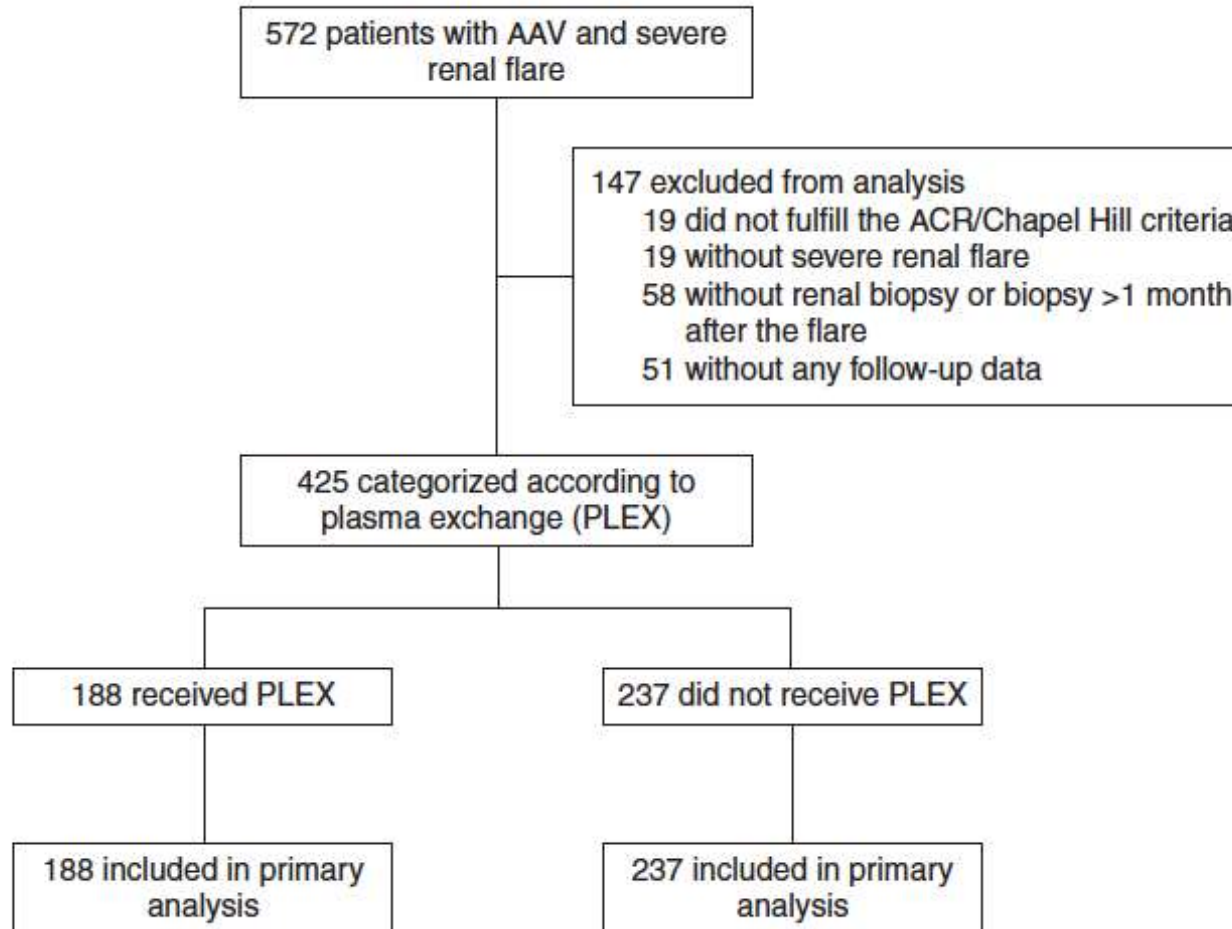# Kidney Histopathology Can Predict Kidney Function in ANCA–Associated Vasculitides with Acute Kidney Injury Treated with Plasma Exchanges
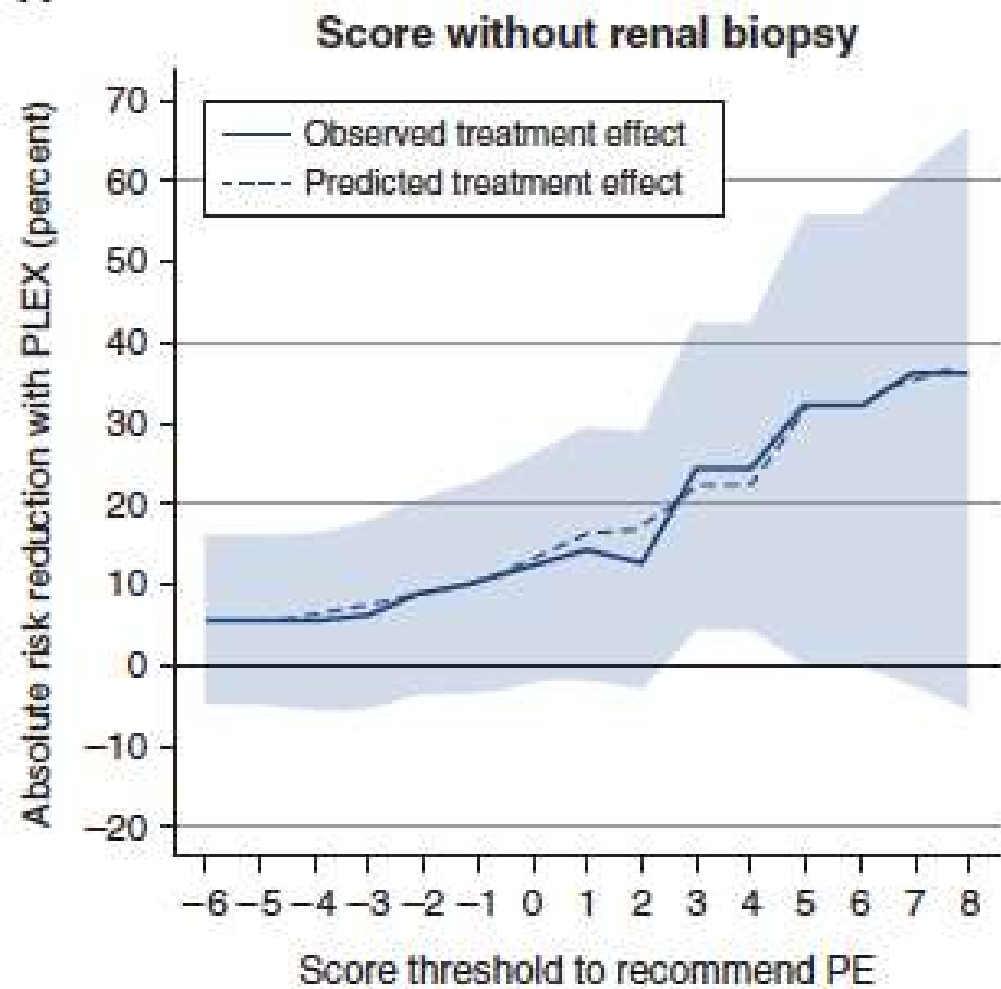
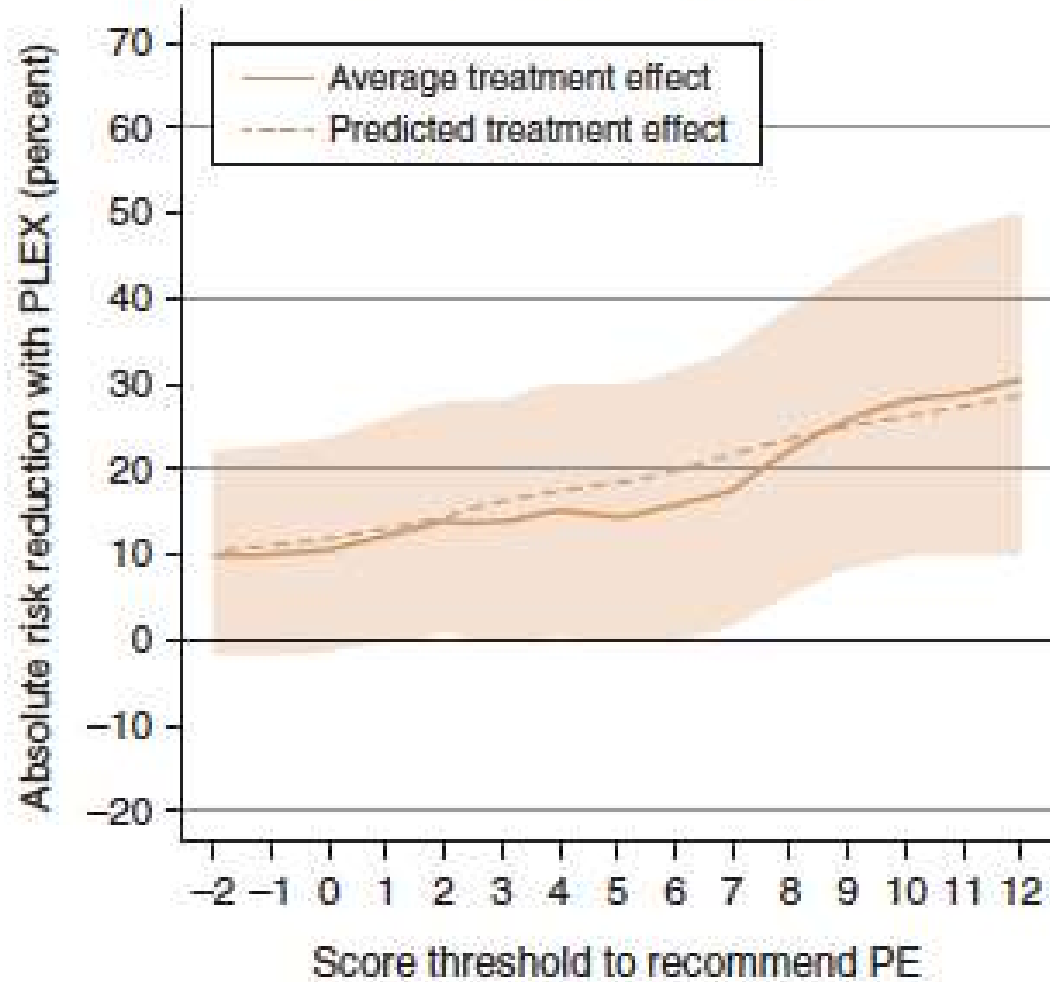Dorian Nezam, et al., JASN, 2022

