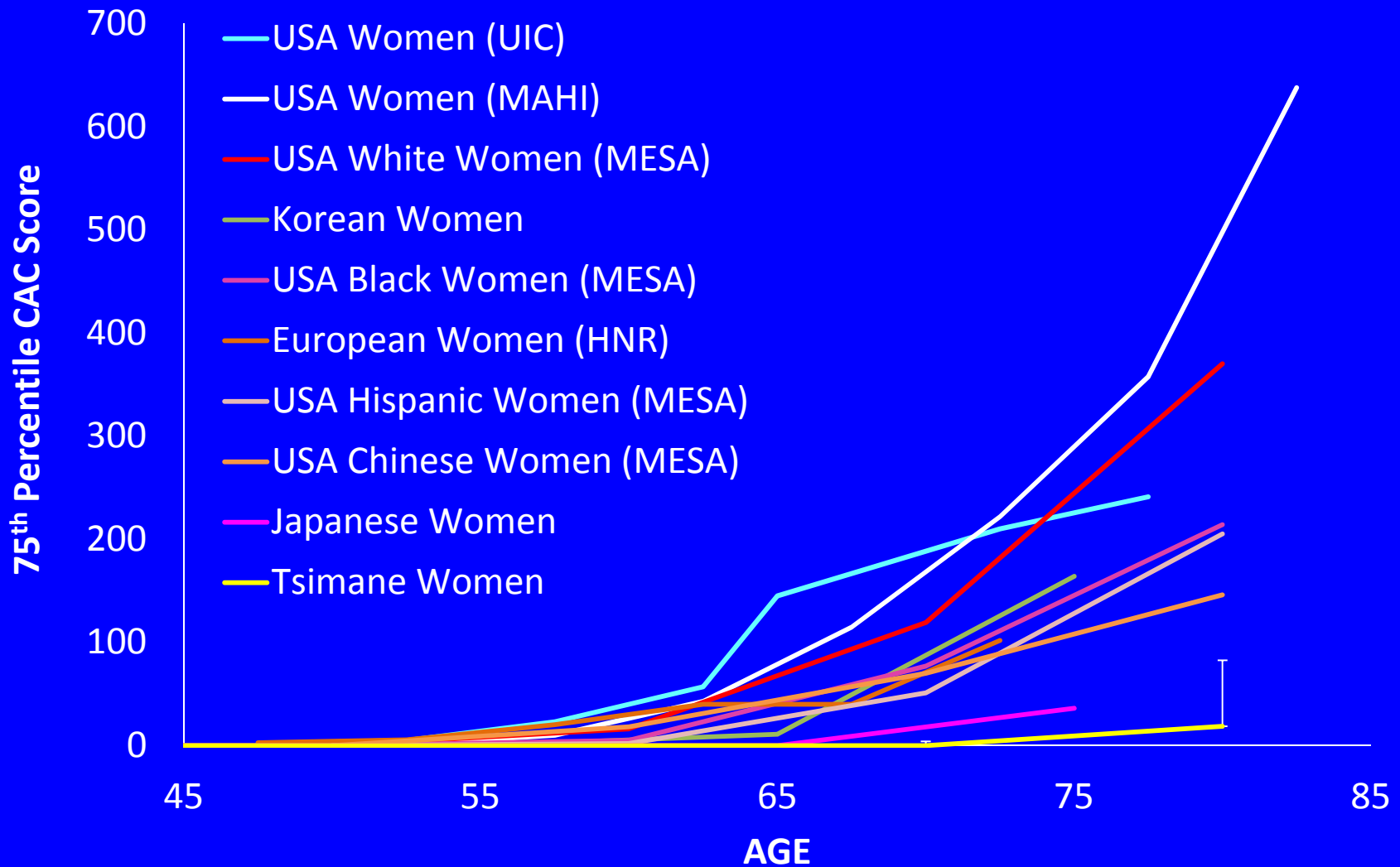|	
BMI >30	6%
Hypertensive	5%
Total cholesterol >240	0%
LDL-C >130	9%
Triglycerides >200	4%
Glucose > 125	0%
HDL-C <40	56%
Leukocytes >10,700	23%
ESR Elevated	27%
hs-CRP > 3.0	48%

