The Rationale & Need for a Definition and Classification of AKD

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DISCLOSURES

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Definition and Classification of Kidney Diseases (1)

The rationale for developing definitions and classifications for kidney disease is based on the idea that uniform terminology and explicit and objective criteria can enhance communication and awareness, enable earlier detection and intervention, and ultimately improve outcomes.

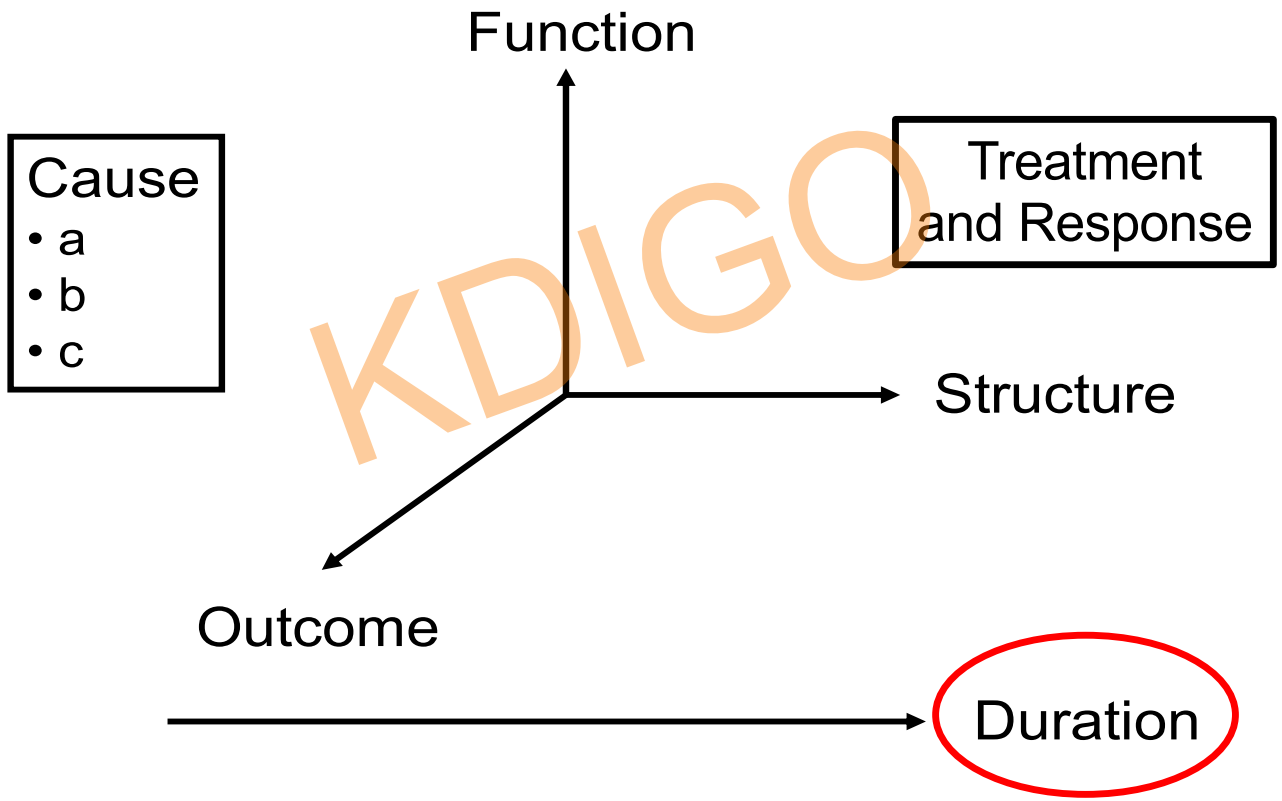
Levey, Levin, Kellum. AJKD 2013
Levey 2002 KDOQI CKD Guideline Chair
Levin 2012 KDIGO CKD Guideline Update Chair
Kellum 2001 KDIGO AKI Guideline Chair

Definition and Classification of Kidney Diseases (2)

Kidney disease is defined as a heterogenous group of disorders affecting kidney structure and function. It is recognized now that even mild abnormalities in measures of kidney structure and function are associated with increased risk for developing complications in other organ systems as well as mortality, all of which occur far more frequently than kidney failure.

Levey, Levin, Kellum. AJKD 2013

Classification in Kidney Disease



Levey, Levin, Kellum. AJKD 2013

DEFINITIONS (WIKITIONARY)

- Acute (medicine)
  - Of an abnormal condition of recent or sudden onset, in contrast to delayed: this sense does not imply severity (unlike the common usage)
  - Of a short-lived condition, in contrast to a chronic condition; this sense also does not imply severity
- Chronic (medicine)
  - Prolonged or slow to heal

DEFINITIONS (OXFORD VIA LEXICO)

- Acute (of a disease or its symptoms)
  - severe but of short duration, often contrasted with chronic
- Chronic (of an illness)
  - persisting for a long time or constantly recurring, often contrasted with acute

Disease Definition

- Concept
- Description
- Criteria

Pay attention to important conditions that do not fulfill the criteria (are “outside” the definition)

Disease Descriptions

- We have descriptions for CKD and AKI
  - CKD: Decreased GFR or markers of kidney damage with duration >3 months
  - AKI: Oliguria for 6 hours or rising Scr over 2-7 days with duration <3 months

AKI Guideline

- 2.3.4: Evaluate patients 3 months after AKI for resolution, new onset, or worsening of pre-existing CKD. (Not Graded)
  - If patients have CKD, manage these patients as detailed in the KDOQI CKD Guideline (Guidelines 7–15). (Not Graded)
  - If patients do not have CKD, consider them to be at increased risk for CKD and care for them as detailed in the KDOQI CKD Guideline 3 for patients at increased risk for CKD. (Not Graded)

- This recommendation addresses duration, but does NOT address criteria for resolution, persistence, recurrence, etc.

