“…the ghosts of dead patients that haunt us do not ask why we did not employ the latest fad of clinical investigation. They ask us, why did you not test my urine?”

—Sir Robert Grieve Hutchison (1871–1960)

Case 1

32M
HTN
Recently started ACEi
Presents to A&E - Unwell/ Fever/swelling
AKI
Catheterised - urine dipstick- B4+,P3+

Urine

- Quantity
- Gross examination
- Dipstick
- Microscopy

Colour

- red
- brown/cola
- rarely -
  - white
  - green
  - black

Colour

- red - spin it
  - supernatant clear
  - supernatant red

Sediment

- Fresh sample
- Spin at 2500-3000rpm for 3-5 minutes
- No sudden brake

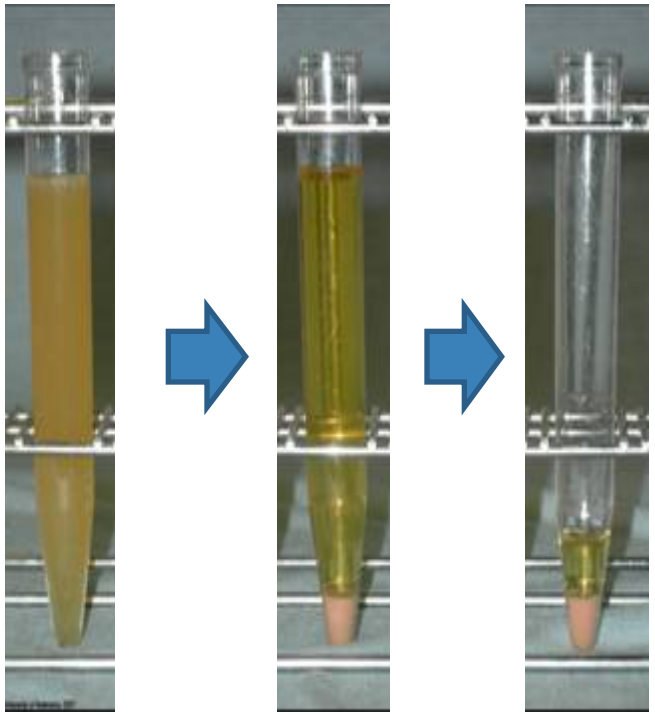
SPIN

Case 2

45F
Rash, Joint pain, Fever x 2 mo
NSAIDs
Creatinine 95
Urine dipstick - Blood ++, Protein +++
Microscopy

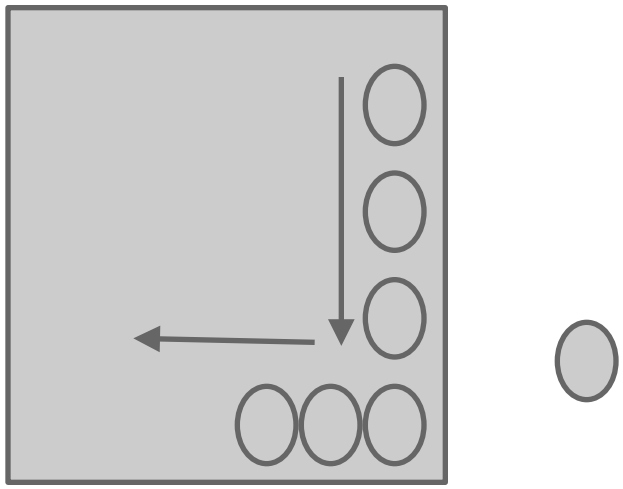
How much

- Semi Quantitative
  - 12ml
  - use 1ml of spun sample
  - Resuspend



Low power microscopy

- 100x magnification
- Scan slide for
  - casts
  - larger cells (epithelial)
  - fat globules