Results

- The majority of Tsimane, 85% (n=596) had no CAC

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- Moderate CAD, as defined by a CAC ≥100 was 3%, about 1/10th of the prevalence among matched individuals in industrialized populations.
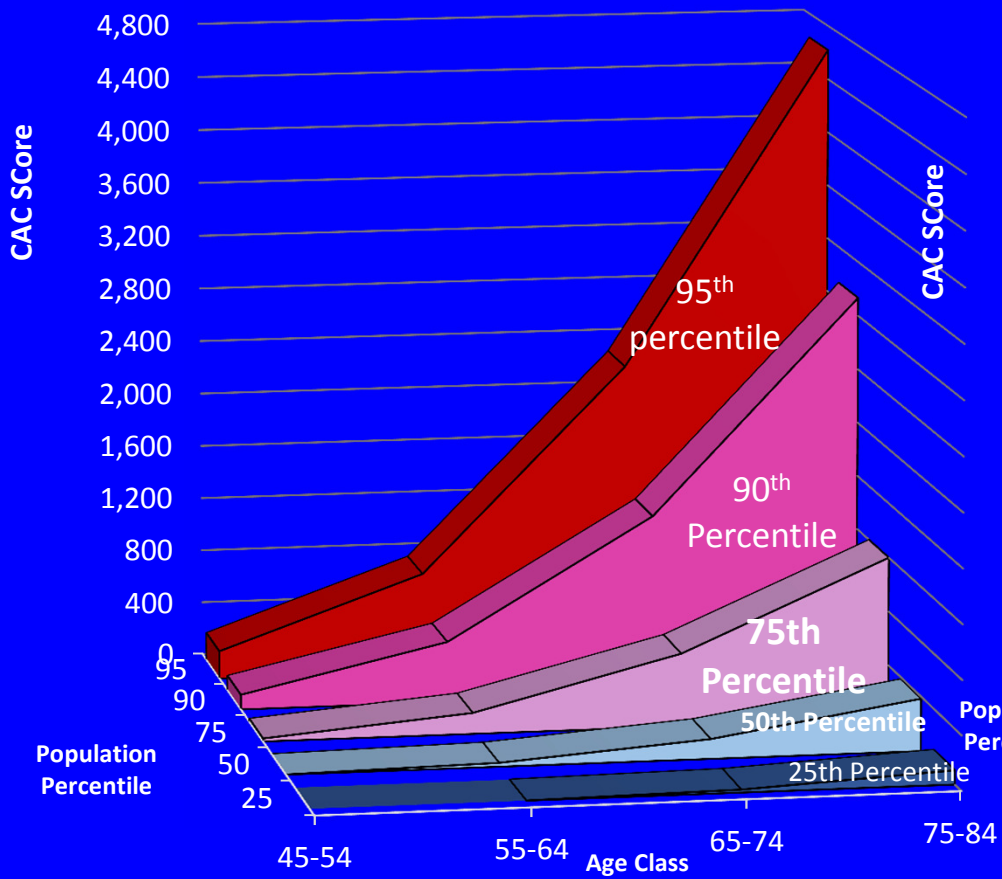
Men