Disease Definitions

- We have definitions for CKD and AKI
  - CKD: Decreased GFR or markers of kidney damage with duration >3 months
  - AKI: Oliguria for 6 hours or rising Scr over 2-7 days with duration <3 months

- We do not have definitions for kidney diseases and disorders (KD) or acute kidney diseases or disorders (AKD)
  - If we define kidney diseases and disorders, we should describe no known kidney disease or disorder (NKD).
  - When we defined CKD, we should have defined AKD.
  - When we defined AKI, we should have described AKD without AKI.

WHY IS THIS IMPORTANT?

Some patients with kidney diseases and disorders do not fulfil the criteria for either AKI or CKD, yet require medical attention. Without a definition for AKD, there is a gap between AKI and CKD, which is conceptually illogical, leaving patients in a grey area, without a valid label and without management recommendations.

EXAMPLES OF ACUTE KIDNEY DISEASES AND DISORDERS THAT DO NOT FULFILL THE CRITERIA FOR AKI

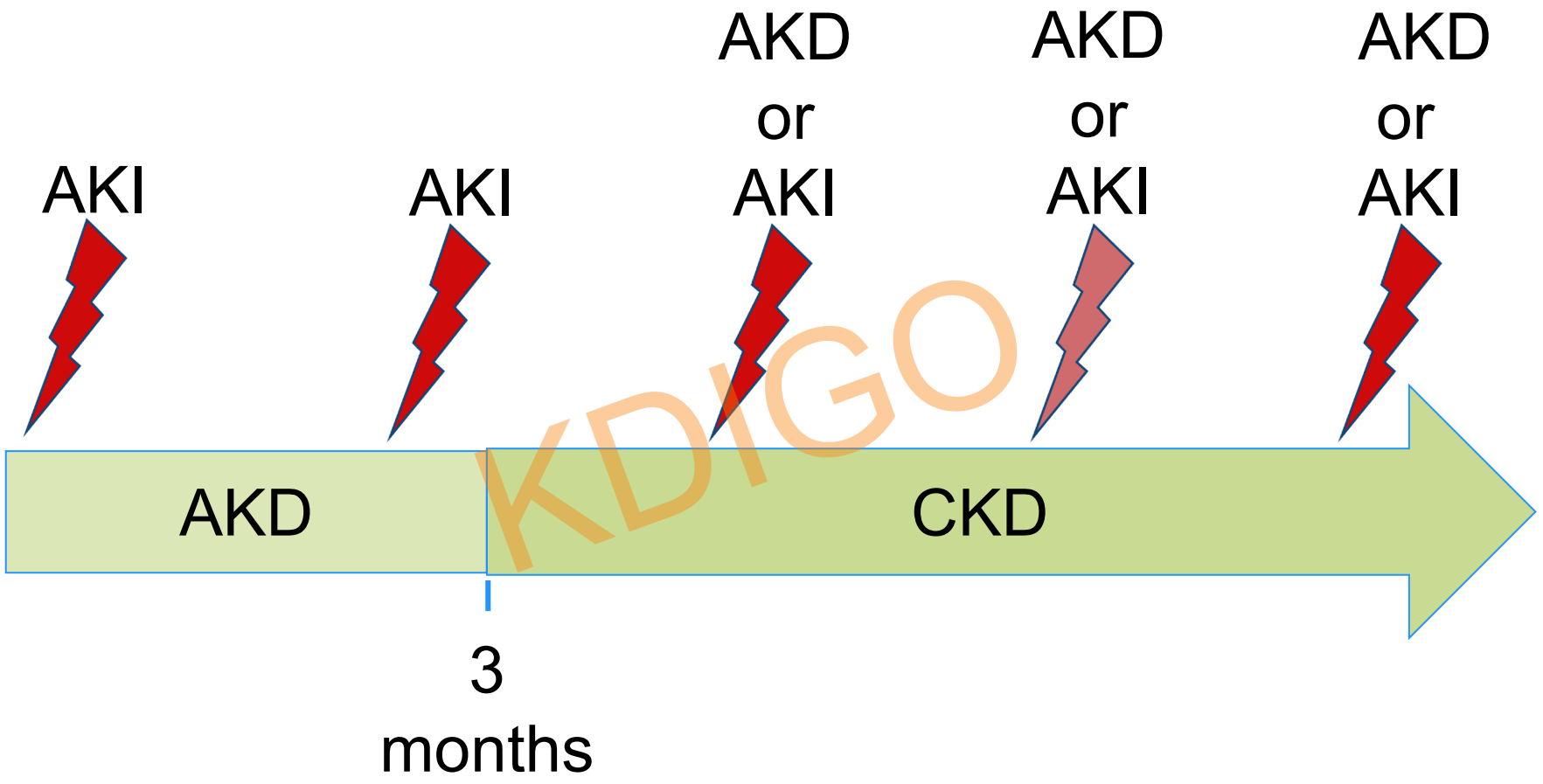
- Decreased kidney perfusion
  - volume depletion, CHF, cirrhosis
  - arterial or venous infarction (segmental)
- Parenchymal diseases
  - glomerulonephritis
  - nephrotic syndrome
  - pyelonephritis
  - interstitial nephritis
  - papillary necrosis
  - mild ATN
  - transplant rejection
- Obstruction (usually unilateral)
  - stone
  - tumor

