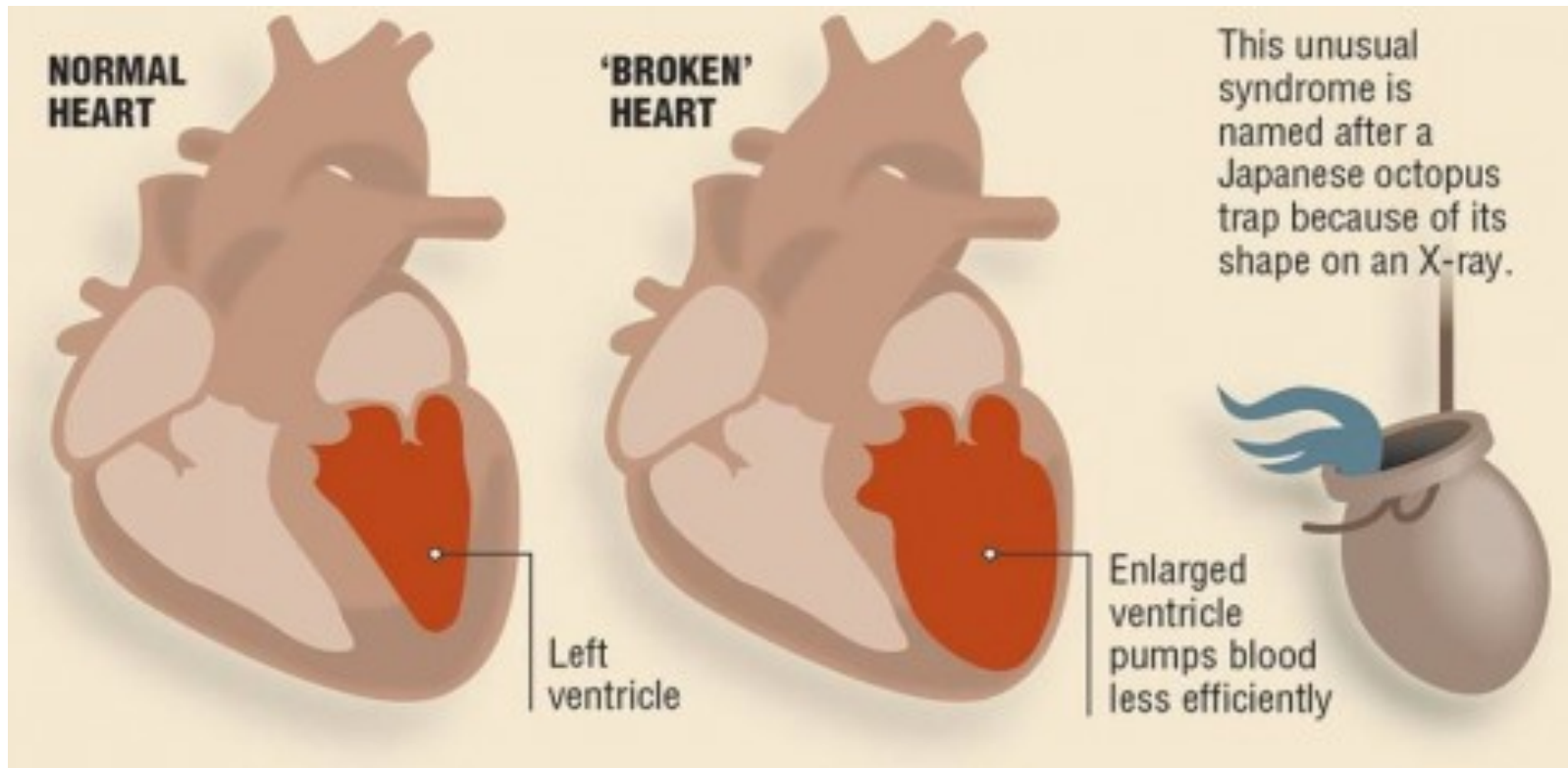


Low-Grade Endotoxemia, Oxidative Stress, and Endothelial Dysfunction in Takotsubo Syndrome