Women

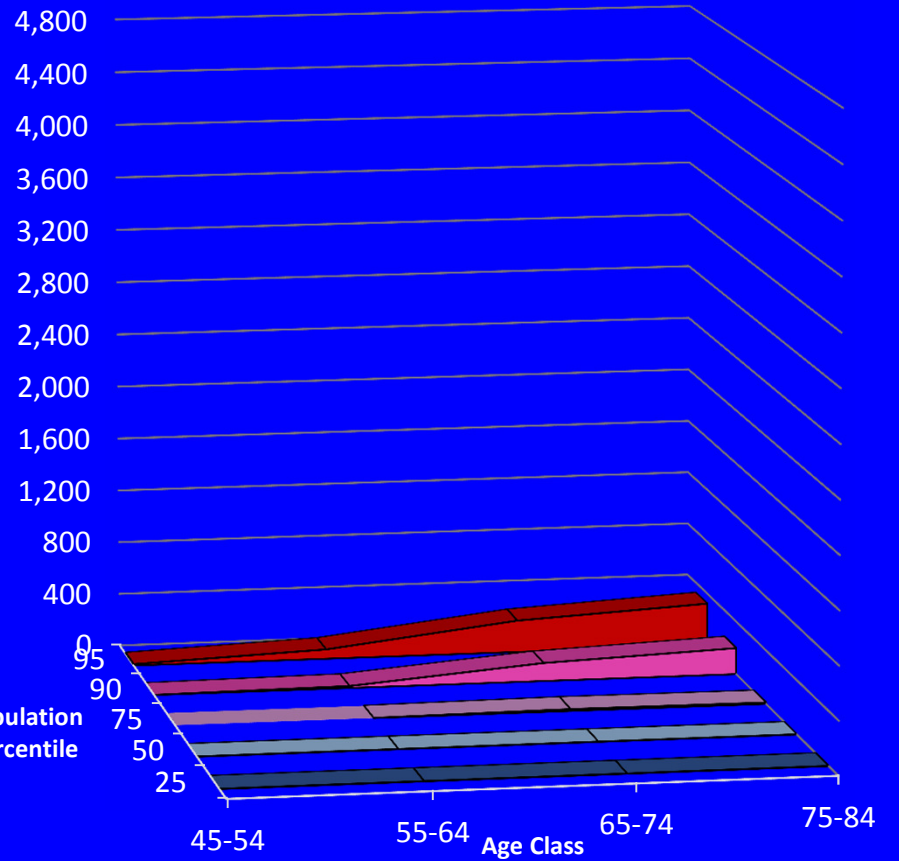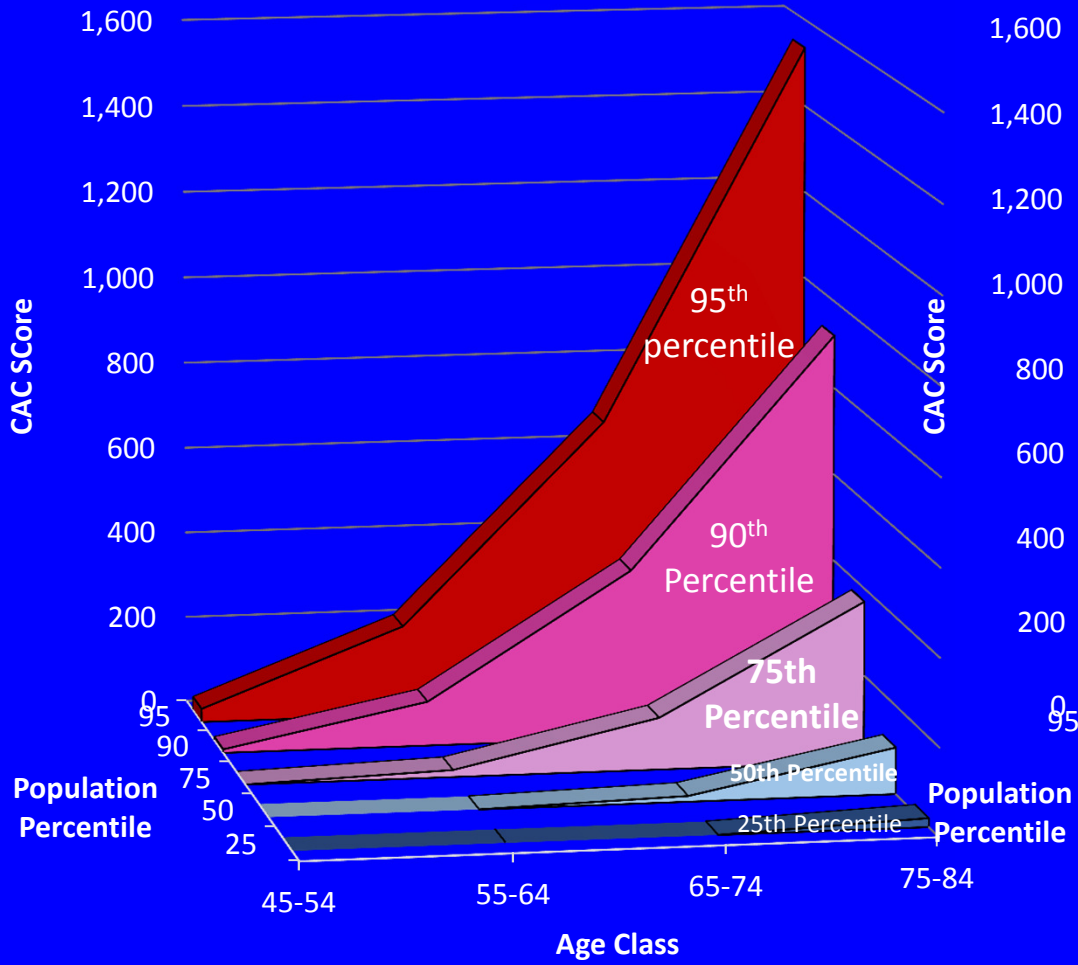75th Percentile CAC Score vs AGE