- Without or before sufficient GFR decline to fulfill criteria for AKI (GFR decline is too small or too slow)
- Can be superimposed on CKD

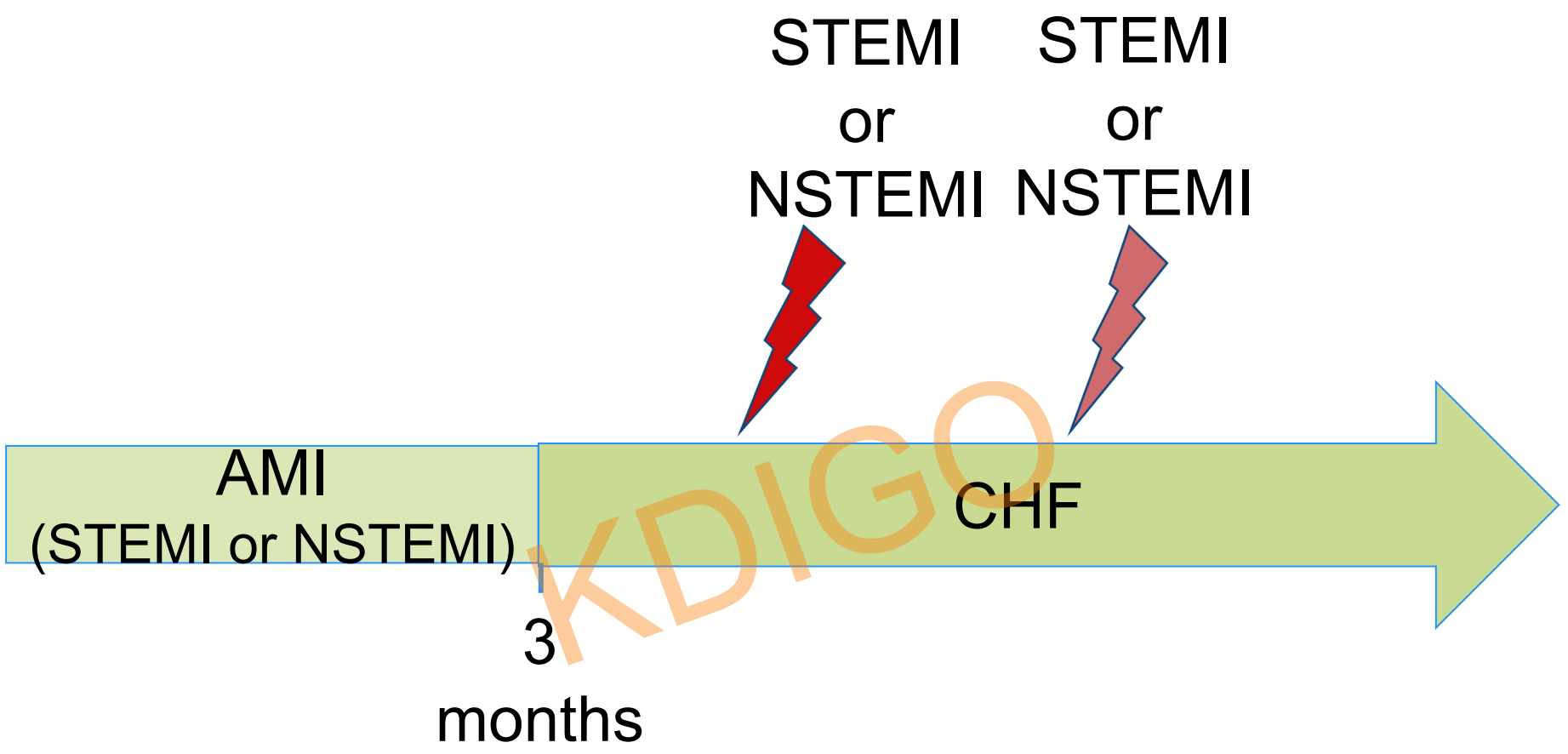
Some characterized by markers of kidney damage (proteinuria, urine sediment, imaging abnormalities, biopsy); others characterized only by decreased GFR.

CAUTION

- In proposing new definitions, we should try to avoid changing current definitions, because epidemiology and management are related to current definitions.
- To “fill in the gap”, new definitions will need to be consistent with concepts and will need to use criteria from the current definitions.