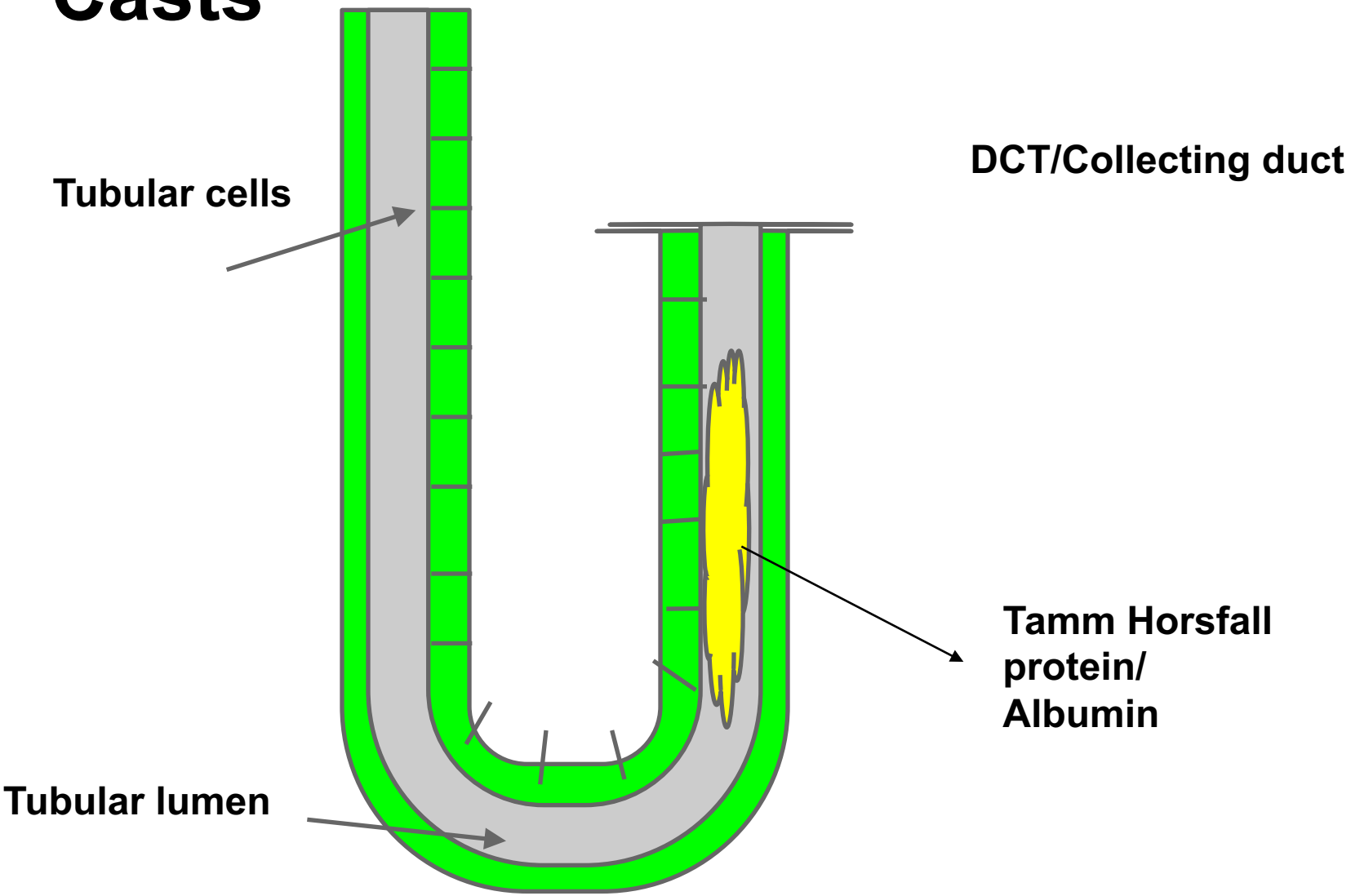


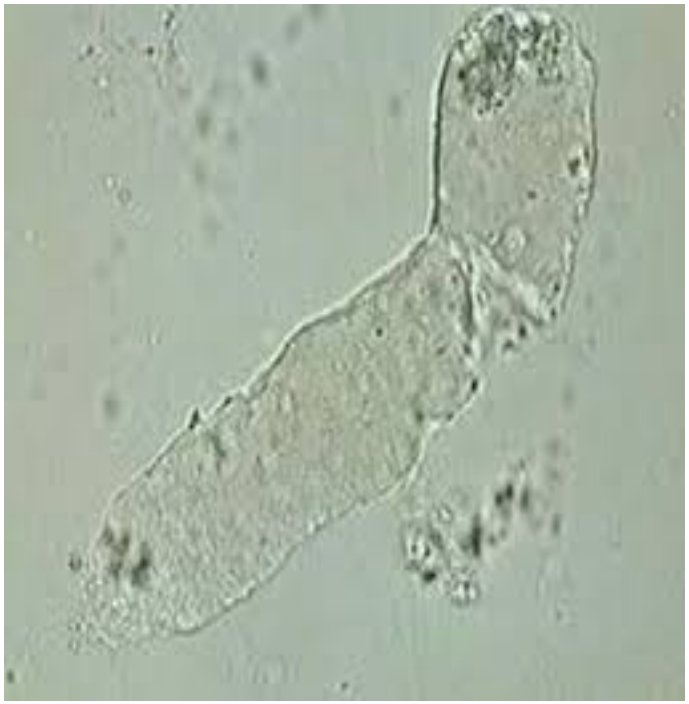
Quality of imaging/ enhancement

- Bright view microscopy
- Phase contrast microscopy
- Polarised microscopy
- Additives - acetic acid
- Staining

Epithelial cells