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┌─────────────────────────────┐
│ 572 patients with AAV and severe │
│        renal flare          │
└─────────────────────────────┘
            │
            │        ┌──────────────────────────────────────────────┐
            │        │ 147 excluded from analysis                   │
            │        │    19 did not fulfill the ACR/Chapel Hill criteria │
            ├────────│    19 without severe renal flare             │
            │        │    58 without renal biopsy or biopsy >1 month │
            │        │       after the flare                        │
            │        │    51 without any follow-up data             │
            │        └──────────────────────────────────────────────┘
            │
┌─────────────────────────────┐
│ 425 categorized according to │
│   plasma exchange (PLEX)    │
└─────────────────────────────┘
            │
      ┌─────┴──────────────────┐
      │                        │
┌──────────────────┐   ┌──────────────────────┐
│ 188 received PLEX │   │ 237 did not receive PLEX │
└──────────────────┘   └──────────────────────┘
      │                        │
┌──────────────────┐   ┌──────────────────────┐
│ 188 included in primary │ │ 237 included in primary │
│      analysis     │   │       analysis       │
└──────────────────┘   └──────────────────────┘
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Outcome	PLEX	No PLEX	Relative Risk (95% Confidence Interval) or Adjusted Mean Difference (95% Confidence Interval)
Death or dialysis at month 12			
Unweighted sample analysis	28.0%	18.7%	1.50 (1.05 to 2.14)
IPTW analysis	21.5%	27.8%	0.77 (0.50 to 1.19)
IPTW analysis, reduced PS model	21.6%	27.0%	0.80 (0.53 to 1.21)
Double-robust analysis	20.1%	26.2%	0.77 (0.47 to 1.25)
eGFR $\geq$30 ml/min per 1.73 m^2 at month 12			
Unweighted sample analysis	46.3%	54.4%	0.85 (0.70 to 1.03)
IPTW analysis	49.7%	48.0%	1.04 (0.80 to 1.34)
Changes in eGFR at month 12, ml/min			
Unweighted sample analysis	19.1 (22.4)	12.5 (18.1)	5.7 (1.6 to 9.9)
IPTW analysis	15.7 (20.5)	12.5 (18.5)	3.1 (−6.9 to 13.2)
Changes in eGFR >15 ml/min per 1.73 m^2 at month 12			
Unweighted sample analysis	52.8%	39.2%	1.35 (1.09 to 1.67)
IPTW analysis	48.6%	37.9%	1.28 (0.97 to 1.70)

