Blast and Relation to Tau and Amyloid Beta in Military Personnel

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Chronic Traumatic Encephalopathy (CTE)

- CTE appears similar to Alzheimer's Disease in symptoms and plaques
- Plaques include both tau and amyloid depositions that compromise functioning
- Alzheimer’s Disease is linked to higher tau and amyloid beta in the CSF

Madigan Army Medical Center Study

- Total sample= 202
- Military personnel within 16 months of deployment
- 128 had one or more TBIs
- 64% had more than 1 TBI, and 24% had more than 3 TBIs
- 71 had PTSD

Demographics and Clinical

	TBI (N=70)	No TBI (N=28)	Significance
Mean age in years (sd)	30.3 (4.97)	28.6 (4.39)	$F_{1,97}$=2.25 p=0.14
Gender, % (no.)			N/A
Male	98.6% (69)	96.4% (27)	
Race, % (no.)			χ^2=4.10,p=0.20
Caucasian	90.0% (63)	78.7% (23)	
Hispanic	1.4% (1)	3.6% (1)	
African American	2.9% (2)	10.7% (2)	
Other/Unknown	5.7% (4)	3.6% (1)	
Marital status, % (no.)*			χ^2=5.20, p=0.157
Married	90.0% (63)	81.5% (22)	
Never been married	2.9% (2)	14.8% (4)	
Separated/Divorced	7.1% (5)	3.7% (1)	
Time Since Most Recent deployment			$F_{1,97}$=16.15, p<0.01
<6 months	7.1% (5)	35.7% (10)	
6-12 months	58.6% (41)	25.0% (7)	
>1 year	34.3% (24)	39.3% (11)	
Deploy to OEF*			χ^2=0.00, p=1.00
Yes	100.0% (70)	100.0% (27)	
Deploy to OIF*			χ^2=3.17, p=0.08
Yes	35.7% (25)	55.6% (15)	
PTSD (PCL-M)	31.4 (11.2)	45.1 (16.1)	$F_{1,97}$=17.8, p<0.01
Depression (QIDS)	8.9 (4.5)	11.5 (6.5)	$F_{1,97}$=3.8, p=0.06