Dott. Maggio Enrico

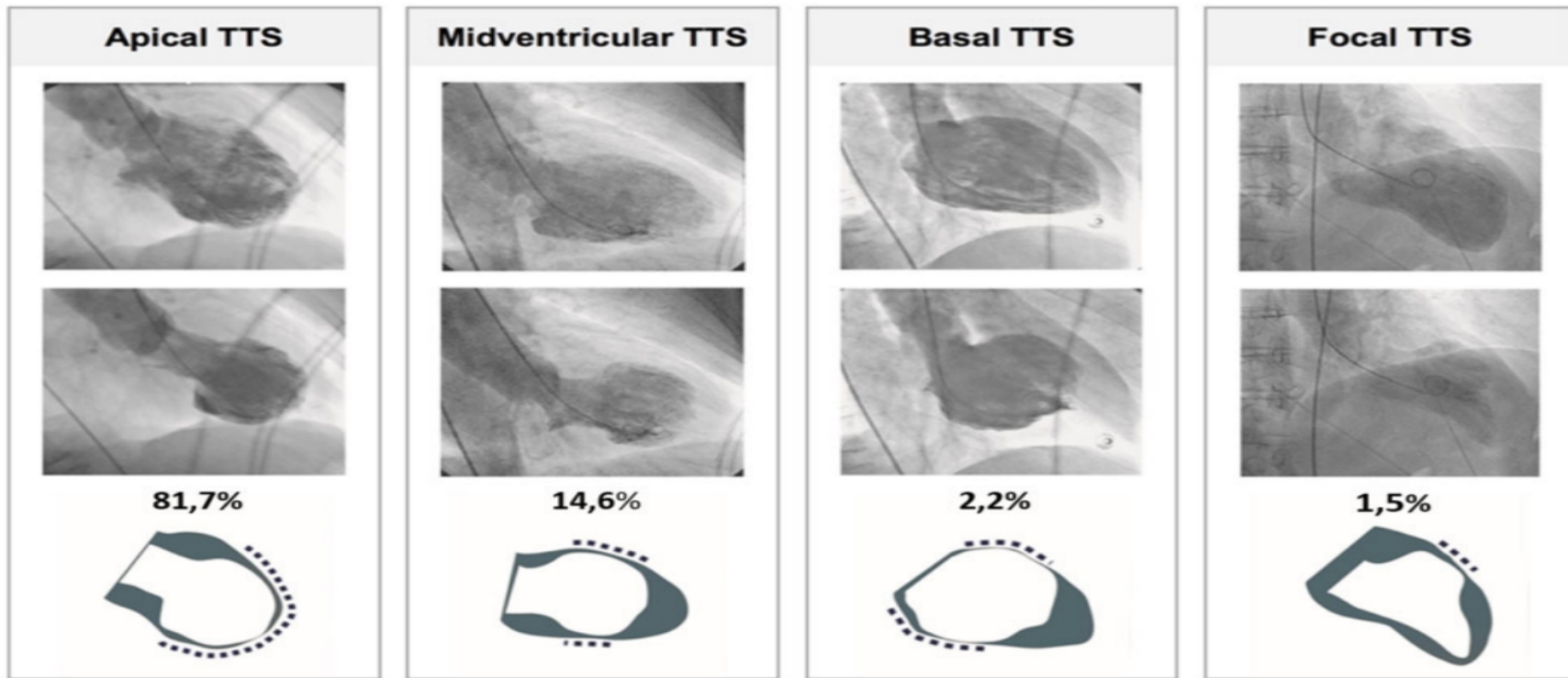
- 1) Dipartimento di Scienze Mediche e Cardiovascolari
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- 2) IRCCS San Raffaele Pisana





Ghizlane Slimani et al. *Evaluation psychiatrique et psychologique du syndrome de Tako-Tsubo: à propos d'un cas.*
Pan African Medical Journal. 2017;27:70. [doi: [10.11604/pamj.2017.27.70.12434](https://doi.org/10.11604/pamj.2017.27.70.12434)]



