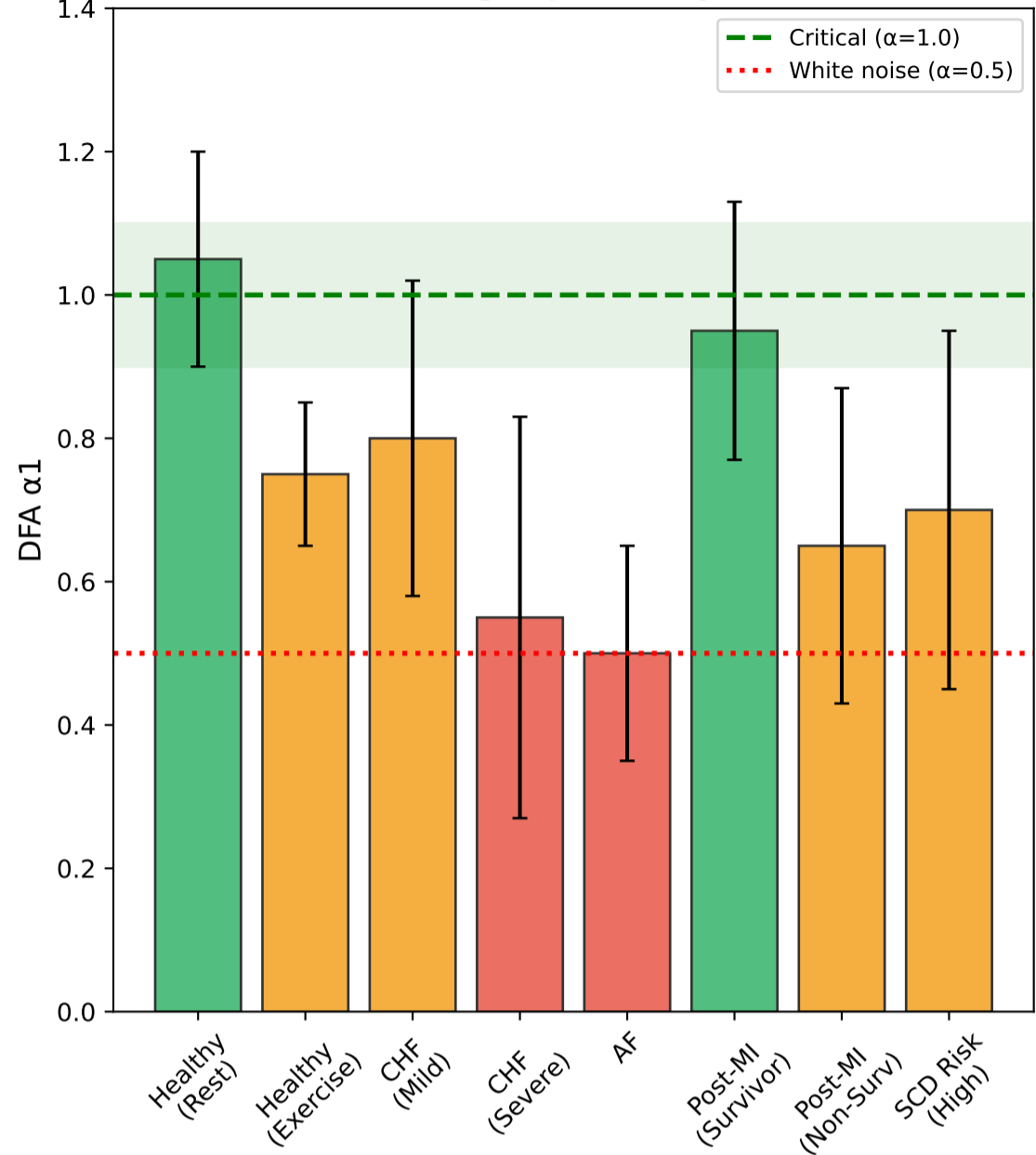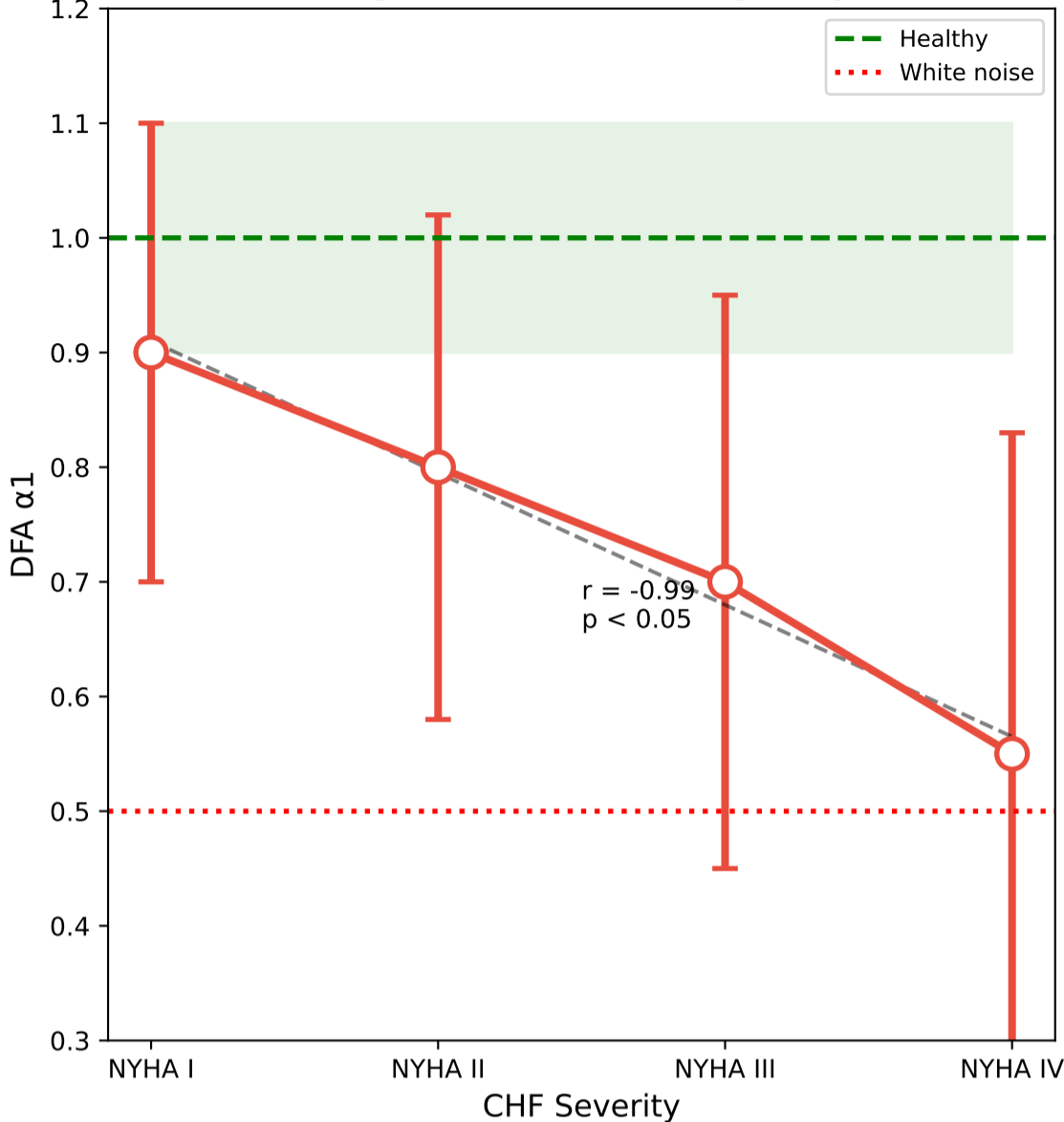RTM