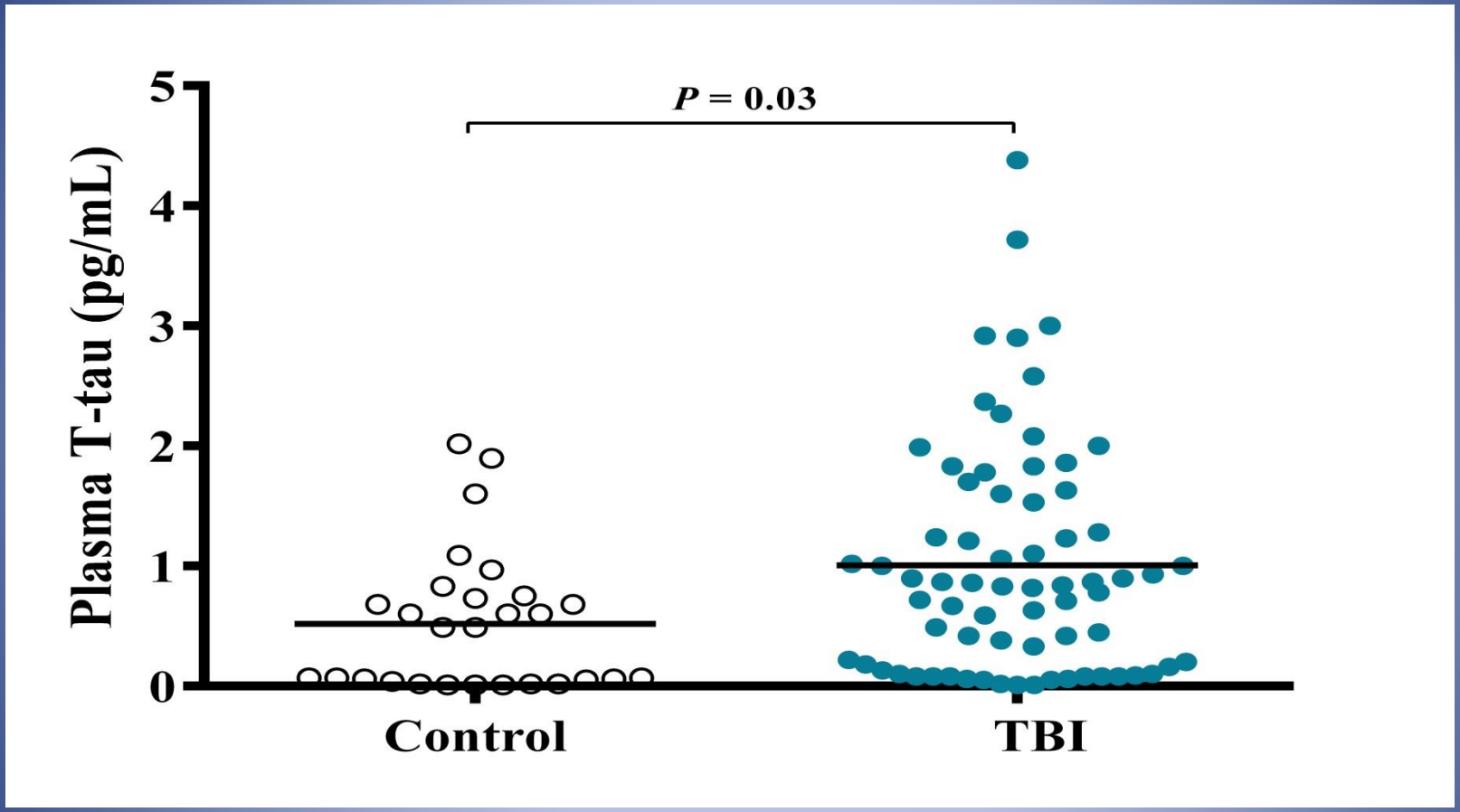
TBIs

- Within the TBI group (n=70)

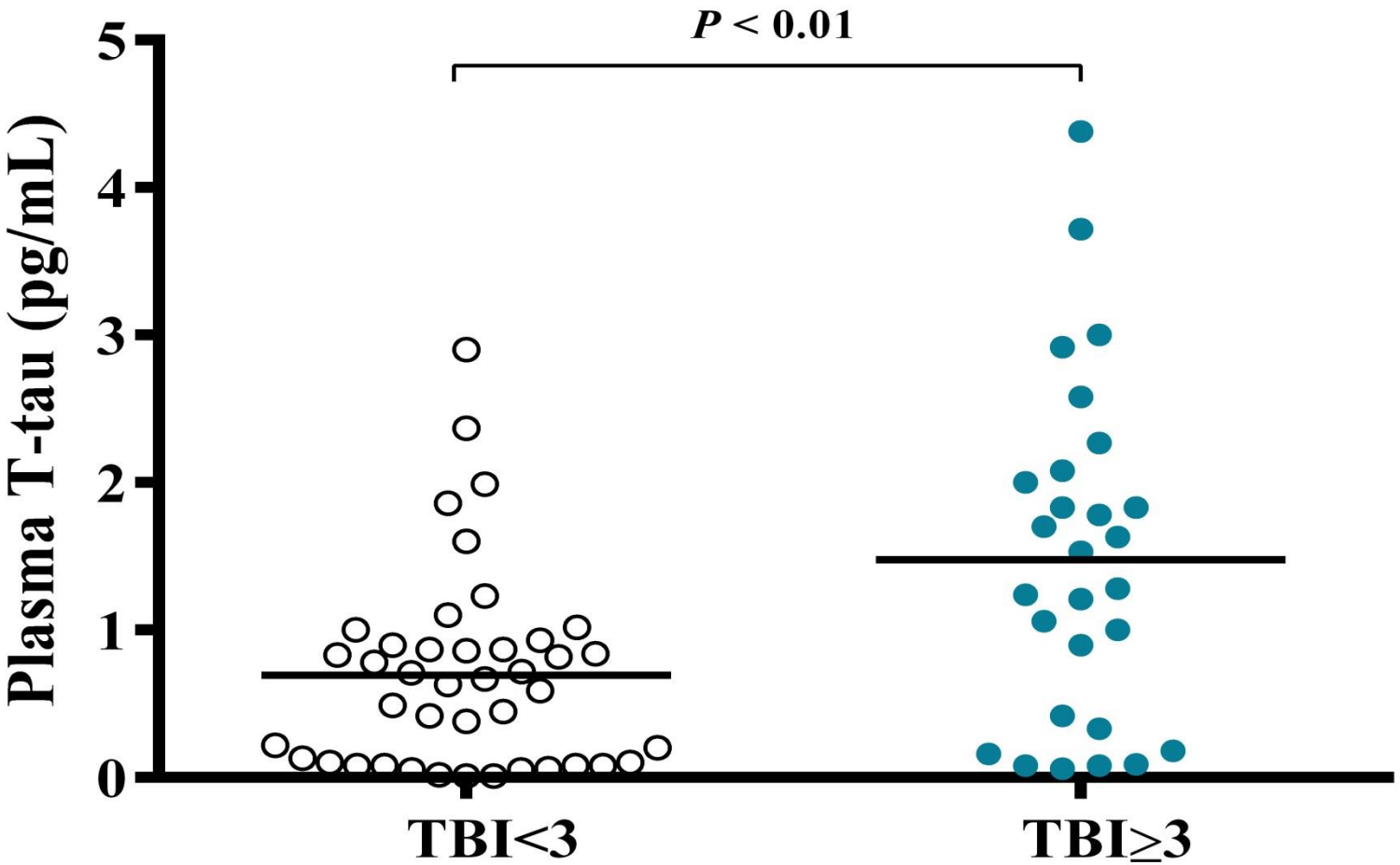
❖ 82.8% had one or more blast (n=58)

