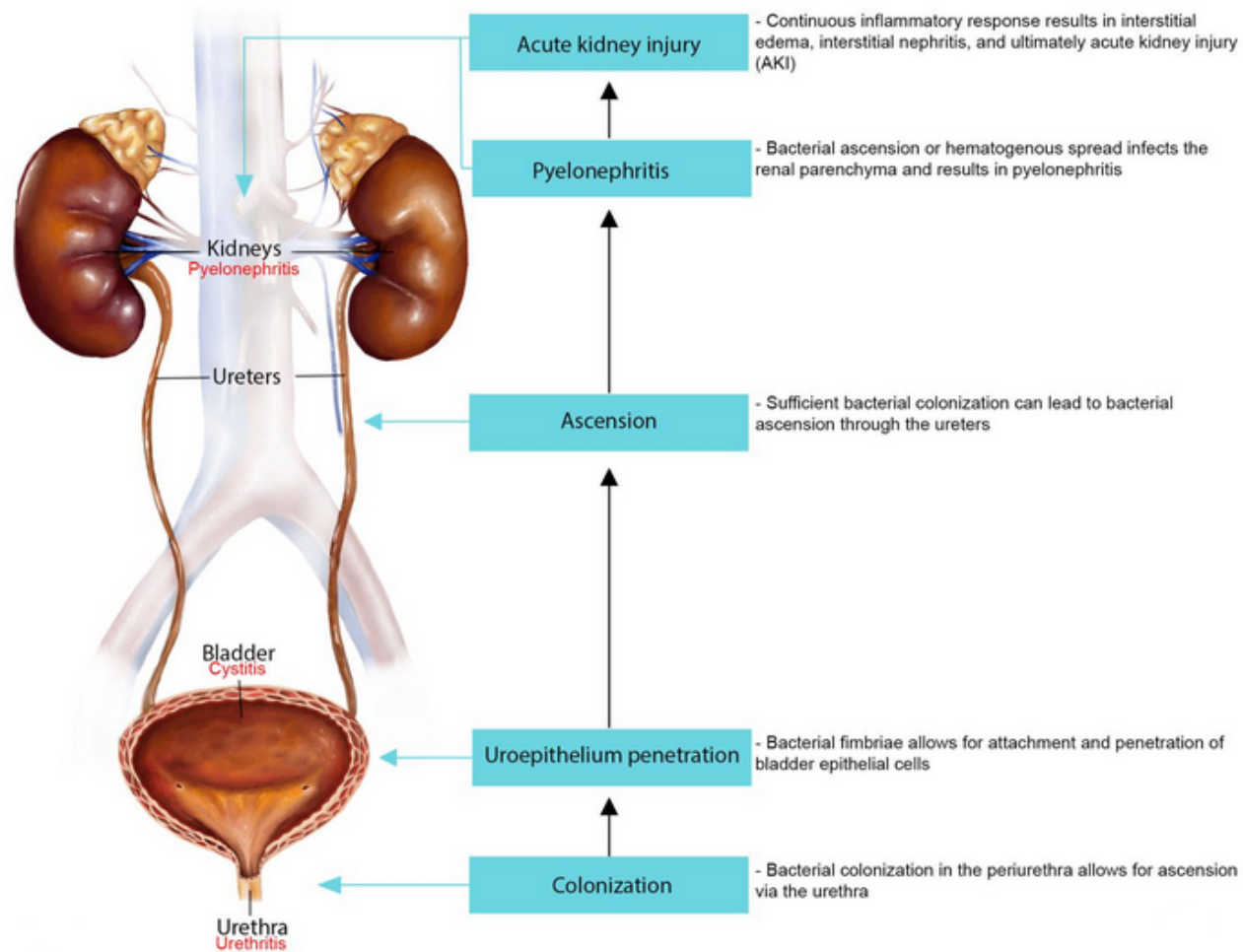


**Role of urinary MMP9 and TIMP1 in  
anticipating scar formation in children  
with urinary tract infection**

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Sciences

# Urinary Tract infection

## Pathogenesis of Urinary Tract Infections

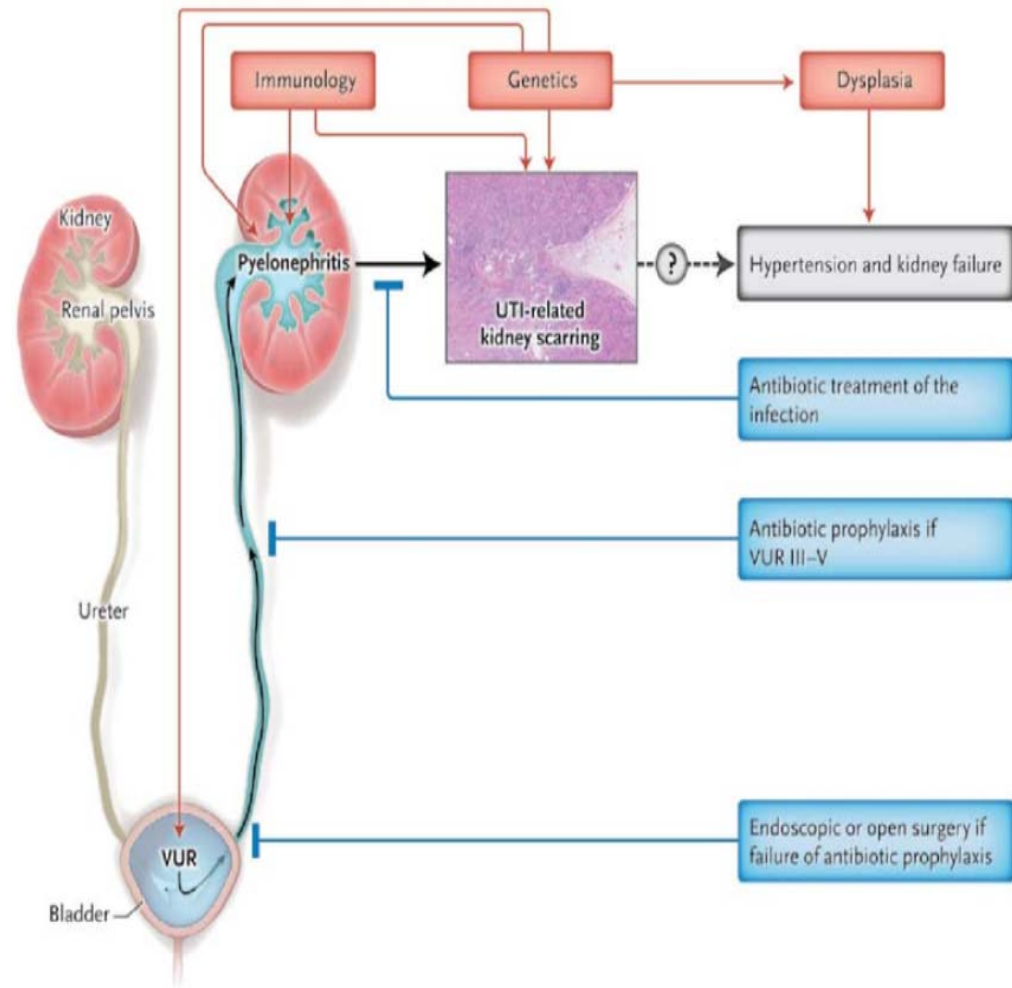


# Renal Scar formation

## Risk factors

**15-66% APN lead to renal scar**

- 1- VesicoUreteric reflux (VUR)
- 2- Gender
- 3- Recurrent infections
- 4- Treatment delay
- 5- Inflammation
- 6- Genetic background
- 7- Host defense factors



# Renal Scintigraphy

<sup>99m</sup>Tc dimercaptosuccinic acid (<sup>99m</sup>Tc-DMSA)

is gold st. for diagnosing APN

## Renal Cortical Scan

Renal scar VS acute pyelonephritis

1-

2-

3-

af

**Biomarkers**

may be our solution

on

hs

Normal

Acute Pyelonephritis

Renal Scarring

# Matrix metalloproteinases (MMPs)

- **Renal fibrosis** is the result of **excessive accumulation of extracellular matrix (ECM) components** (type **IV collagen**, proteoglycan, laminin,..)
- MMPs are zinc-containing endopeptidases
- MMPs degrade extracellular matrix components
- MMP expression and activity increase in injured tissue and under inflammatory conditions
- **Gelatinases (MMP2 and MMP9)** are more effective on type IV collagenes)
- Degradation of ECM is restrained by **tissue inhibitors of metalloproteinases (TIMPs)**,

# The main Goal of our study

**Disruption of the balance** between **MMPs** and their inhibitors (**TIMPs**) may lead to **fibrinogenesis** and **scar formation** in the kidney

# ارزیابی ارزش تشخیصی غلظت ادراری MMP9 و مهارکننده بافتی متالوپروتئیناز-1 (TIMP1) در پیشگویی احتمال ایجاد اسکار کلیه در اطفال مبتلا به پیلونفریت حاد (ANP)

