

# CKD PREDICTION AND PROGNOSTICATION: AN INEXACT SCIENCE – A 2008 US POPULATION-WIDE CKD TO ESRD RATES ANALYSIS AND A 2011 CROSS-SECTIONAL STUDY OF CKD STAGE TRANSLATIONS IN A MAYO CLINIC HEALTH SYSTEM LABORATORY DATABASE: THE CONCEPT OF “PROGRESSORS” AND “NON-PROGRESSORS”

**Macaulay Amechi Onuigbo MD MSc FWACP FASN MBA (1,2)**  
**Nneoma Agbasi RMN MSc PGDip (3)**

1Mayo Clinic College of Medicine, Rochester, MN, USA.  
 2Department of Nephrology, Mayo Clinic Health System, Eau Claire, WI, USA.  
 3North East London NHS Foundation Trust, United Kingdom.

## OBJECTIVES

**Background:** By common consensus, chronic kidney disease (CKD) results in a predictable time-dependent loss of GFR, subsequent inexorable progression to ESRD and the need for RRT. This explains the current CKD stages I, II, III, IV and V according to KDOQI 2002 guidelines.

### Objectives:

- A. We examined the accuracy of annualized ESRD rates as reported in current nephrology literature.
- B. We analyzed CKD stage translations among CKD IV patients in a Mayo Clinic Laboratory Database over two years.