❖In those with more than 3 TBIs (n=42), almost all had (n=40), had a high number of blasts, with a mean of 4.4 blasts (sd= 2.2)

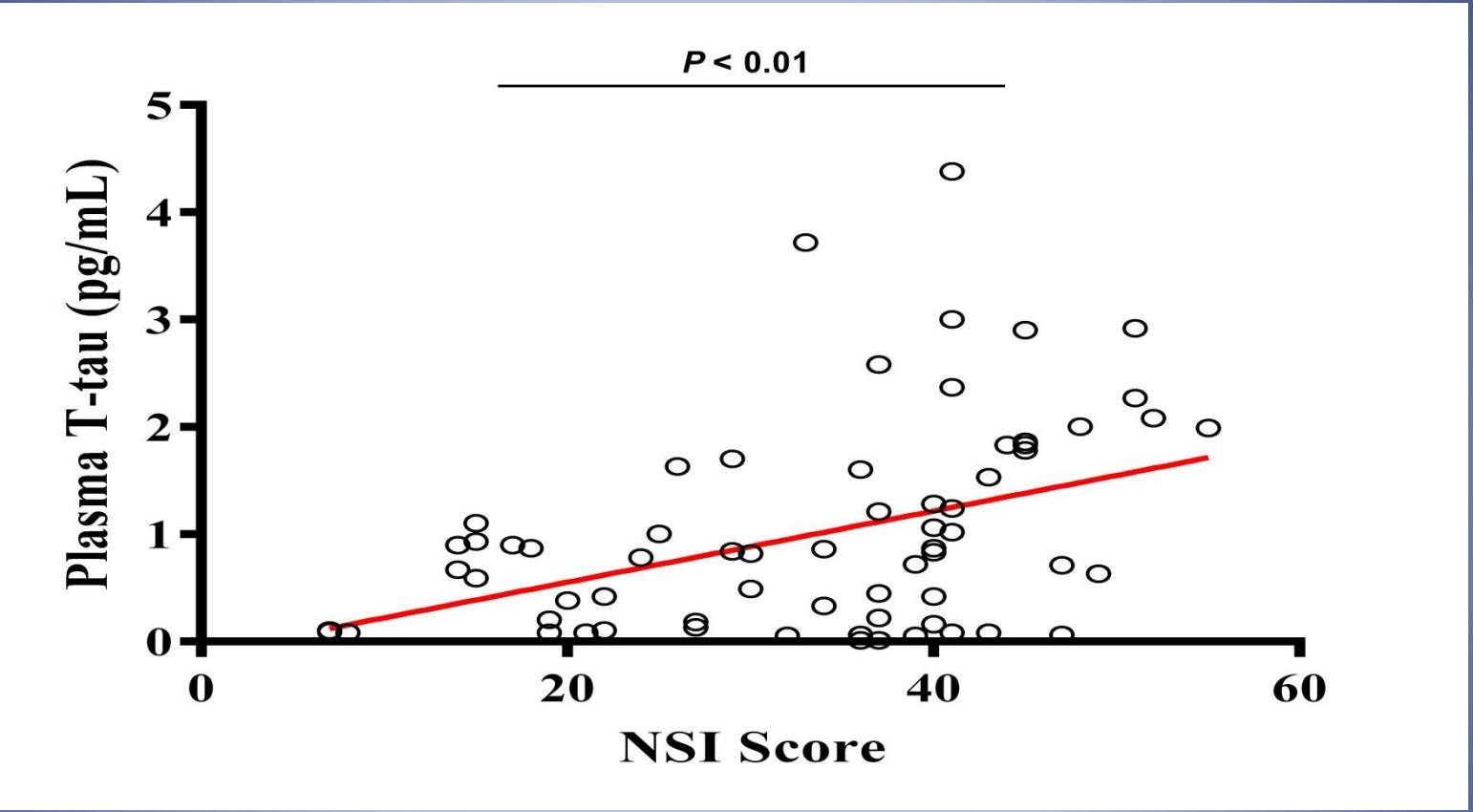
Total Tau is Higher in TBI+ Military Personnel