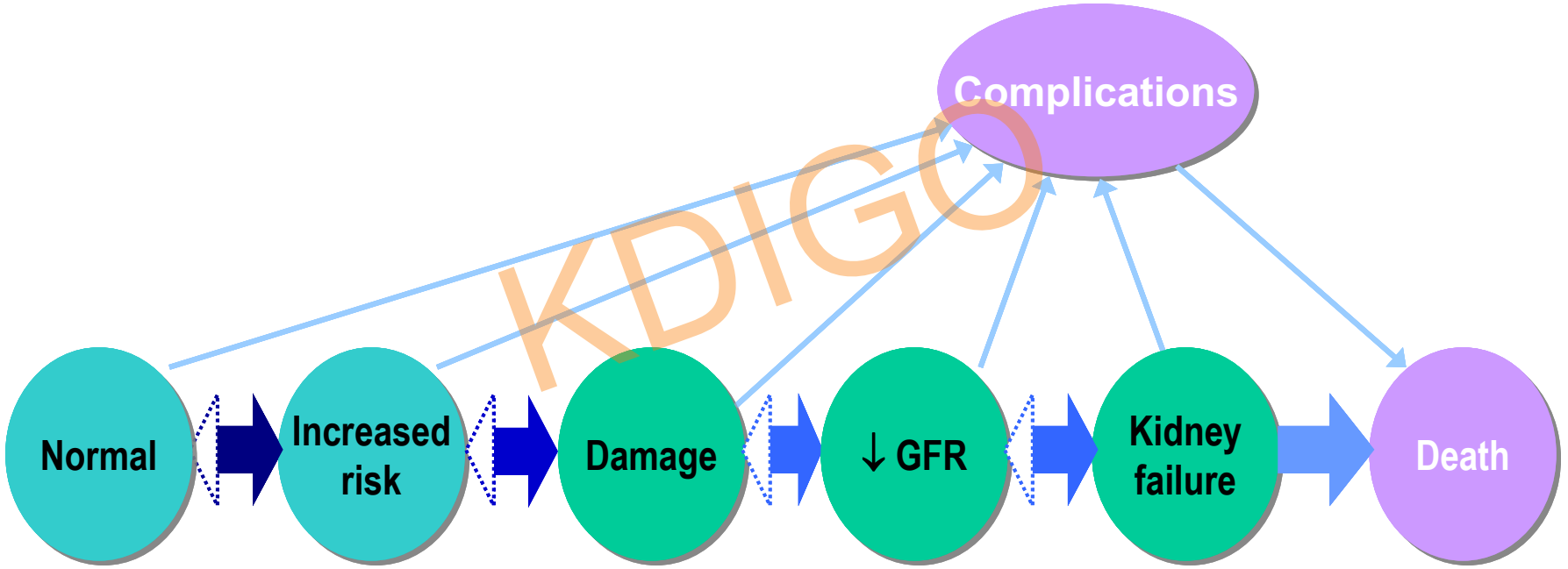


Proposed Conceptual Model for the Continuum of Acute and Chronic Kidney Disease and AKI