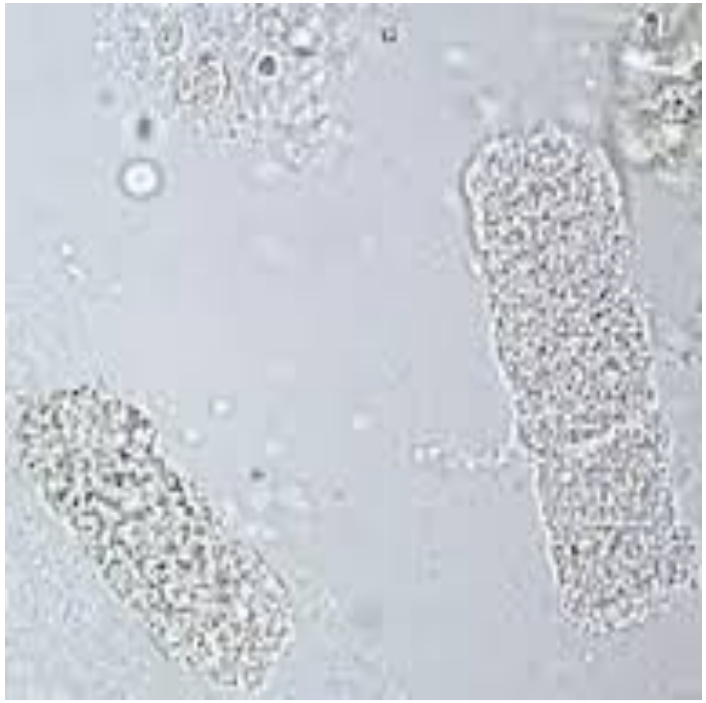
Casts


Tubular cells
DCT/Collecting duct
Tamm Horsfall protein/ Albumin
Tubular lumen



Hyaline casts

Granular casts



Red cell casts

Others-

- White cell casts
- Bacterial casts
- Waxy casts
- Fatty casts
- Crystal and pigment casts