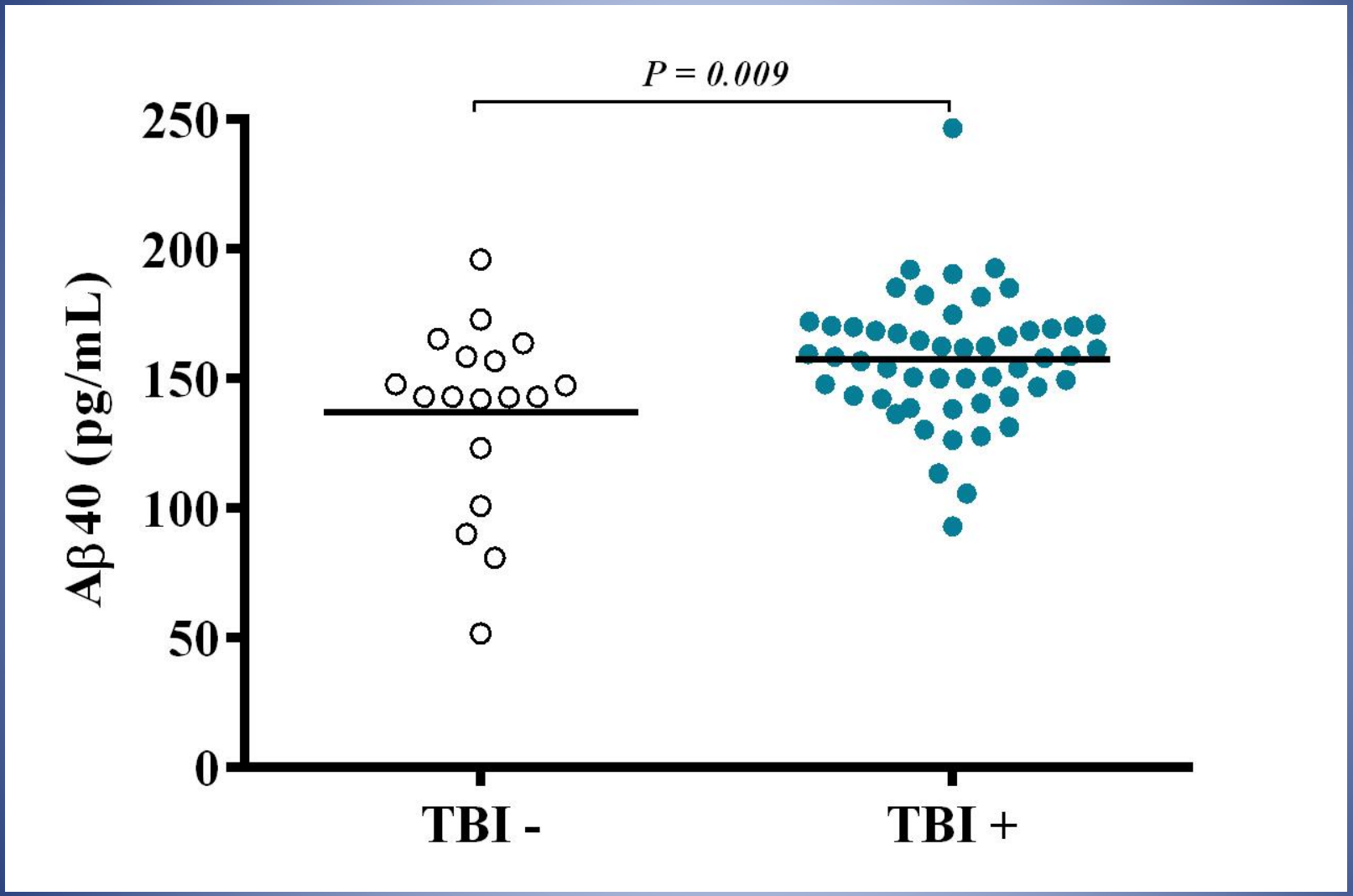
Multiple TBIs are Related to Higher Total Tau