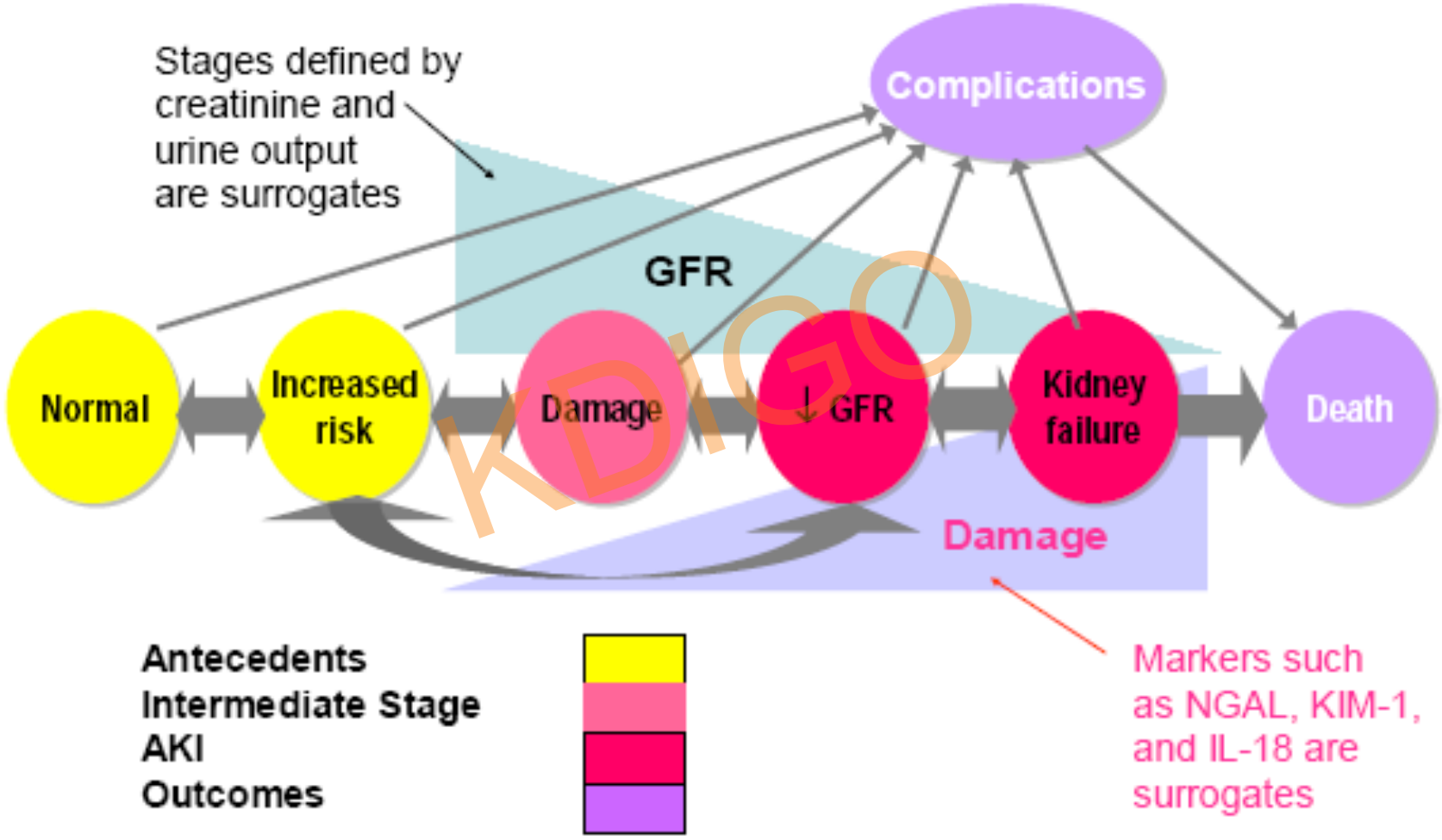


Analogy for Heart Disease

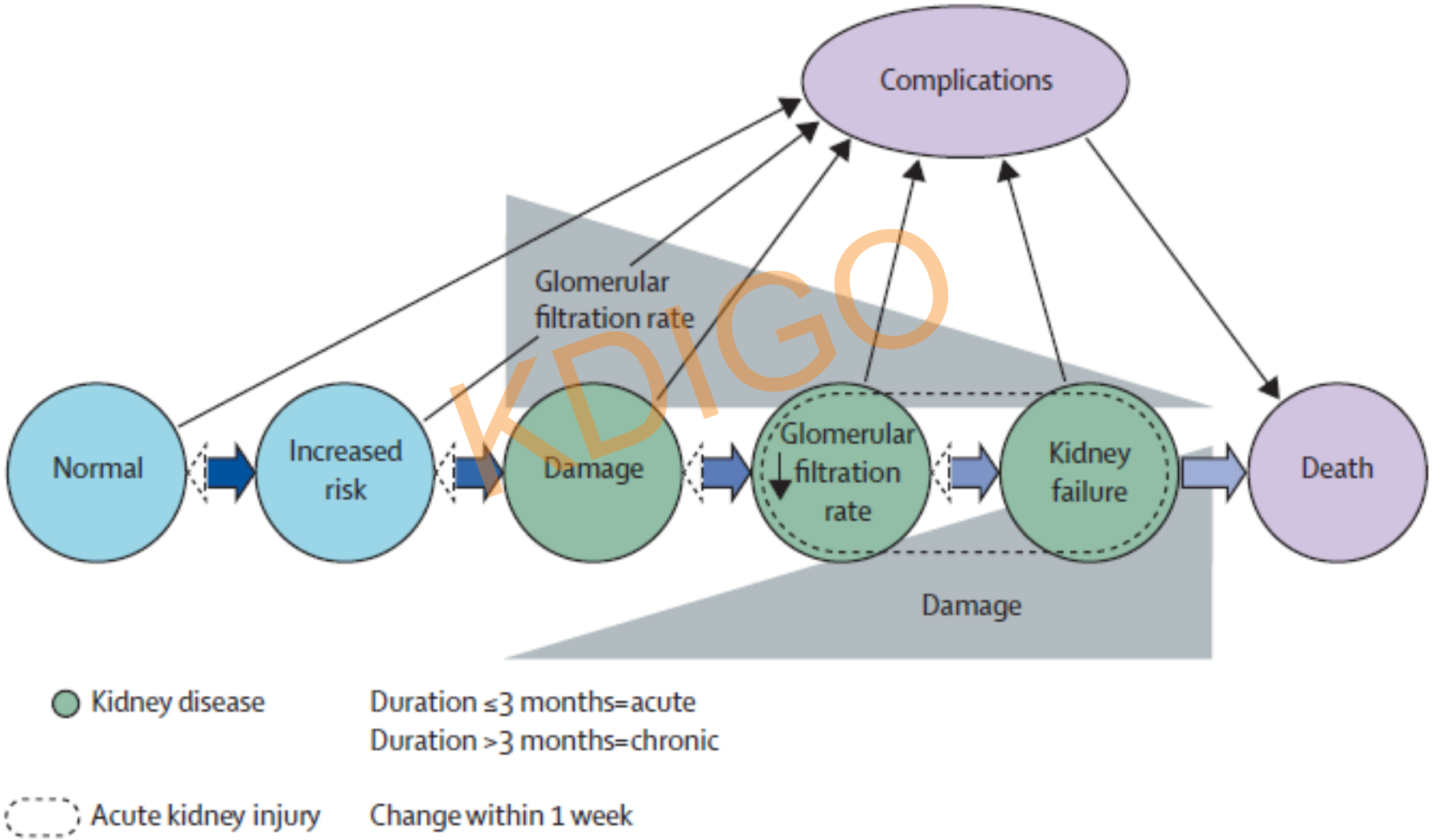
Conceptual Model for CKD



Conceptual Model for AKI



Conceptual Model of Kidney Disease



Eckardt et al. Lancet 2013

Chronic Kidney Disease

Chronic kidney disease is defined as abnormalities of kidney structure or function, present for >3 months, with implications for health.