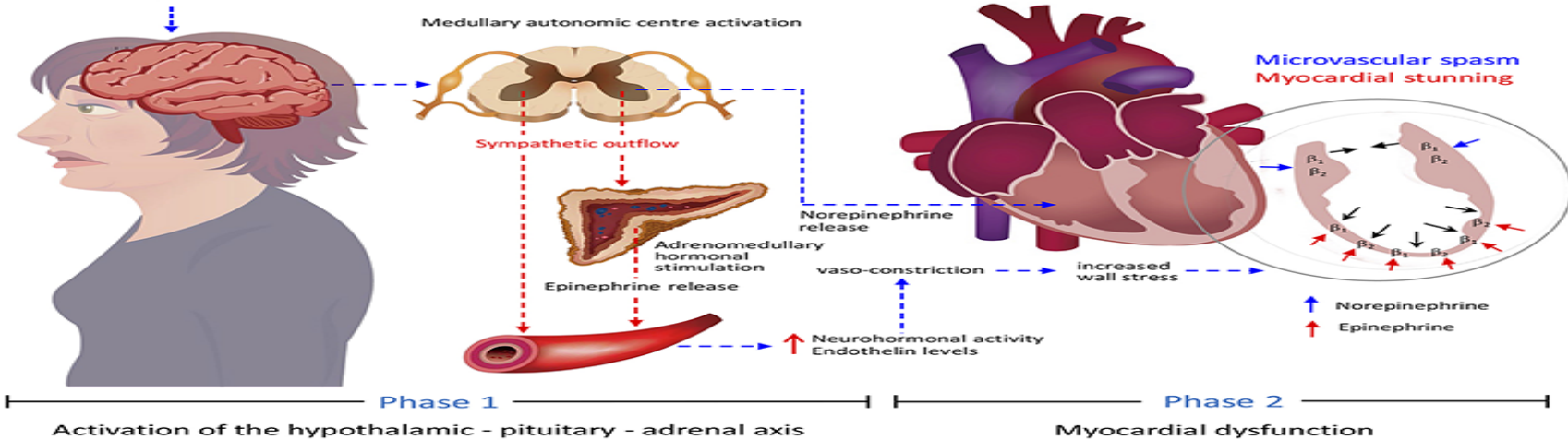
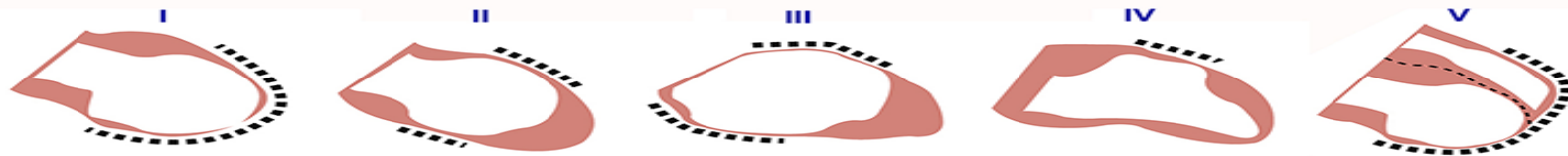


Citro, R., Okura, H., Ghadri, J. *et al.* Multimodality imaging in takotsubo syndrome: a joint consensus document of the European Association of Cardiovascular Imaging (EACVI) and the Japanese Society of Echocardiography (JSE). *J Echocardiogr* **18**, 199–224 (2020). <https://doi.org/10.1007/s12574-020-00480-y>