Legend:
- USA Women (UIC)
- USA Women (MAHI)
- USA White Women (MESA)
- Korean Women
- USA Black Women (MESA)
- European Women (HNR)
- USA Hispanic Women (MESA)
- USA Chinese Women (MESA)
- Japanese Women
- Tsimane Women

MESA White Men

CAC SCore

4,800
4,400
4,000
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
400
0

95th percentile

90th Percentile

75th Percentile

50th Percentile

25th Percentile

Population Percentile

95
90
75
50
25

Age Class

45-54   55-64   65-74   75-84

Tsimane Men

CAC SCore

4,800
4,400
4,000
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
400
0

Population Percentile

95
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Age Class

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MESA White Women

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95th percentile

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Age Class

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Tsimane Women

CAC SCore

1,600
1,400
1,200
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400
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Population Percentile

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75
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Age Class

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CACS: Absent vs > 100, Tsimane and MESA

Age Group

≈ 28 years

≈ 28 years

MESA CAC=0   Tsimane CAC=0   MESA CAC >100   Tsimane CAC >100
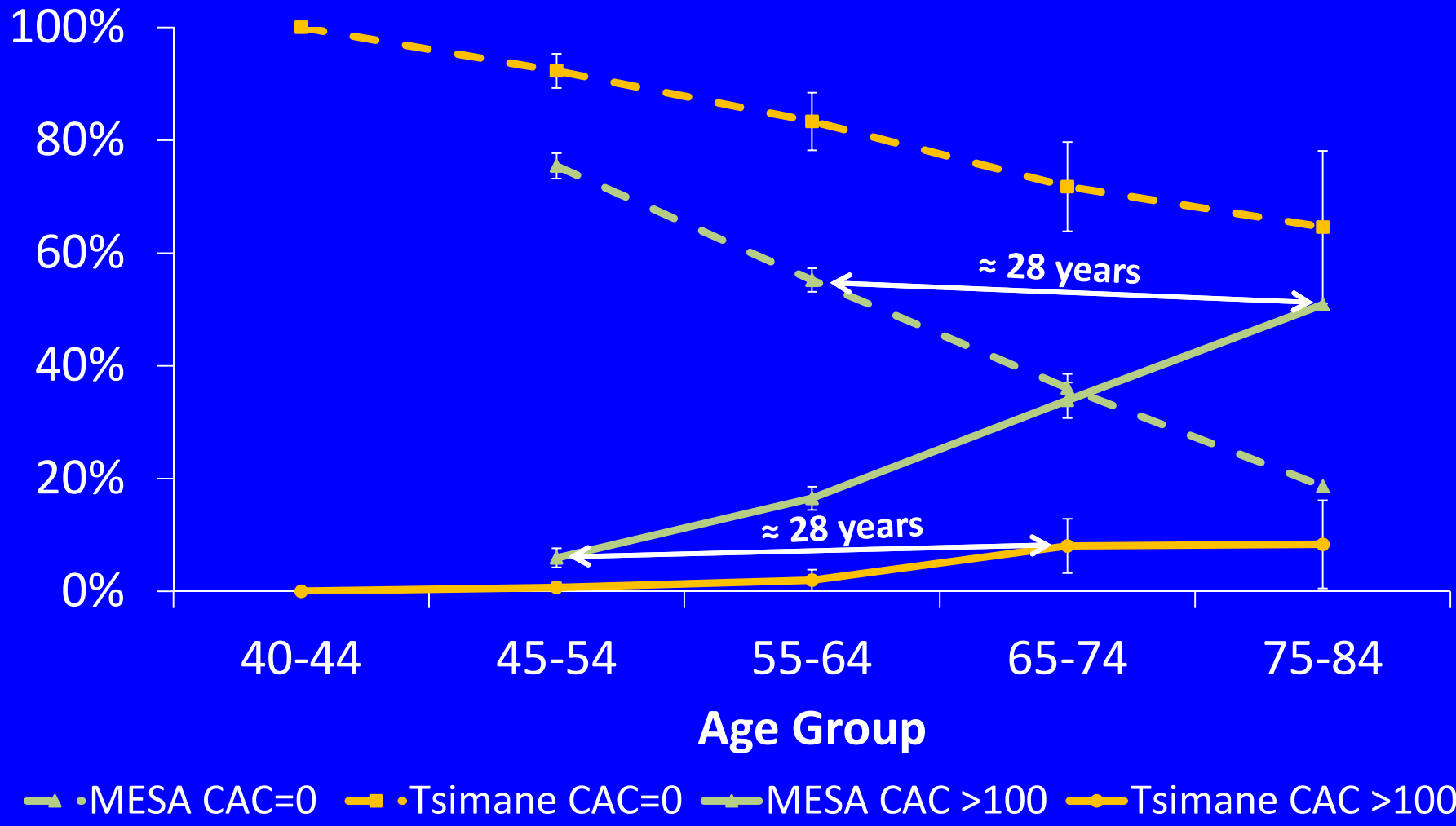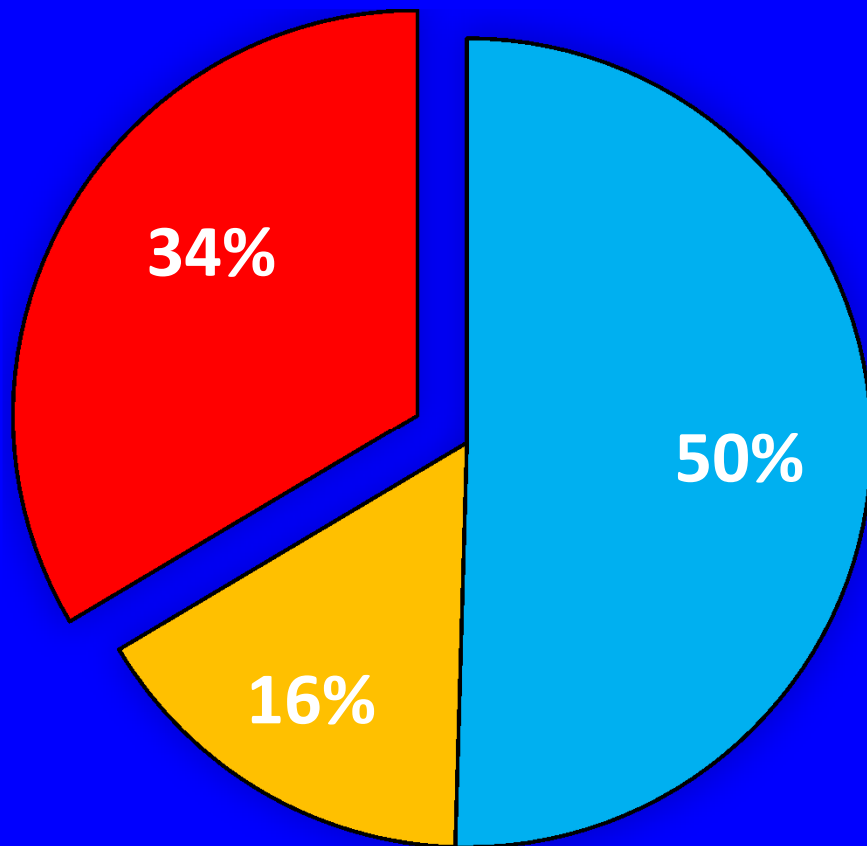
Tsimane Diet and Exercise

- **Very low fat diet – 14% of diet is fat (5% saturated), 14% protein, 72% carbohydrates. High in omega 3 and fiber**