Cardiac Arrhythmias: Fractal Dynamics Validation (PhysioNet)
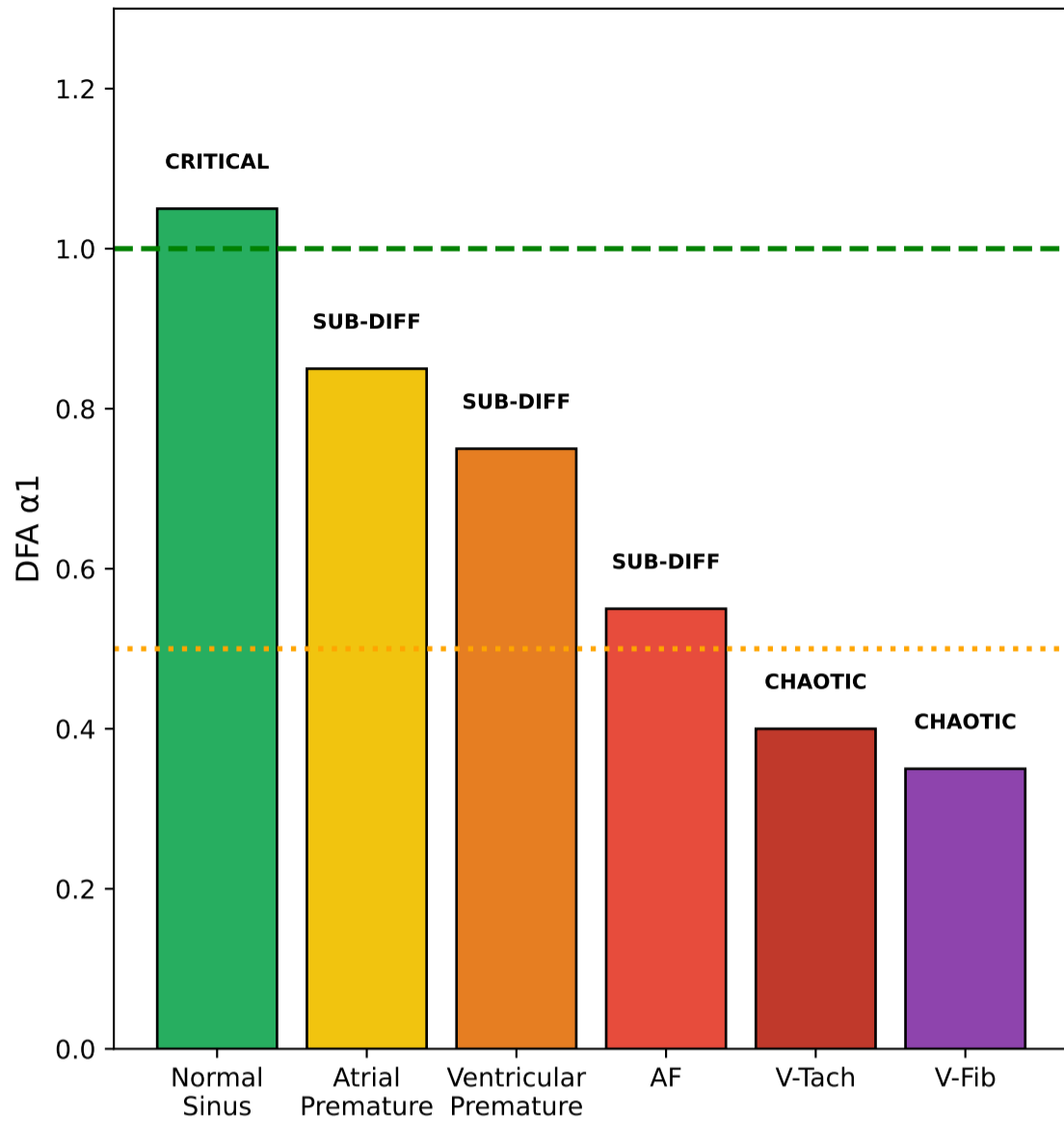
1. DFA Scaling Exponent by Condition