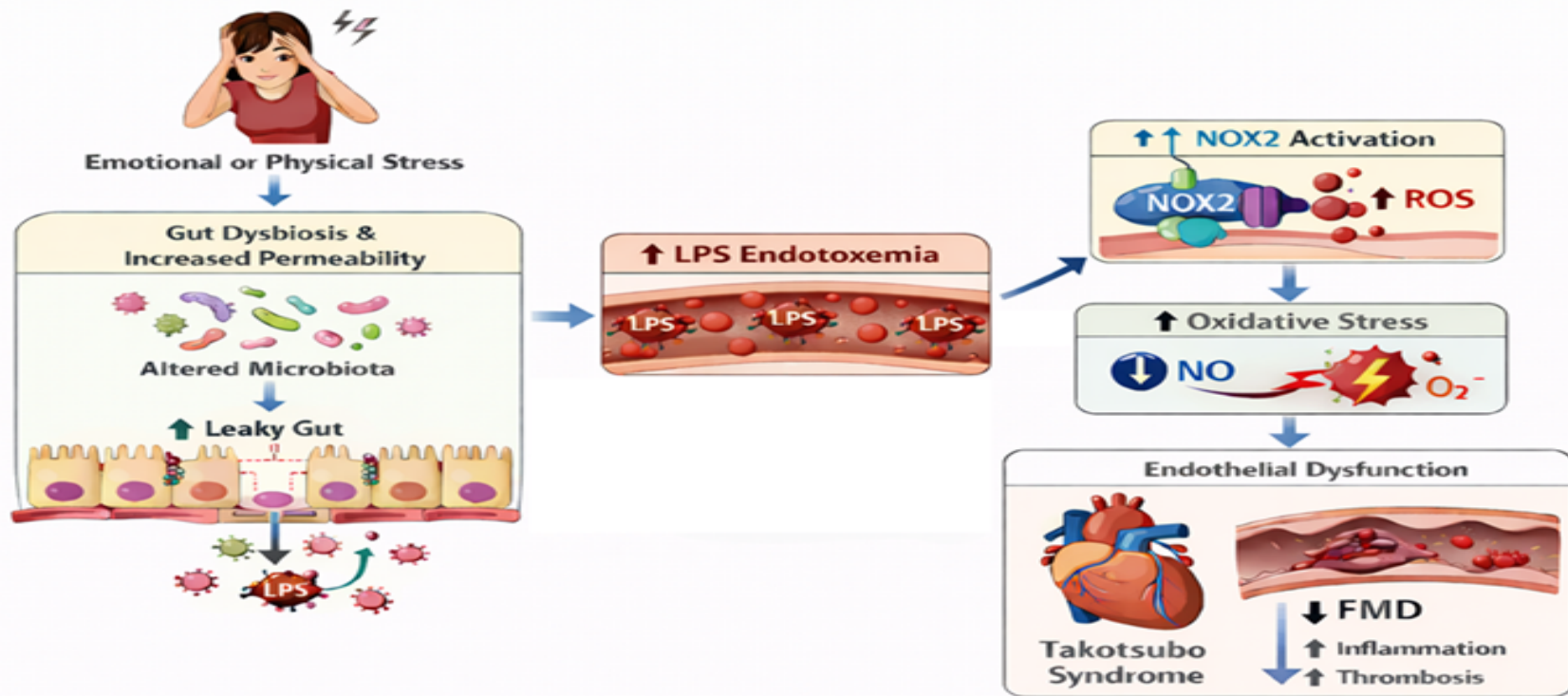
A

Emotional - Physical Stress

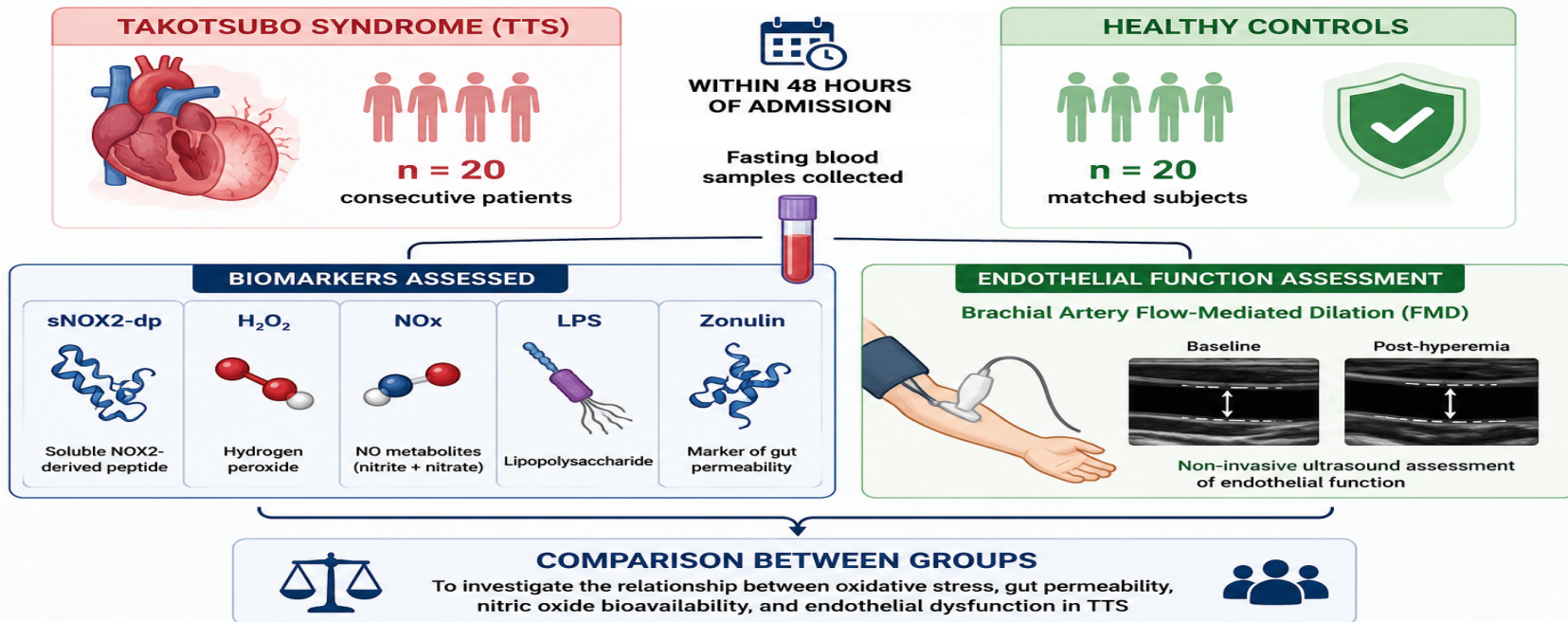
**B**

Díaz-Navarro R. Takotsubo syndrome: the broken-heart syndrome. *Br J Cardiol*. 2021 Mar 9;28(1):11. doi: 10.5837/bjc.2021.011. PMID: 35747479; PMCID: PMC8822514.





Study Design



BIOMARKERS & ENDOTHELIAL FUNCTION (TTS vs. CONTROLS)

BASILINE CHARACTERISTICS



All enrolled TTS patients were female.



No significant differences between TTS patients and controls in:

- ✓ Demographic variables
- ✓ Cardiovascular risk factors
- ✓ Pharmacological therapies



None of the TTS patients had a history of myocardial infarction or prior coronary revascularization.

Variable	TTS (n=20)	Controls (n=20)	P value
sNOX2-dp (pg/mL)	34.5 ± 8.5	23.3 ± 11.3	0.001
H ₂ O ₂ (μM)	27.6 ± 7.7	19.7 ± 7.9	0.003
NO _x (μM)	24.0 ± 9.0	39.4 ± 17.3	0.001
LPS (pg/mL)	34.6 ± 10.0	16.9 ± 8.2	<0.001
Zonulin (ng/mL)	2.1 ± 0.6	1.4 ± 0.4	0.002
FMD (%)	2.0 ± 2.3	6.6 ± 2.4	<0.001



SIGNIFICANTLY LOWER IN TTS PATIENTS



SIGNIFICANTLY HIGHER IN TTS PATIENTS

NO_x
(Nitric Oxide Bioavailability)



FMD
(Flow-Mediated Dilation)



sNOX2-dp



H₂O₂



LPS



Zonulin



IN-HOSPITAL COURSE & SHORT-TERM PROGNOSIS



No ICU transfer



No vasopressor support



No mechanical circulatory assistance



At 30 days:

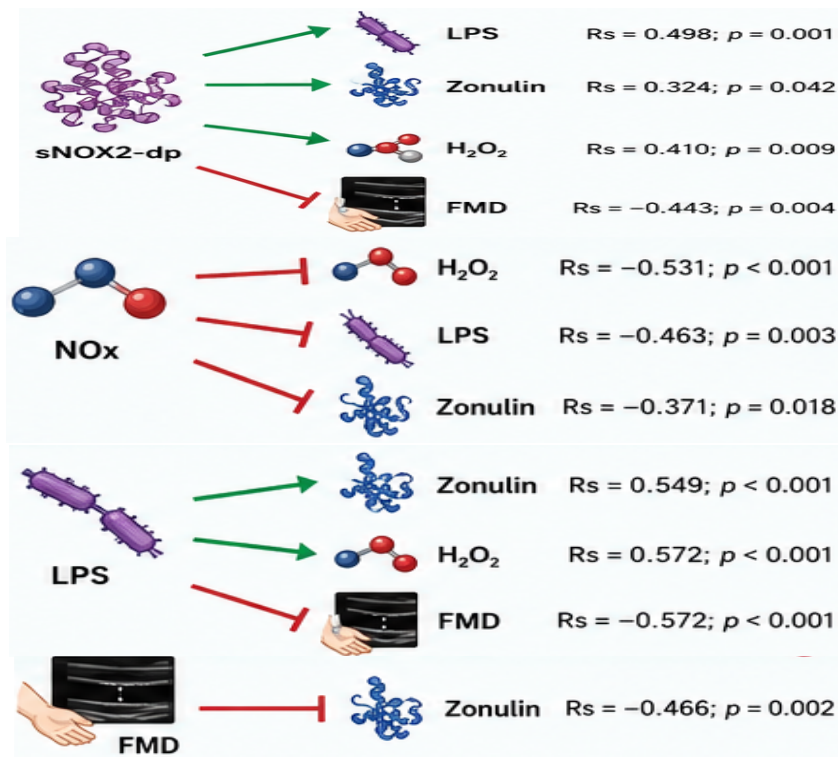
- No rehospitalization
- No cardiovascular death
- No all-cause death



CORRELATION ANALYSES

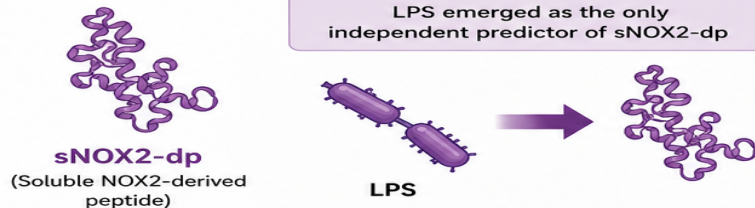
Correlation	R	P
sNOX2-dp vs LPS	0.498	0.001
sNOX2-dp vs FMD	-0.443	0.004
NO vs H2O2	-0.531	<0.001
NO vs Zonulin	-0.371	0.018
LPS vs H2O2	0.572	<0.001
sNOX2-dp vs H2O2	0.410	0.009

Correlation	R	P
sNOX2-dp vs Zonulin	0.324	0.042
NO vs LPS	-0.463	0.003
LPS vs Zonulin	0.549	<0.001
LPS vs FMD	-0.572	<0.001
FMD vs Zonulin	-0.466	0.002