~~Chronic~~ Kidney Disease

~~Chronic~~ Kidney disease is defined as abnormalities of kidney structure or function, ~~present for >3 months,~~ with implications for health.

Proposed

Definition of Acute ~~Chronic~~ Kidney Diseases and Disorders

Acute ~~Chronic~~ kidney diseases and disorders are ~~is~~ defined as abnormalities of kidney structure or function,
present for ~~>~~<3 months,
with implications for health.

Proposed

Acute Kidney Injury

Acute kidney injury is a subgroup of AKD, defined by alterations in kidney function over 6 hours to 1 week, with duration up to 3 months.

Proposed; not explicitly defined in AKI guideline

AKD Without AKI

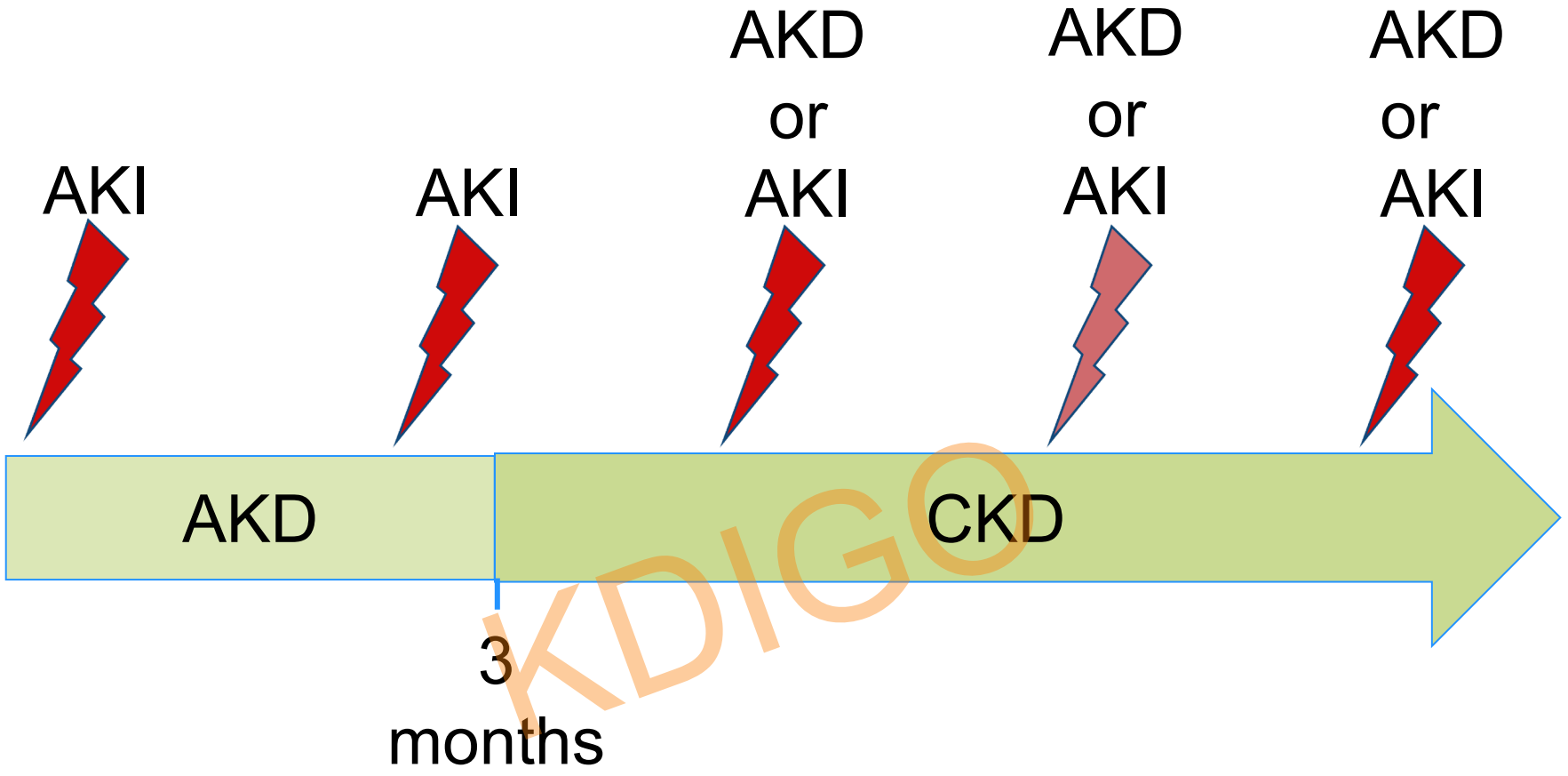
AKD without AKI is a subgroup of AKD in which the alteration in kidney function is not as severe as in AKI.