Case 3

52 M

Painless visible haematuria

Urine dip - Blood 4+, Protein 3+

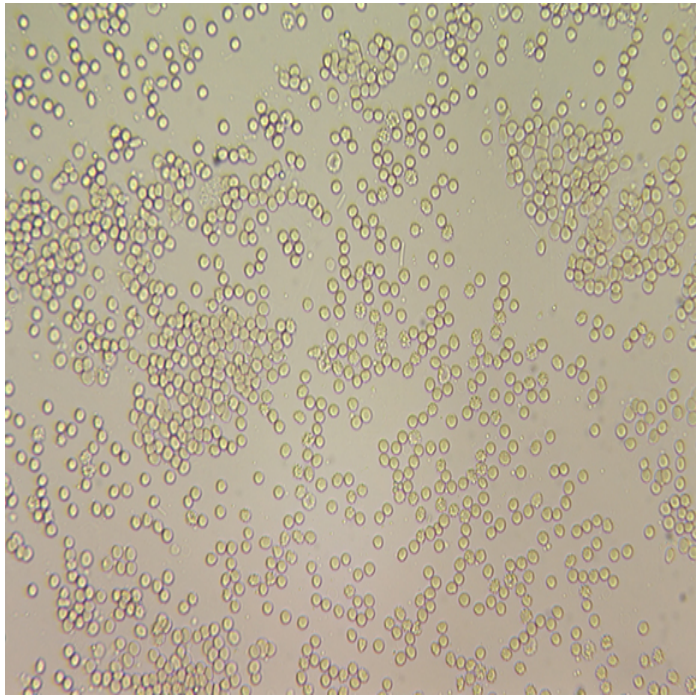
Sub-nephrotic proteinuria

Creatinine 165

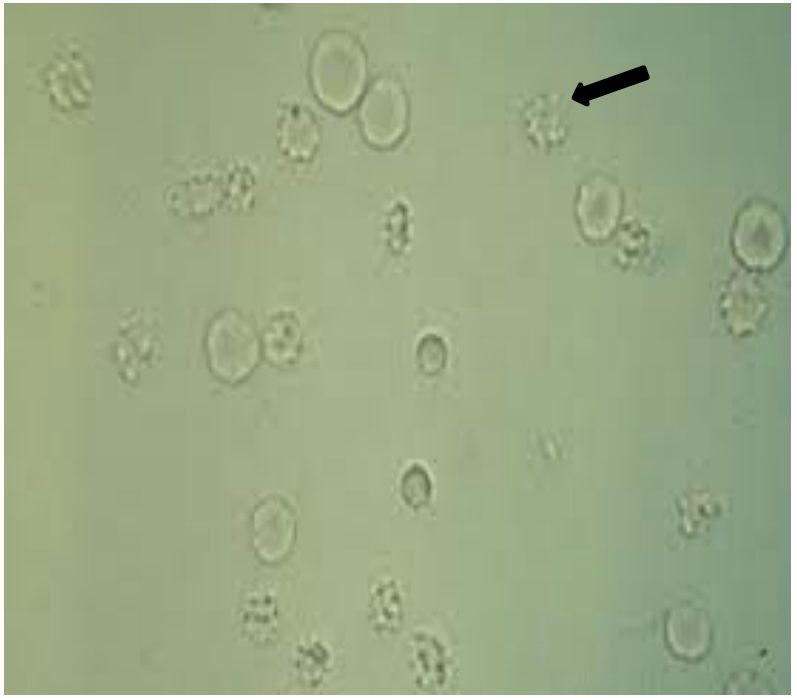
High power microscopy

- 400x magnification
- look for
  - RBC
  - WBC - (eosinophils)
  - Microorganisms- Yeast/Bacteria/(Trichomonads)
  - Crystals