- **Low in simple sugar (but not salt)**
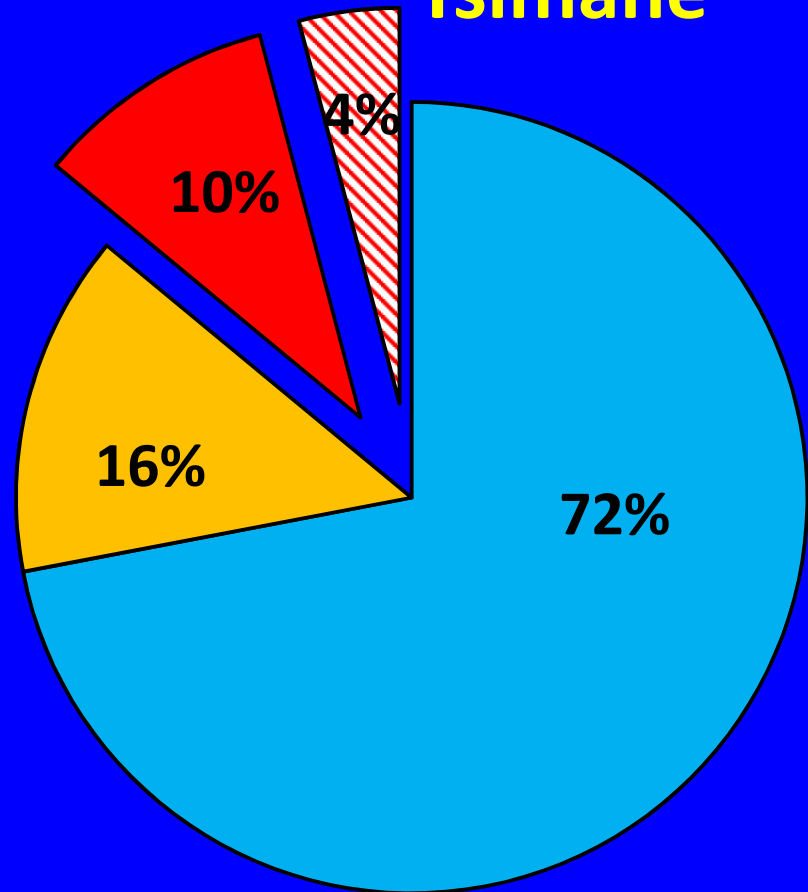
- **No transfats, preservatives, etc**