Proposed

No Known Kidney Disease or Disorder

NKD is defined as no known structural or functional alteration of the kidneys – not fulfilling the criteria for AKD (with or without AKI) or CKD.

Proposed



AKD – alterations in kidney structure and function for ≤ 3 months, which may precede CKD or may be superimposed on CKD, with duration up to 3 months

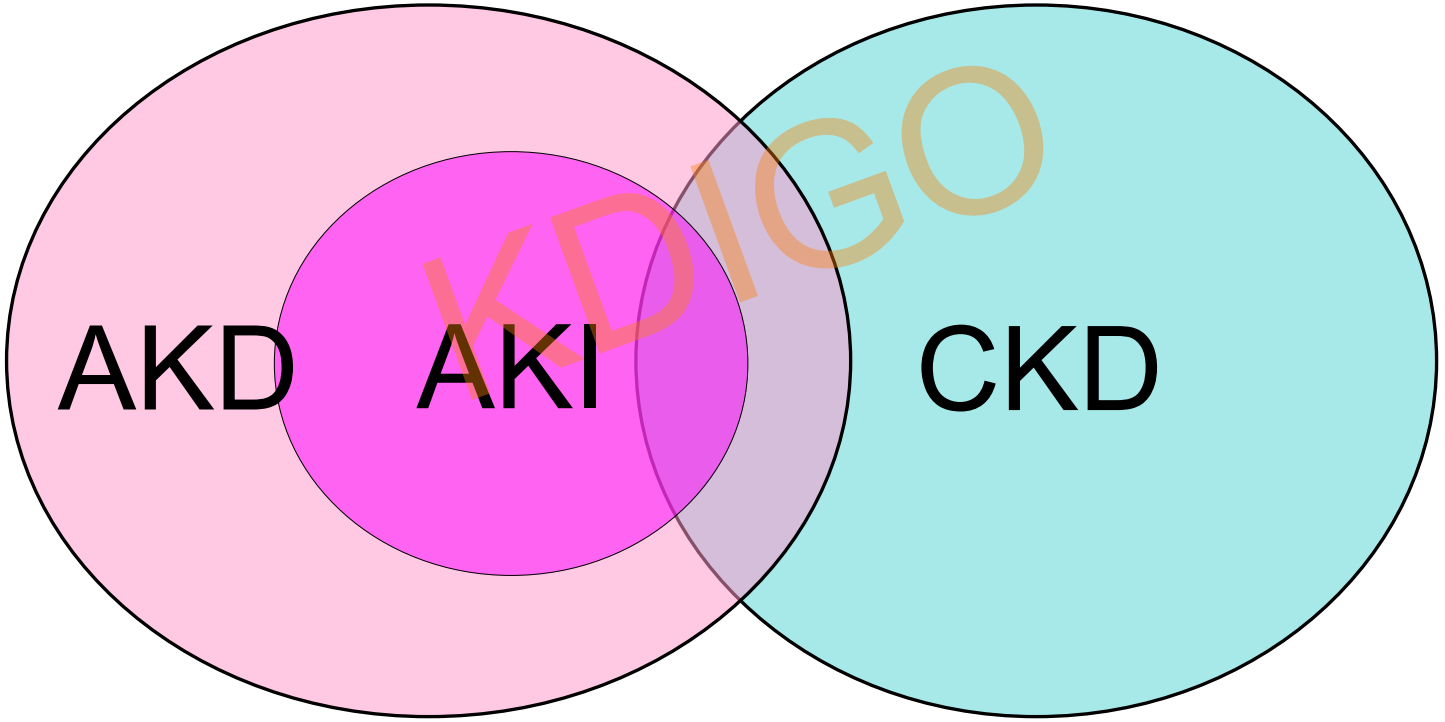
AKI – a subgroup of AKD, defined by alterations in kidney function over 6 hours to 1 week