Variables	PLEX Not Recommended, n=248	PLEX Recommended, n=177	P Value
Age, mean (SD), yr	63.1 (13.1)	63.6 (14.4)	0.76
Women	112 (45)	80 (45)	>0.99
Vasculitis type			<0.001
GPA	116 (47)	44 (25)	
MPA	87 (35)	107 (60)	
RLV	45 (18)	26 (15)	
ANCA positive	240 (97)	165 (93)	0.06
PR3	104 (42)	34 (19)	<0.001
MPO	136 (55)	130 (73)	<0.001
Initial flare	234 (94)	169 (95)	0.66
Serum creatinine, median (IQR), μmol/L	282 (187–416)	550 (409–748)	<0.001
eGFR, median (IQR), ml/min per 1.73 m^2	18 (12–28)	7 (3–11)	<0.001
Medications			
Cyclophosphamide	172 (70)	150 (85)	<0.001
Rituximab	70 (28)	26 (15)	0.001
KRT	13 (5)	104 (59)	<0.001
Ventilation support	4 (2)	13 (7)	0.005
Berden classification			<0.001
Focal	64 (26)	21 (12)	
Crescentic	33 (14)	85 (48)	
Mixed	102 (42)	13 (7)	
Sclerotic	45 (18)	57 (32)	
Brix score, median (IQR)	4 (0–7)	9 (5–9)	<0.001
Treatment received			<0.001
PLEX	79 (32)	109 (62)	
No PLEX	169 (68)	68 (38)	

Score without renal biopsy

Variable	Score points
Age > 45 y	−2
MPA vasculitis	2
PR3 positive	−5
MPO positive	−2
Serum creatinine	
251...400 μmol/L	4
401...600 μmol/L	6
>600 μmol/L	11

Legend:
- Observed treatment effect
- Predicted treatment effect

Y-axis: Absolute risk reduction with PLEX (percent)

X-axis: Score threshold to recommend PE

Score with renal biopsy

Variable	Score points
Male sex	1
MPA	5
RLV	3
PR3 positive	−10
MPO positive	−3
Serum creatinine	
251...400 µmol/L	5
401...600 µmol/L	8
>600 µmol/L	16
Brix score ≥ 7	1
Berden score	
Crescentic	6
Mixed	−8