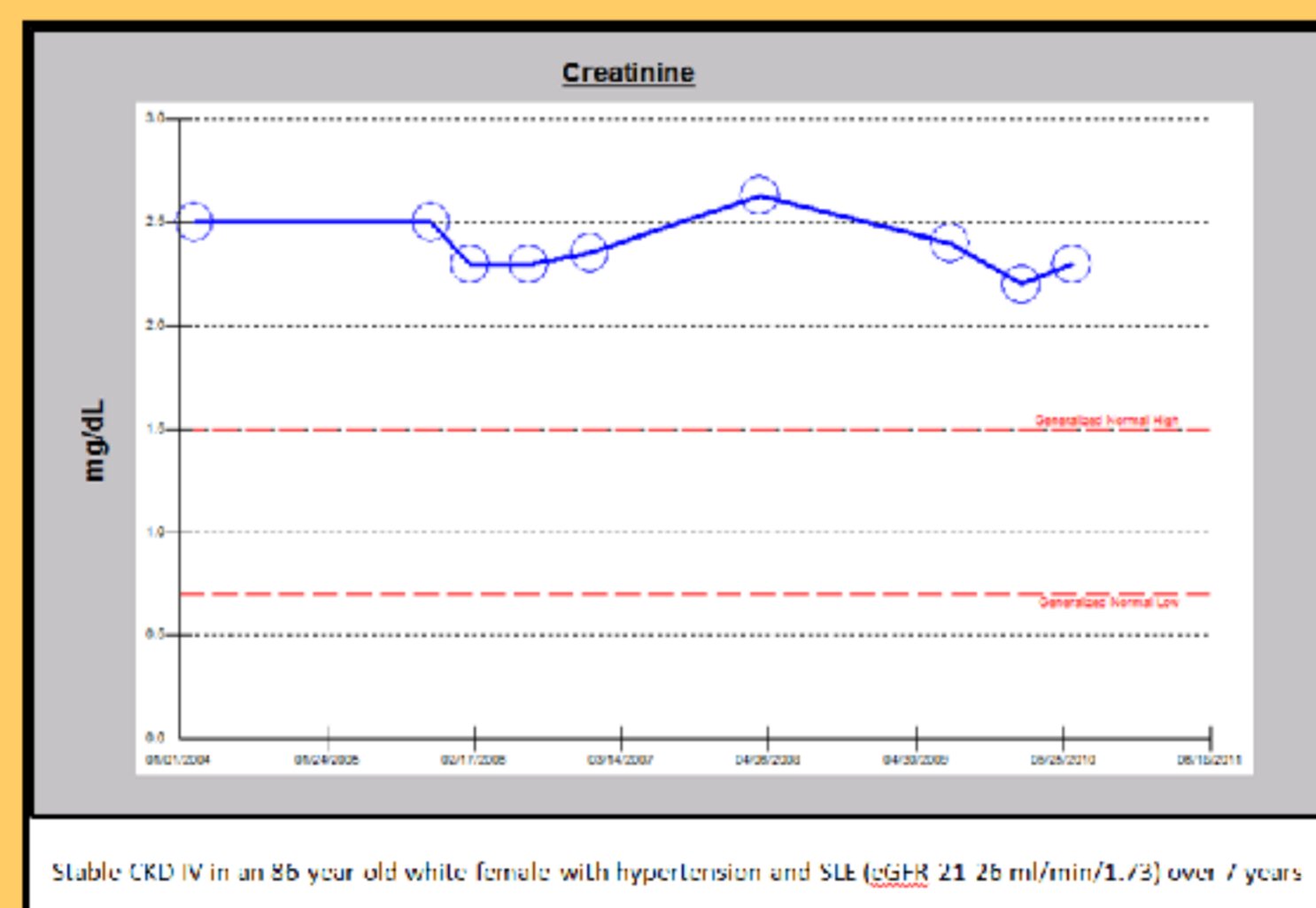
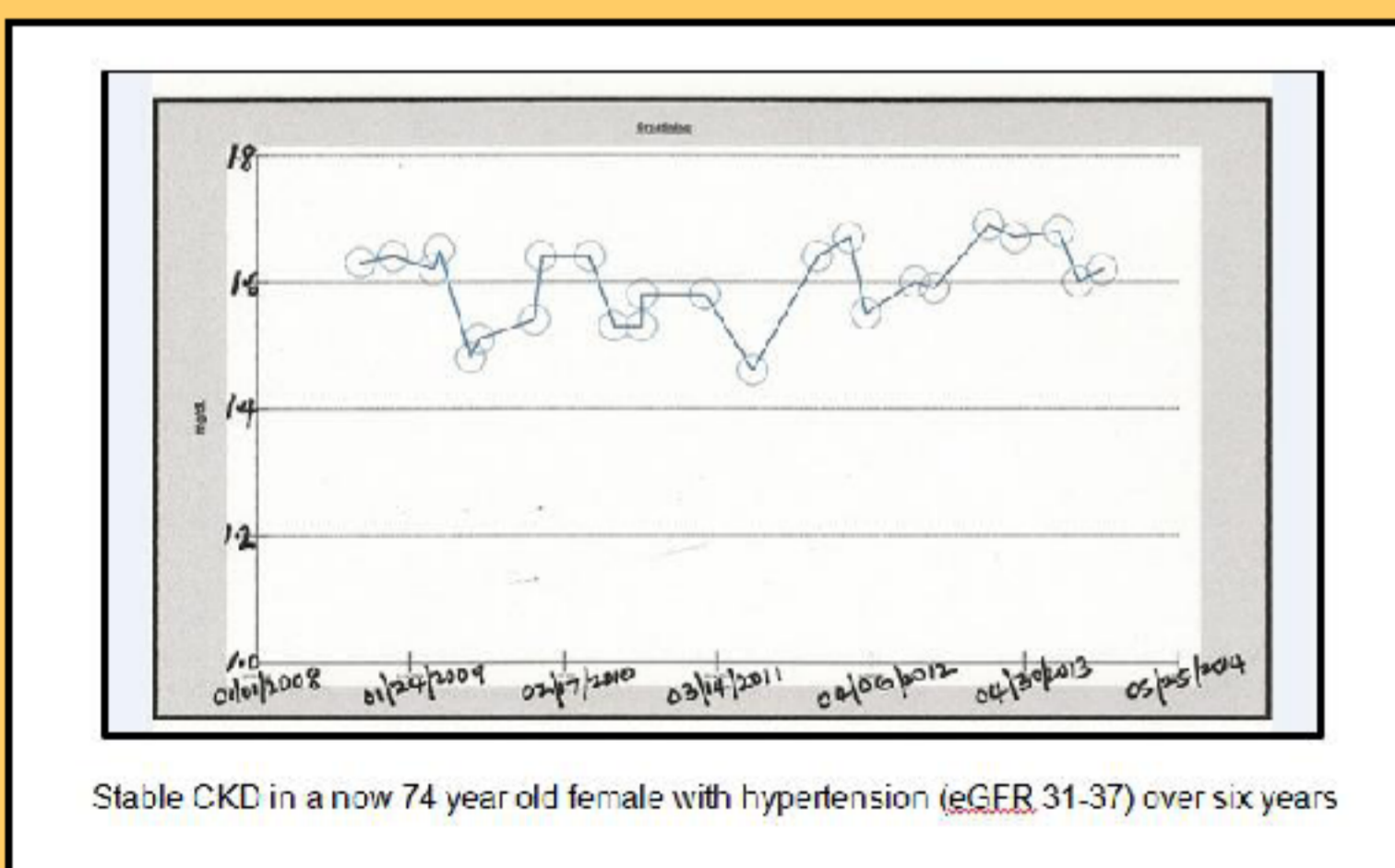