علیرضا رفیعی، حمید محمدجعفری، سید محمد عابدی، سارا بازی، پونه یزدانی

- گروه ایمنولوژی
- گروه اطفال
- گروه رادیولوژی و پزشکی هسته ای

دانشکده پزشکی، دانشگاه علوم پزشکی مازندران

## Acute pyelonephritis patients with and without Scar

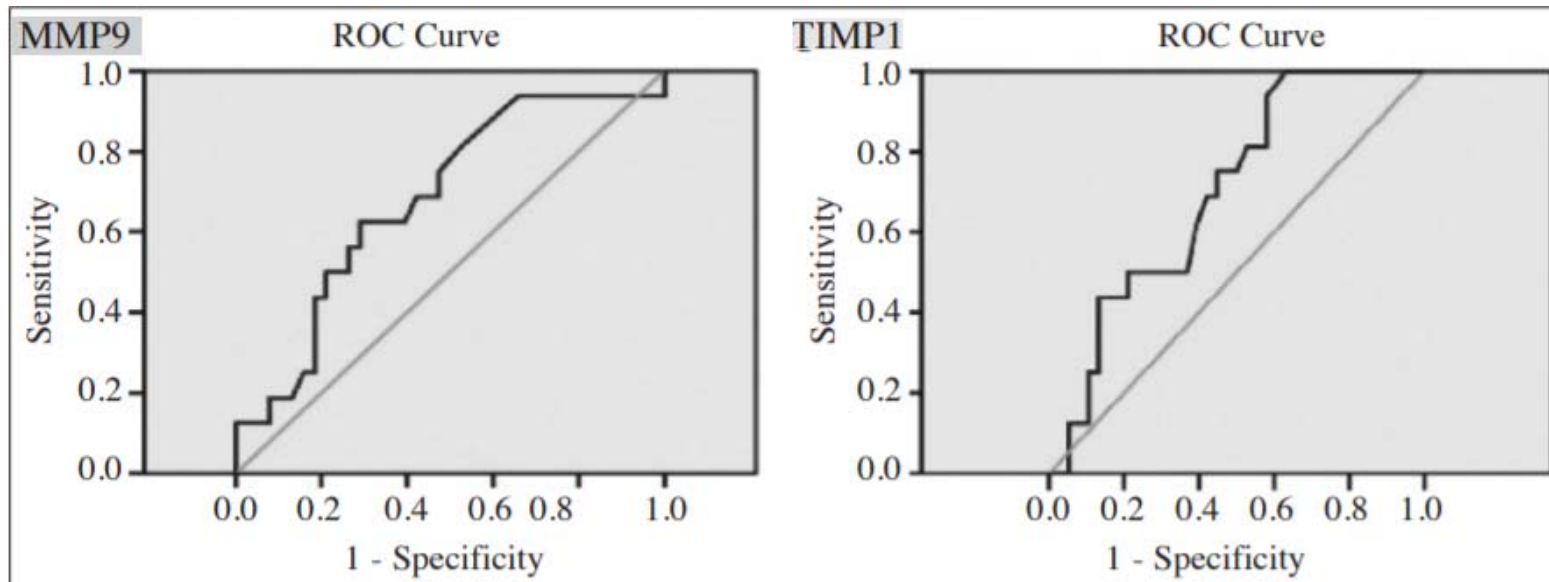
	APN with Scar n=24	APN without Scar n=35	P-value
Age (M)	<b>44.1±25.1</b>	<b>35.7±37.3</b>	<b>0.42</b>
Gender (F/M)	<b>20, 4</b>	<b>35, 2</b>	<b>0.35</b>
BUN(mg/dl)	<b>24.2±10.4</b>	<b>17±5.3</b>	<b>0.06</b>
Creatinine	<b>0.55±0.16</b>	<b>0.6±0.11</b>	<b>0.44</b>
<b>VUR</b>			
VUR –grade 0	<b>20</b>	<b>28</b>	
VUR-grade I	<b>0</b>	<b>16</b>	
VUR- grade II	<b>27</b>	<b>32</b>	<b>0.12</b>
VUR- Grade III	<b>33</b>	<b>16</b>	
VUR- grade IV	<b>7</b>	<b>0</b>	
VUR-grade V	<b>13</b>	<b>8</b>	



## Urinary MMP9 and TIMP1 levels in APN patients

Parameter	APN with scar	APN without scar	P value
MMP9 (ng/ml)	80 (71.15 – 88.50)	71 (61.58 – 80.70)	0.037
TIMP1 (ng/ml)	18.65 (15.90 – 26.83)	15.90 (14.5 – 19.15)	0.022
MMP9/Cr (ng/mg)	2.49 (0.76 – 3.47)	2.59 (0.73 -3.52)	0.532
TIMP1/Cr(ng/mg)	0.49 (0.18 – 0.89)	0.53 (0.18 – 0.93)	0.483
MMP9/TIMP1(ng/ng)	0.22 (0.20 – 0.26)	0.22 (0.20 – 0.26)	0.677
MMP9/TIMP1/Cr(ng/mg)	0.007 (0.003 – 0.011)	0.007 (0.003 – 0.012)	0.218

# Cut-off value, sensitivity and specificity of MMP9 and TIMP1 to diagnosing of renal scar



Parameter	Cut off value	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
MMP9	75.5 (ng/mL)	62.5	71.1	48	82
TIMP1	16.1 (ng/mL)	75	55.3	41	84

## Combined results of urinary MMP9 and TIMP1 levels in anticipating scar formation

	No Scar	Scar
High MMP+ High TIMP	9	8
High MMP+ Low TIMP	2	2
Low MMP+ High TIMP	8	4
Low MMP+ Low TIMP	19	2

A photograph of a paved road curving through a lush green forest. The road is dark asphalt with a white line on the right side. The trees are tall and thin, with dense green foliage. The ground is covered in fallen leaves and some green plants.

**Thank you  
for  
attention**