RBC

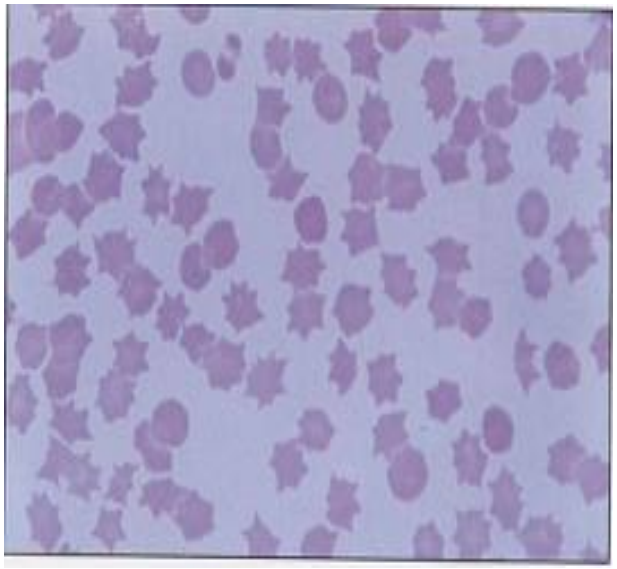


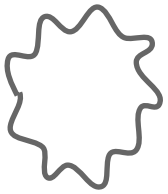
Urological haematuria



Glomerular haematuria

Crenated RBC





Dysmorphic RBC

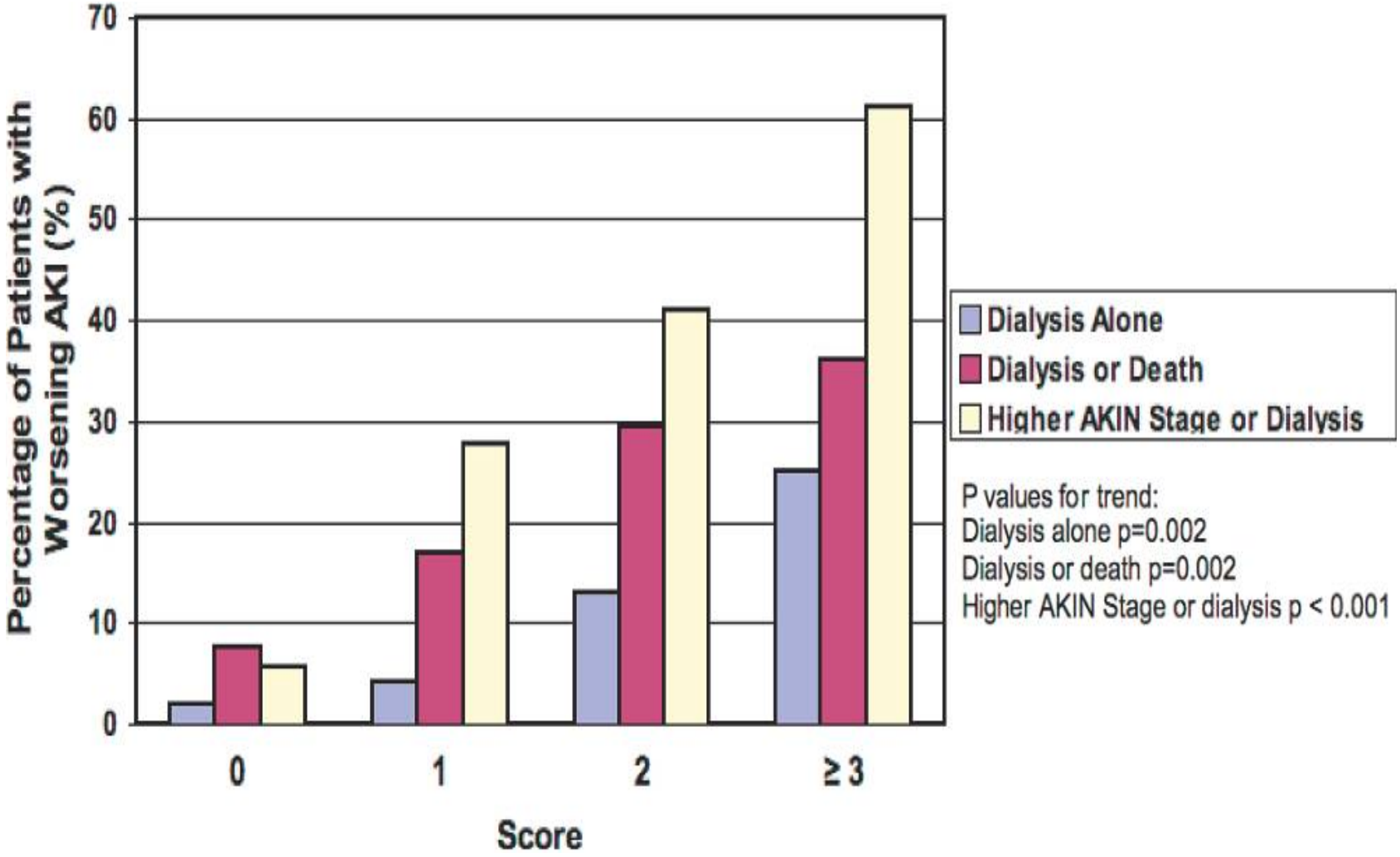
Prognostic information from urine microscopy

Scoring system based on number of granular casts and RTE cells

RTE cells (per HPF)	Granular Casts (per LPF)		
	0 (0 Points)	1 to 5 (1 Point)	≥6 (2 Points)
0 (0 points)	0	1	2
1 to 5 (1 point)	1	2	3
≥6 (2 points)	2	3	4

Values denote total points awarded.