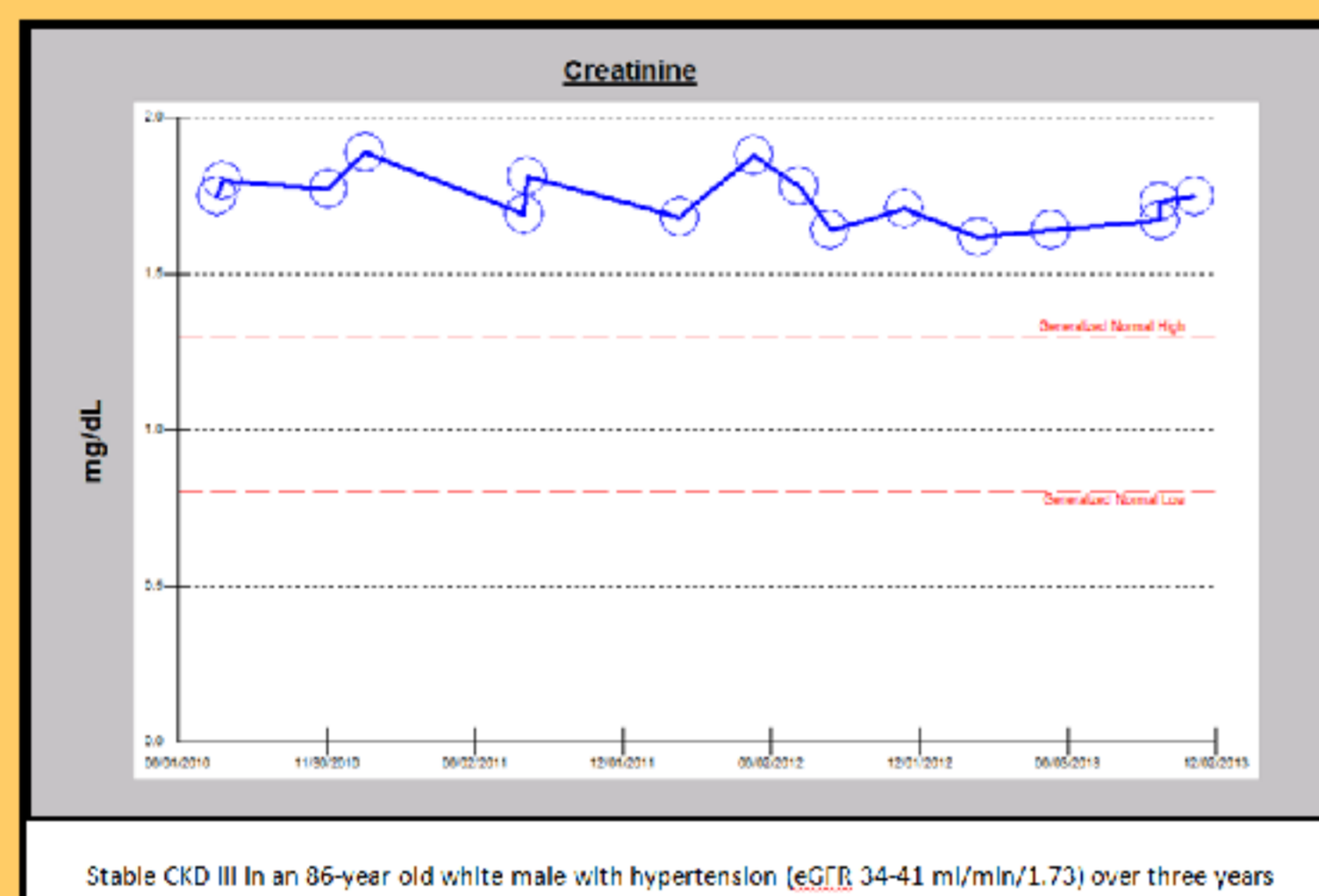
## METHODS

