

# Update in Nephrology 2013

## Does AKI lead to ESRD?

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# Incidence of Acute Renal Failure

- Serious Acute Kidney Injury Is On the Rise: An Interview with Chi-yuan Hsu, MD, and Raymond Hsu, MD
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- Chi-yuan Hsu, MD (left) and Raymond Hsu, MD (right)
- *The incidence of [acute kidney injury \(AKI\)](#) requiring dialysis is now higher than the incidence of end-stage renal disease (ESRD) requiring dialysis or transplant, discovered a team led by **Chi-yuan Hsu, MD**, Nephrology Division Chief at the University of California-San Francisco (UCSF), and UCSF nephrology fellow **Raymond Hsu, MD**.*

*December 6, 2012, in Journal of the American Society of Nephrology ([“Temporal Changes in Incidence of Dialysis-Requiring AKI”](#)).*

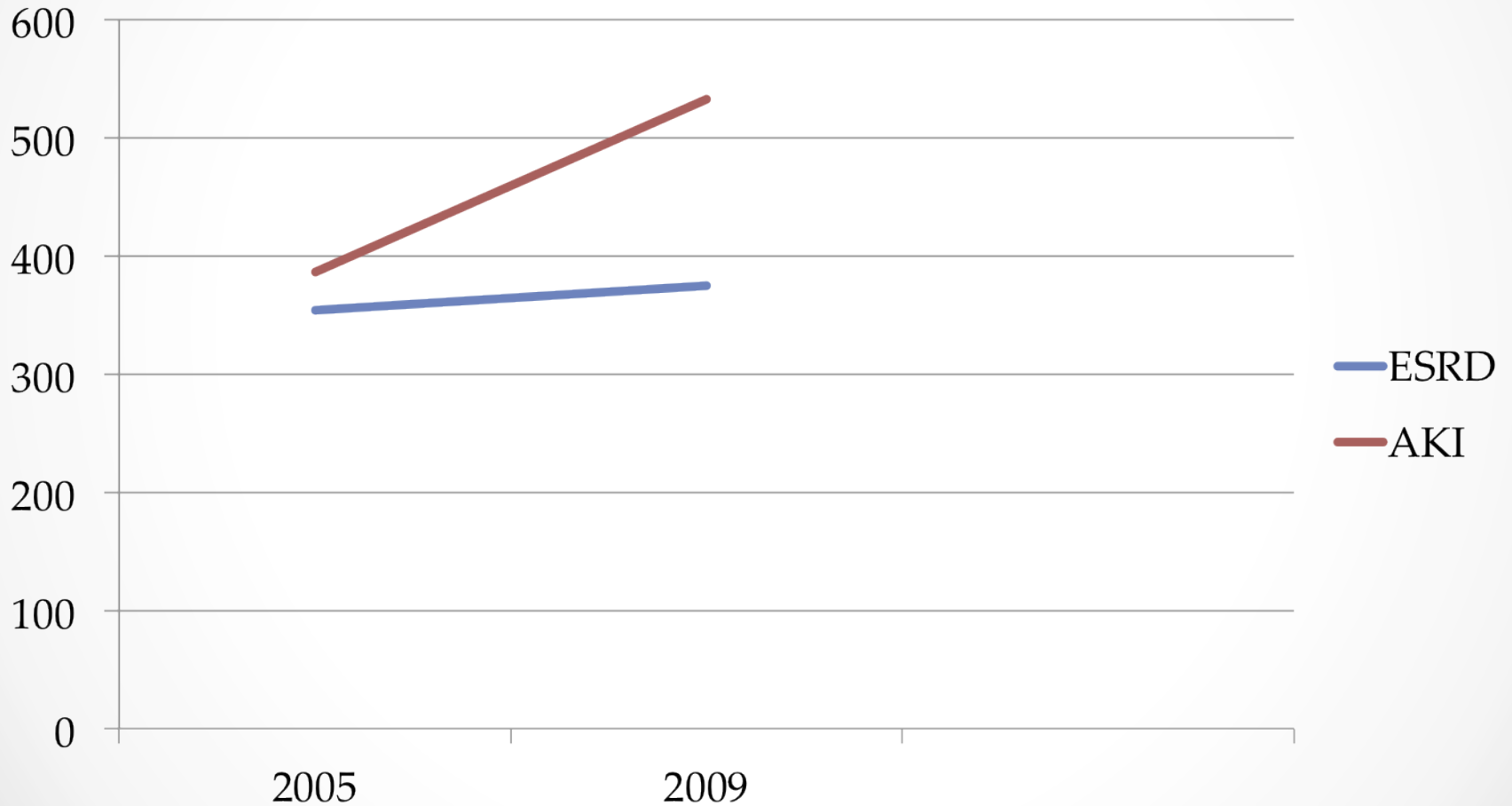
# AKI

- from 2000 to 2009, the incidence of dialysis-requiring AKI increased by an average of 10% per year and the total number of associated deaths during that period more than doubled, from 18,000 to nearly 39,000?
- about 30% of the total increase in dialysis-requiring AKI may be attributed to trends in certain conditions and procedures over the same period, such as sepsis, acute heart failure, cardiac catheterization, and mechanical ventilation. However, we are not completely certain as to what *other* factors are responsible for the rest of the increase.

# AKI and ESRD

- The incidence of end-stage renal failure (ESRD) that requires dialysis or a transplant has been fairly stable since the mid 2000s.
- For comparison, in 2005, the incidence of ESRD was 354 cases per million persons, while the incidence of dialysis-requiring AKI was 386 per million persons.
- In 2009, the incidence of ESRD was 375 per million persons, while the incidence of dialysis-requiring AKI was 533 per million persons

# Incidence of AKI and ESRD



# AKI on CKD confers worse prognosis

- fewer than 10% of individuals without any pre-existing kidney disease who suffered dialysis-requiring AKI remained on dialysis long-term.
- That percentage increases drastically for those with pre-existing kidney disease: About half who suffered dialysis-requiring AKI will remain on dialysis long-term.
- Patients with pre-existing chronic kidney disease are the ones most at risk for dialysis-requiring AKI. Other at-risk populations include the elderly.