Perazella et al. Clin J Am Soc Nephrol 5: 402–408, 2010



Perazella et al. Clin J Am Soc Nephrol 5: 402–408, 2010

Table 3. Studies evaluating urine microscopy and prognosis of AKI

Study Year (Reference)	Population	Patients (n)	Scoring System	Outcomes	Findings
Chawla *et al.*, 2008 (16)	AKI on renal consult service	18	Grade 1–4[a]	Renal nonrecovery	AUC, 0.79
Perazella *et al.*, 2010 (17)	AKI on renal consult service	197	Score 0 to ≥3[b]	Worsened AKI (increase in AKIN stage, RRT, or death)	AUC, 0.75 Score 1: RR, 3.4 Score 2: RR, 6.6 Score ≥3: RR, 7.3
Bagshaw *et al.*, 2011 (23)	ICU patients with AKI	83	Score 0 to ≥3[c]	A) Worsened AKI B) RRT/death	AUC, 0.85 Score 1–2: OR, 5.6 Score ≥3: OR, 8.0
Hall *et al.*, 2011 (24)	AKI ≥ stage 1	249	Score 0 to ≥3[b]	Worsened AKI (increase in AKIN stage, RRT, or death)	AUC, 0.66; NRI, 24% Score 1: RR, 1.6 Score 2: RR, 2.3 Score ≥3: RR, 3.5

Perazella et al.Clin J Am Soc Nephrol (7), 2012: 167–174

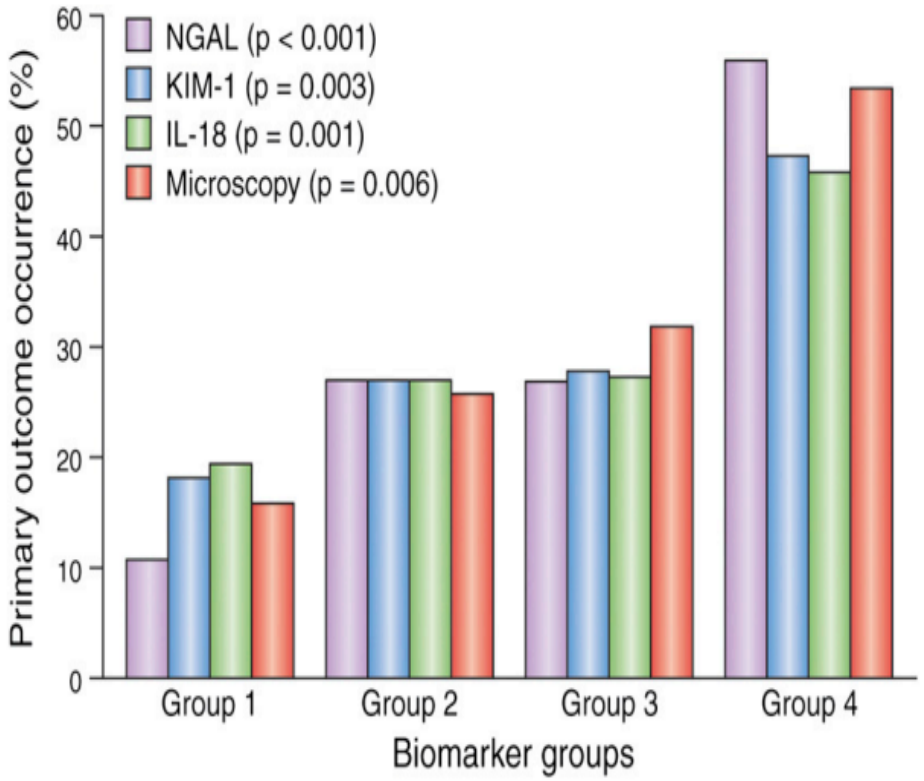


Figure 4. | Urine biomarker groups (neutrophil gelatinase-associated lipocalin, IL-18, kidney injury molecule (KIM-1) in quartiles and urine microscopy score of 0, 1, 2, ≥3) and primary outcome occurrence (worsened AKI or in-hospital death) (24).

Hall et al. Clin J Am Soc Nephrol. 2011 Dec;6(12):2740-9

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NHS Trust

NHS

Thank you