- A. We compared the annual incidence of new ESRD patients among the US CKD population for 2008 using reported annual ESRD rates from three available CKD cohort studies completed in the US about in the period 2007-2008 (Table of studies below). This estimated ESRD incidence for 2008 was then compared with the actual ESRD incidence for 2008 as was reported in the United States Renal Data System for 2008.
- B. In June 2011, we retrospectively analyzed the individual patient-level serum creatinine trajectories of all stage IV CKD patients, with eGFR in the 15.0-29. mL/min/1.73 sq. m BSA range, in a Mayo Clinic Electronic Laboratory Database, tested and reported between April 19, 2009 and April 19, 2011. We assessed each patient for a change in eGFR over two years.

## RESULTS

- A. Projected new incident ESRD cases from the US CKD population in 2008 based on average annualized ESRD rates from the three combined studies was 840,000. The actual reported incident new ESRD cases in the US according to the USRDS report for 2008 was 112,476. This represented a **whopping 650%** overestimation by current CKD literature estimates.
  - B. After excluding 62 ESRD patients, and a small number of patients who received RRT for AKI, of 241 patients with stage IV CKD in the Mayo Clinic Laboratory Database, 2009-2011, 102M:139F, over 95% demonstrated stable eGFR within 5 points of baseline eGFR (<25% change from baseline), over the two-year study period.
- The three figures depict representative time graphs of serum creatinine trajectories of two CKD III patients and one CKD IV patients showing stability of CKD stage over several years.

Source	Gallinetal	Morimotoetal	Dravigio&Dravigio
Year of report	2004	2008	2005
Source	Acute Renal Failure	Hypertension	Acute Renal Failure
Study population	Managed Care Org.	MDRD Study Group	Acute Renal Failure
Study type	Retrospective	Retrospective	Prospective
Number of patients	27,866	5,866	130
% Caucasian	74	68	100
% Diabetes mellitus	23.8	9	49
Age at enrollment	60.8	68.9	71.0
Use of Female	42.5%	50.4%	52.4%
Observed mean eGFR	63.4	63.4	22.2 mL/min/1.73 sq m BSA
Study duration	5 years	36 months	5 years
Initial % CKD Stage 2	57	15	4
Initial % CKD Stage 3	40	48	24
Initial % CKD Stage 4	3	28	58
Initial % CKD Stage 5	0	9	13
Annualized ESRD rate	4.4%	0.2%	0.5%
Annualized Death Rate	10%	2.9%	3.3%
ESRD as death rates	Death more common	ESRD more common	ESRD more common



## CONCLUSIONS

1. Published annualized ESRD rates among various reported CKD cohorts in the current US nephrology literature grossly overestimate actual observed ESRD incidence among the US CKD population.
2. The Mayo Clinic Laboratory Database CKD IV retrospective snapshot analysis showed fairly stable eGFR values, over 2 years, in the majority (95%) of the patients studied.
3. Furthermore, representative serum creatinine trajectories of CKD III and CKD IV patients encountered in our Northwestern Wisconsin Renal Unit of the Mayo Clinic Health System reveal that often, patients have maintained stable renal functional status over long periods of time, sometimes approaching 10 years.
4. It would appear that some CKD patients simply remain stable and do not progress (**the so-called nonprogressors**), whereas other CKD patients appear more susceptible to progression (**the so-called progressors**). The determinant factors for such vagaries remain unclear and mostly unknown.
5. These results warrant further study to enhance our knowledge of the natural history of CKD and to optimize CKD care around the world.
6. We recently developed a new IT Software “The CKD Express ©”, currently in US Patent Application, that we believe would help generate new CKD data to improve our ability to prognosticate CKD.

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