Higher Total Tau Relates to Chronic Symptoms

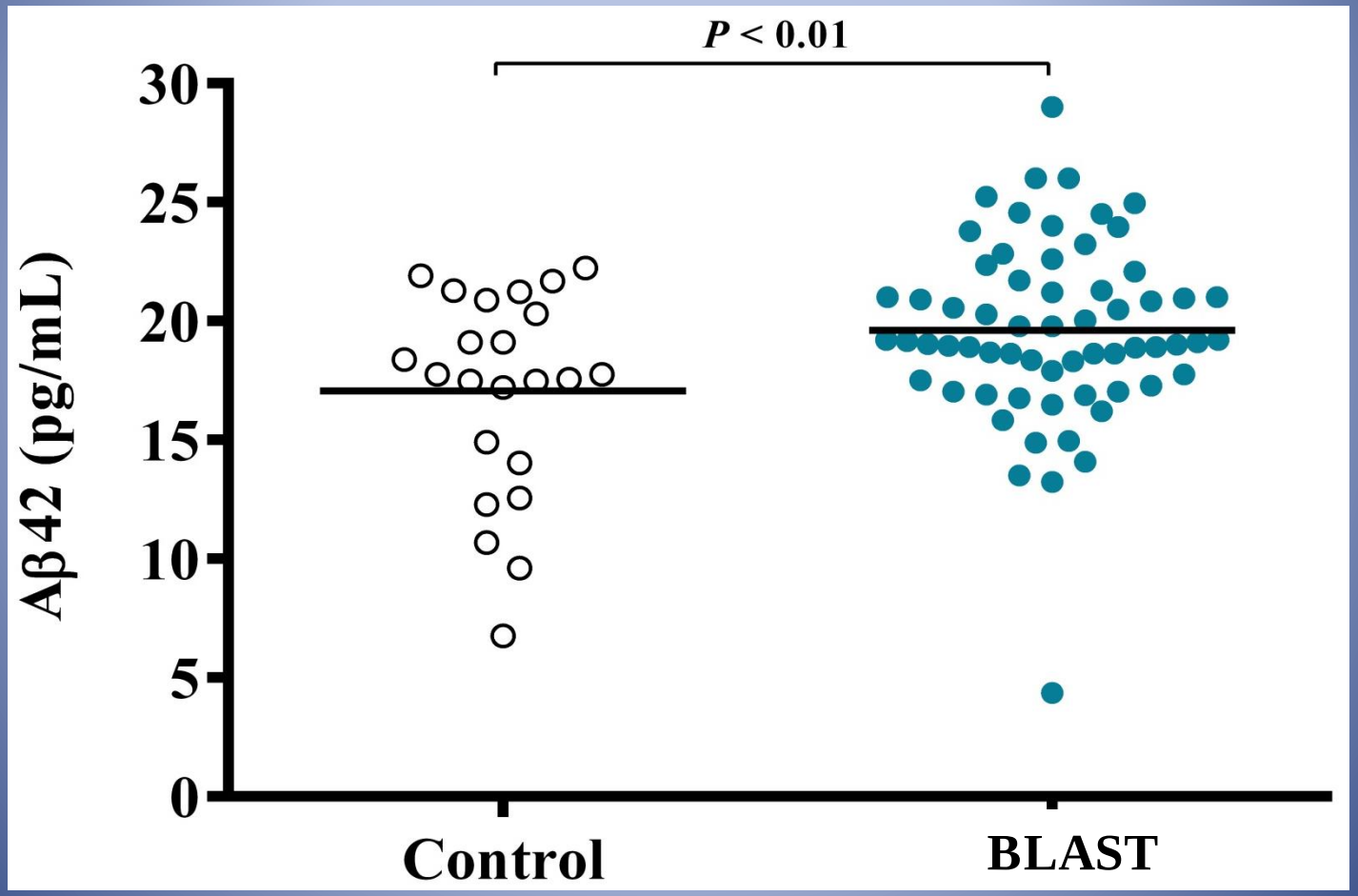


Amyloid-Beta

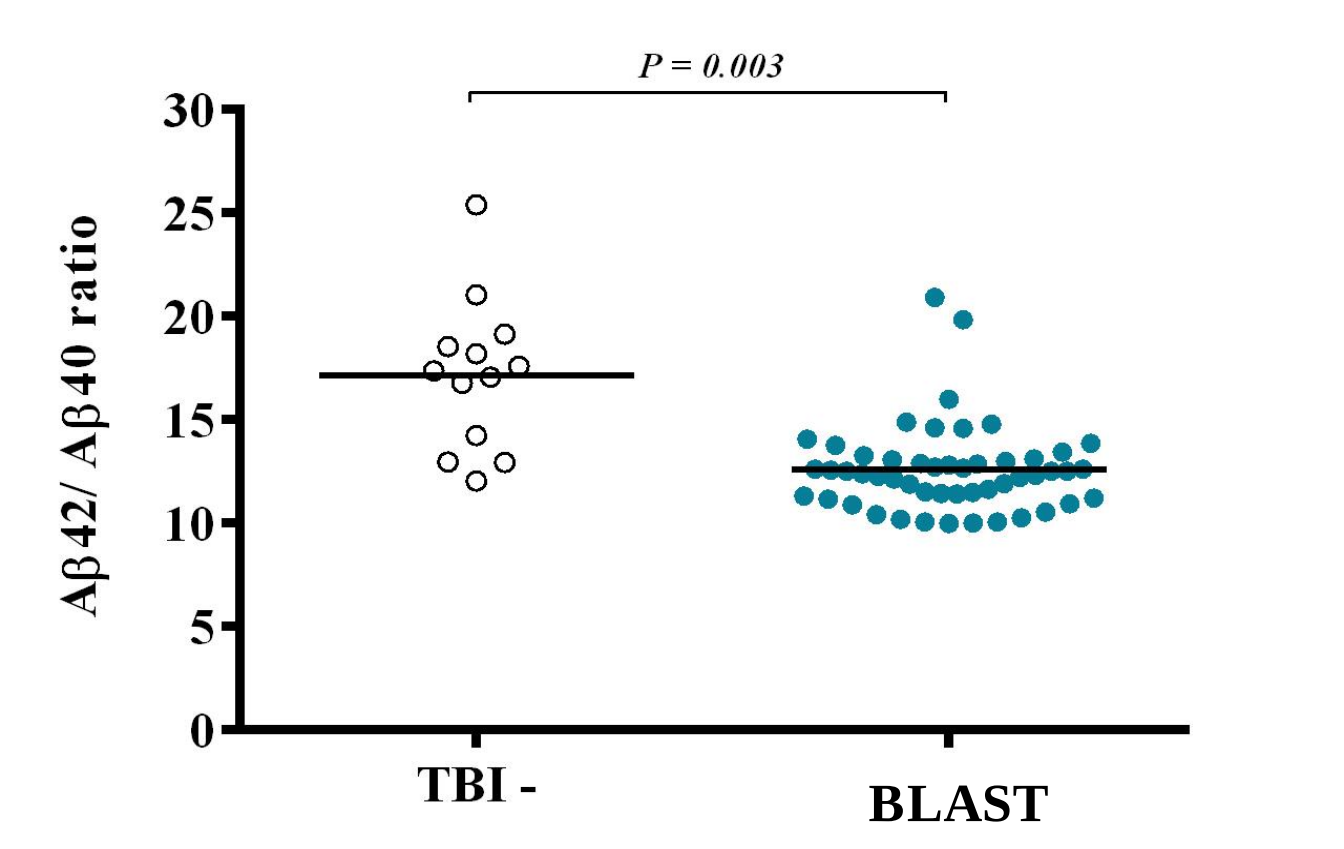


Sub-analyses of Blast Only

Blast and Amyloid-Beta 42



Amyloid Ratio



Amyloid Ratio and Symptoms

- Amyloid 42/40
- 0.41 to total NSI (p=0.02)
- 0.48 to cognitive symptoms (p=0.01)
- 0.46 to somatic symptoms (p=0.01)

Tau

- Tau remains significant in only blast cases (n=58) vs. controls (n=30) (p=0.01), even after controlling for depression and PTSD
- In blast only, total tau correlates with NSI symptoms (r=.43), p=0.01

Summary

- Total tau and amyloid-beta 40 are elevated even years following a TBI in military personnel who are young
- Blast TBIs only remain significant related to tau, and amyloid 40/42, as well as the ratio is altered in blast vs. controls with no TBI
- These elevations may contribute to chronic symptoms and risk for chronic traumatic encephalopathy