MULTIVARIABLE LINEAR REGRESSION ANALYSES

DEPENDENT VARIABLE: sNOX2-dp



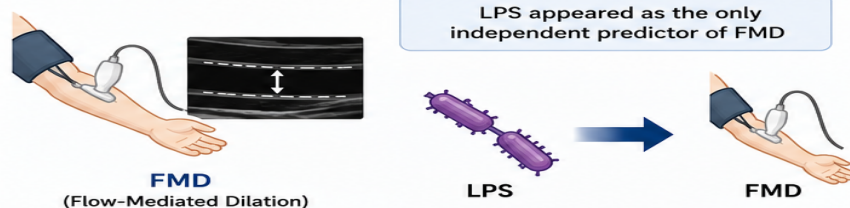
MULTIVARIABLE LINEAR REGRESSION

β	SE	p-value
0.498	0.126	0.001



Explained variability (R^2)
0.24 (24%)
of sNOX2-dp variability

DEPENDENT VARIABLE: FMD



MULTIVARIABLE LINEAR REGRESSION

β	SE	p-value
-0.488	0.051	0.018



Explained variability (R^2)
0.333 (33%)
of FMD variability

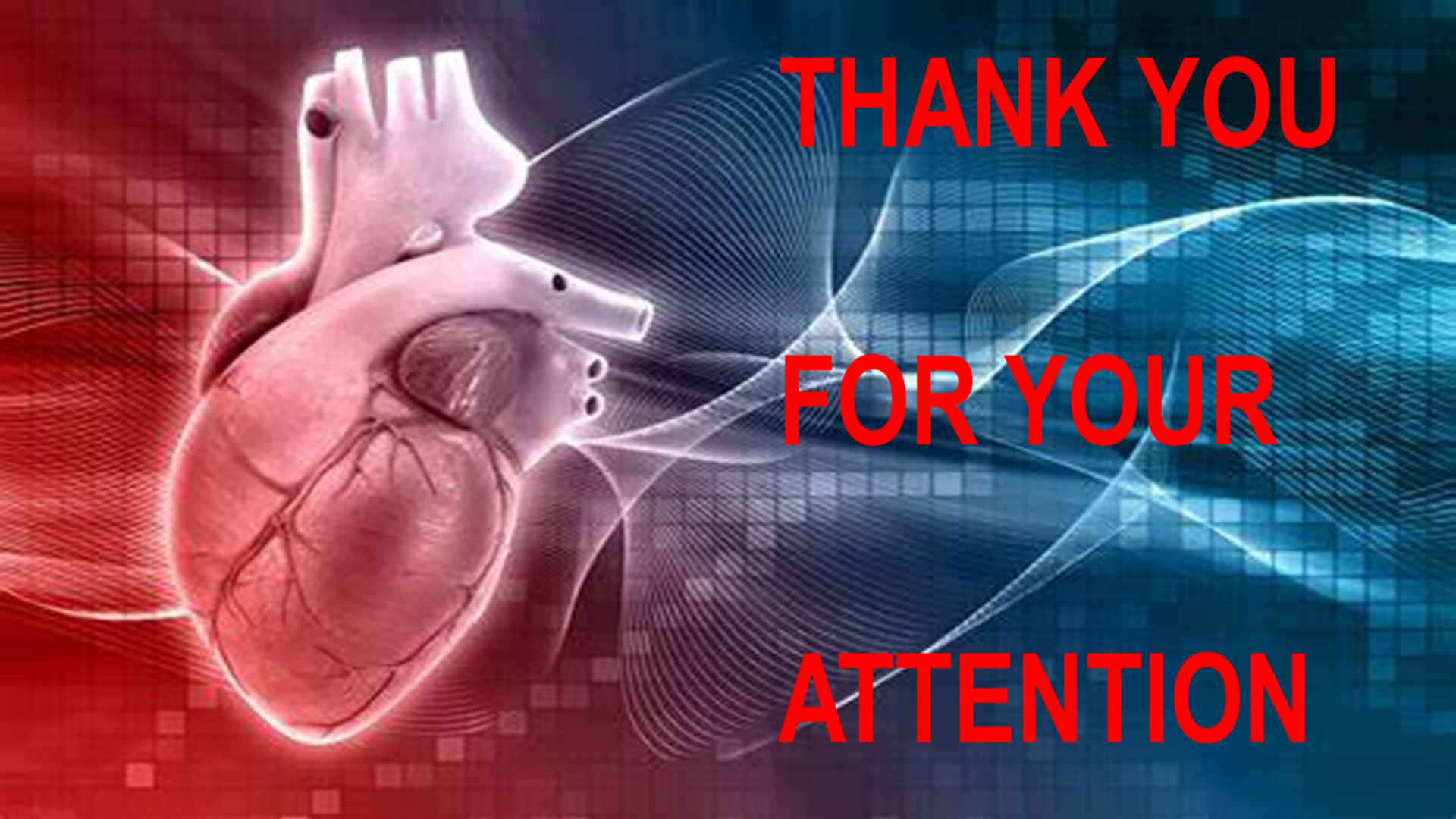


LPS is the only independent predictor of both **sNOX2-dp** and **FMD**, explaining **24%** and **33%** of their variability, respectively.

Conclusions: TTS is associated with low-grade endotoxemia, NOX2-mediated oxidative stress, reduced NO bioavailability, and endothelial dysfunction.

Circulating LPS independently predicts NOX2 activation, supporting a potential gut–vascular axis in TTS.





THANK YOU

FOR YOUR

ATTENTION