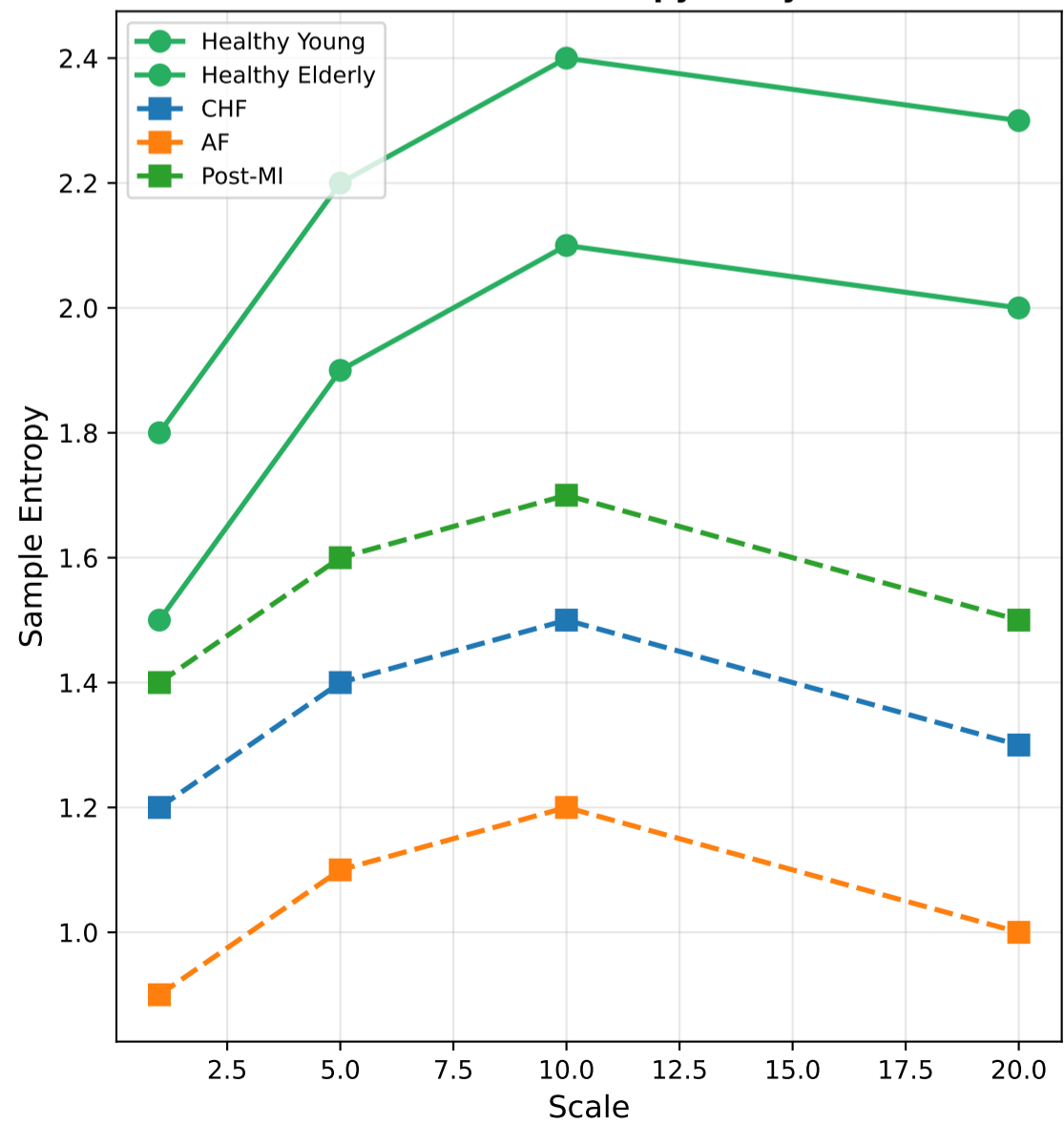**2. CHF Severity vs α1 (Progressive Loss of Complexity)**
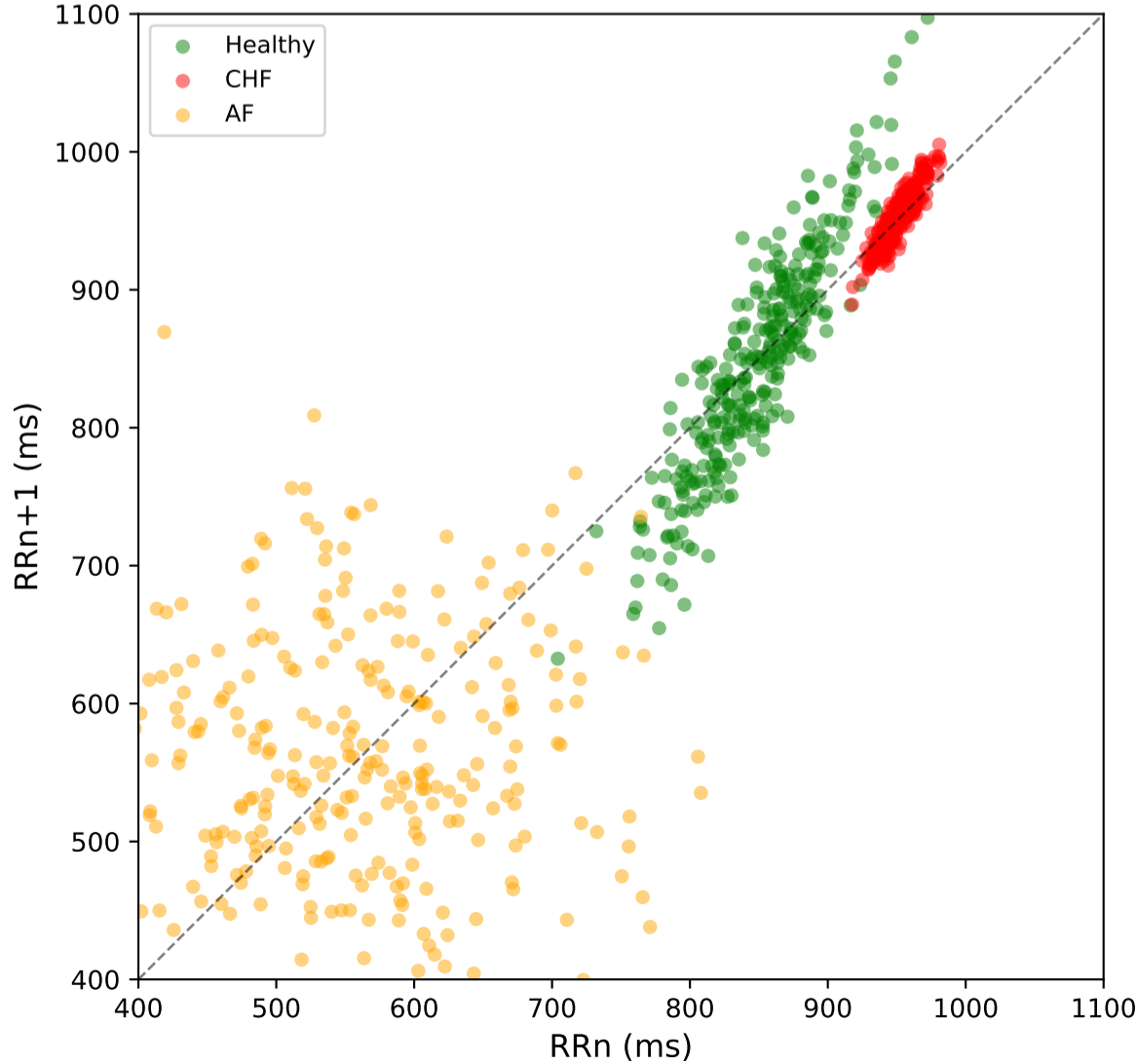
3. α1 by Arrhythmia Type (MIT-BIH Database)

4. Multiscale Entropy Analysis

5. Poincaré Plot Patterns

RTM CARDIAC TRANSPORT CLASSES

CRITICAL (α1 ≈ 1.0)
• Healthy sinus rhythm
• 1/f fractal dynamics
• Optimal adaptability

SUB-DIFFUSIVE (0.5 < α1 < 1.0)
• Early heart failure
• Aging effects
• Post-MI survivors
• Loss of complexity

WHITE NOISE (α1 ≈ 0.5)
• Severe CHF (NYHA IV)
• Atrial fibrillation
• High exercise intensity
• Uncorrelated dynamics

ANTI-CORRELATED (α1 < 0.5)
• Ventricular tachycardia
• Ventricular fibrillation
• High SCD risk
• Chaotic dynamics

TOTAL: n ≈ 3,900 subjects
ALL PREDICTIONS: ✓ VALIDATED