CKD – alterations in kidney structure and function for >3 months

KD – alterations in kidney structure and function, duration not defined

NKD – no known alterations in kidney structure or function

Overlap for AKI, AKD, and CKD



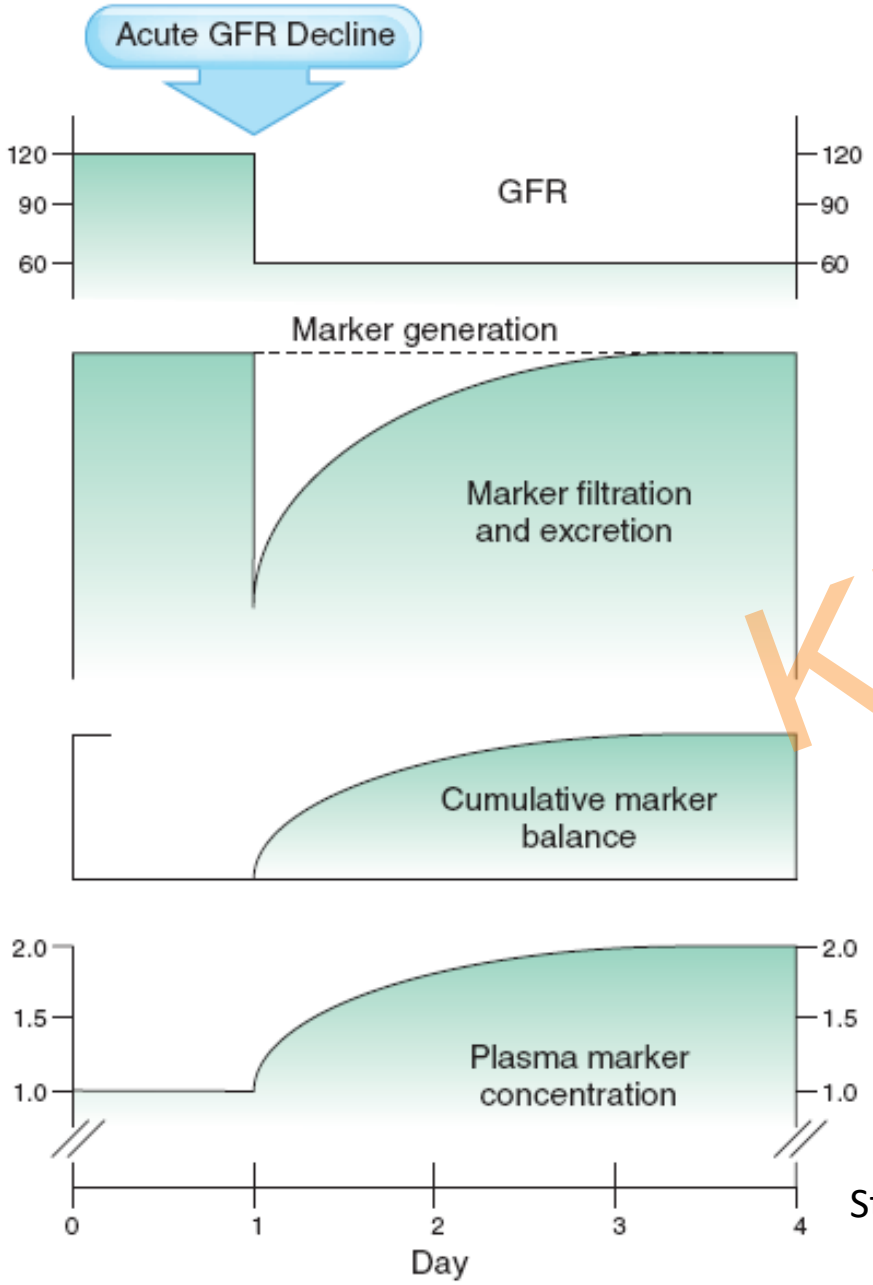
CRITERIA FOR AKD

- Structural criteria
  - Markers of kidney damage
- Functional criteria
  - Changes in Scr, GFR

Markers of Kidney Damage in CKD – Most are Relevant for AKD

- Albuminuria > 30 mg/day
- Urine sediment abnormalities (RBC casts, WBC casts, RTE casts, fat; RBC in population surveys)
- Electrolyte and other abnormalities due to tubular disorders (renal tubular acidosis, nephrogenic diabetes insipidus, ~~Bartter syndrome, Gitelman syndrome~~, etc.)
- Pathologic abnormalities (glomerular, tubulointerstitial, vascular, cystic and ~~congenital~~)
- Imaging abnormalities (obstruction, PKD, renal artery stenosis, congenital anomalies, scarring, atrophy, increased echo texture, “medical renal disease”)
- ~~History of kidney transplantation~~

Filtration Markers During Acute GFR Decline



Day	P_{marker}	eGFR
0	1.0	120
1.5	1.6	79
2.0	1.8	69
2.5	1.9	65
3.0	2.0	60

- Reciprocal relationship with mGFR in the “steady state.”
- eGFR less accurate in the “non-steady state.”

Stevens and Levey. JASN 2009, 20: 2305-13.

- Decreased GFR is a criterion for CKD, usually ascertained as eGFR.
- Rising Scr is a criterion for AKI (neither Scr nor eGFR are accurate measures of GFR during AKI)
- It is not inappropriate for both decreased GFR and rising Scr to be included in the criteria for AKD

	AKI	AKD	CKD	NKD*
Duration	Within 7 days	≤3 months	>3 months	
Functional Criteria	Increase in Scr by ≥50% within 7 days, OR Increase in SCr by ≥0.3mg/dL (26.5µmol/L) within 2 days, OR Oliguria for ≥4 hours	AKI, OR GFR<60 mL/min/1.73m^2, OR Decrease in GFR by ≥35% times baseline, OR Increase in SCr by ≥50% times baseline	GFR <60 ml/min/1.73m^2	GFR ≥60 ml/min/1.73m^2
AND/OR	OR	OR	OR	AND
Structural Criteria	Not defined	Marker of kidney damage (albuminuria, hematuria, or pyuria are most common)	Marker of kidney damage (albuminuria is most common)	No marker of kidney damage

AKI, acute kidney injury; AKD, acute kidney diseases and disorders; CKD, chronic kidney disease; NKD, no kidney disease. *NKD implies no functional or structural criteria according to the definitions for AKI, AKD, or CKD. Clinical judgment required for individual patient decision making.

Related Questions

- Singular or plural?
- Add “disorder” to CKD?

What's Next

- Definition
- Classification
- Evaluation and Management