# Steps to reduce risk of ARF

- initial steps to help reduce a patient's risk. First, clinicians need to identify the patients at the highest risk of AKI, such as those with underlying chronic kidney disease and advanced age, so that they may more carefully reduce those patients' exposure to medications and procedures that may be toxic to the kidneys, as well as more judiciously manage their fluid status (since dehydration is a common precipitant for AKI).
- Clinicians should also discuss with their at-risk patients the risks and benefits of undergoing procedures or interventions that may trigger AKI.



# Financial impact of ESRD

- Today, 95,000 people are on the wait list for kidney transplants, which are still the gold standard for treating end-stage renal disease. In this country we do about 17,000 or 18,000 transplants per year, meaning that more than 75,000 people who require transplants won't get one this year.
- A typical dialysis patient in 2012 costs Medicare about \$45,000 annually, and a transplant patient, after the initial surgery, costs Medicare about \$30,000. Most of that \$30,000 is spent on immunosuppressant medications to prevent rejection.



# Bioartificial Kidney

- Uses cloned renal tubular cells from unusable donor kidneys
- Cells line capillary tubules in a kidney similar to conventional dialysis kidney
- Renal Assist Device can assume endocrine and metabolic functions
- In phase II study reduced mortality in ICU ARF pts from 61 to 34 %.

# Bio-Artificial Kidney

- The best candidates for this device are probably people who are already on the transplant list, but have high PRA or other factors such that the likelihood of them getting a transplant is not that great.
- If they are physically able to withstand the surgery for the device, (similar to a transplant surgery) they would qualify.

# Bio-Artificial Kidney

- The device will require surgery probably like a transplant surgery, although maybe not as complicated. But the patient will likely not require immunosuppressive drugs because the cells in the device are protected from the patient's immune system. The device will probably cost about \$10,000 to \$20,000 a year in maintenance. The Author thinks if they are completely successful and enough patients on dialysis receive the device, it could lower the \$30 billion Medicare currently spends on patients who have kidney failure to at least half that amount.