- **Also, have high levels of activity – 4-7 hours a day in physical activity and < 10% of daylight hours are sedentary.**
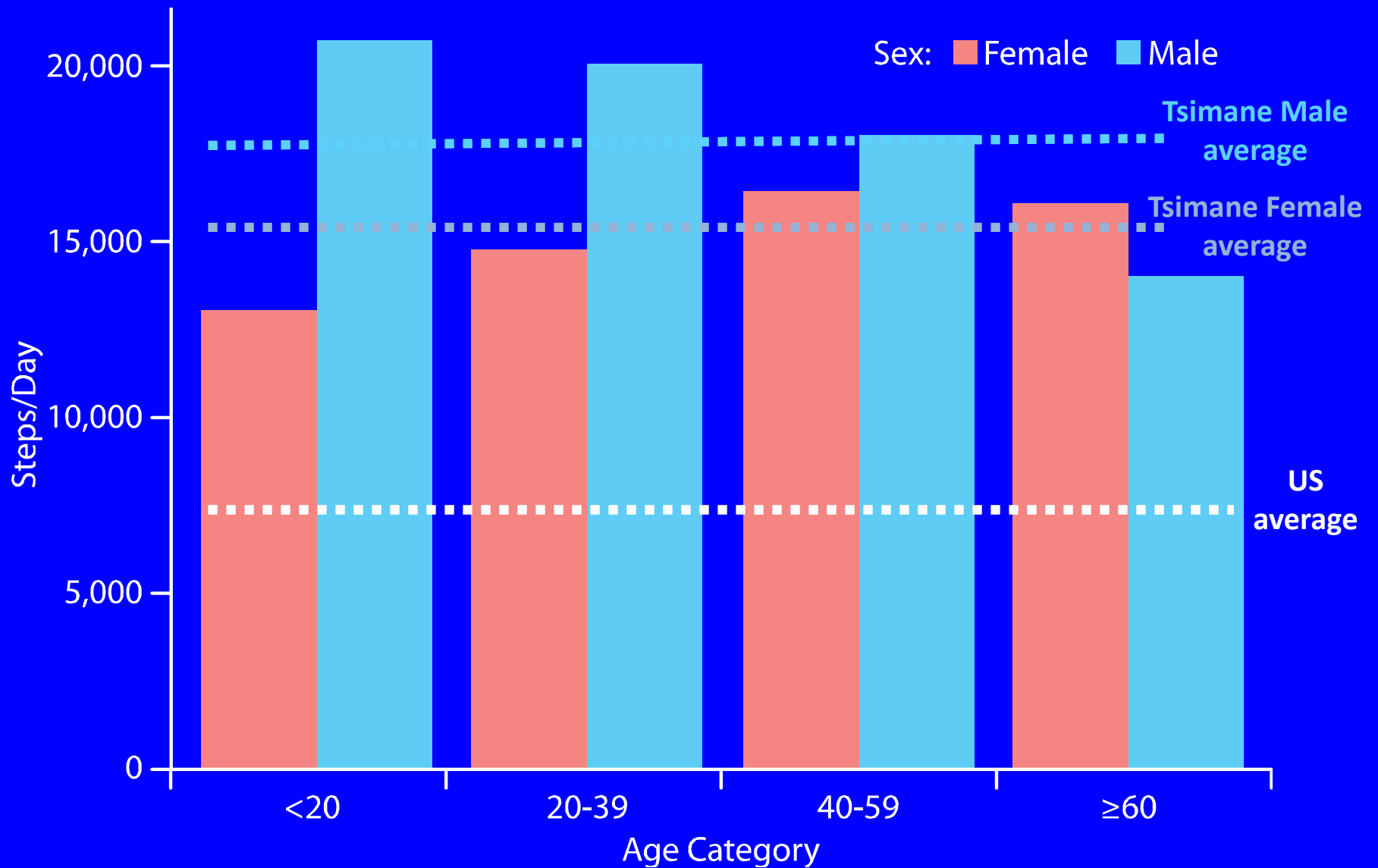
Average Dietary Intake
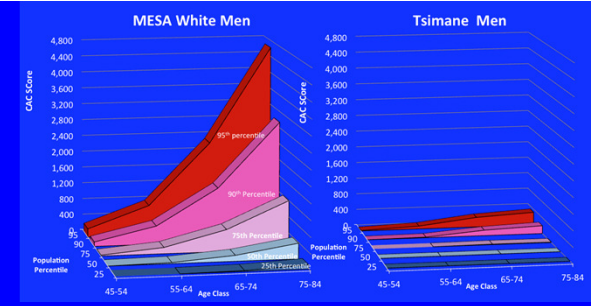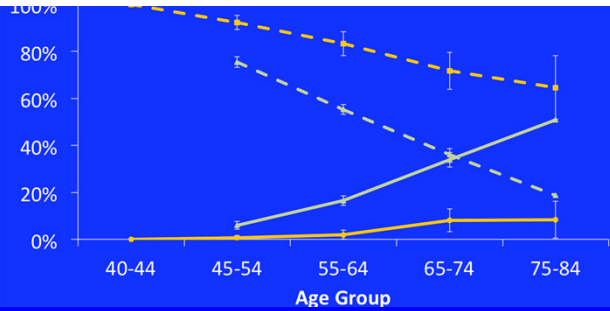
Average Steps/Day by Sex and Age

Summary

- **The Tsimane have extremely low rates of traditional risk factors: smoking, htn, diabetes, dyslipidemia and LDL cholesterol**

- **and high levels of physical activity.**

- **But they have high rates of infection and inflammation.**

Summary

- **Tsimane CACS are extremely low, Even at age 80, 65% have no CAC and only 8.3% have a score >100.**

- **Based on CAC scores and biomarkers, the arterial age of Tsimane is ≈28 years younger than matched industrial populations**

Conclusions

- **Despite a high infectious inflammatory burden, the Tsimane, a forager-horticulturalist population of the Bolivian Amazon with few traditional CAD risk factors, exhibit the lowest reported levels of CAD of any population recorded to date.**

- **Even preclinical CAD can be avoided in the vast majority of people by achieving LDL of 70, mean BP of 116/73, FBS of 79, no/minimal tobacco, and 4-7 hours of daily physical activity**

Thank you