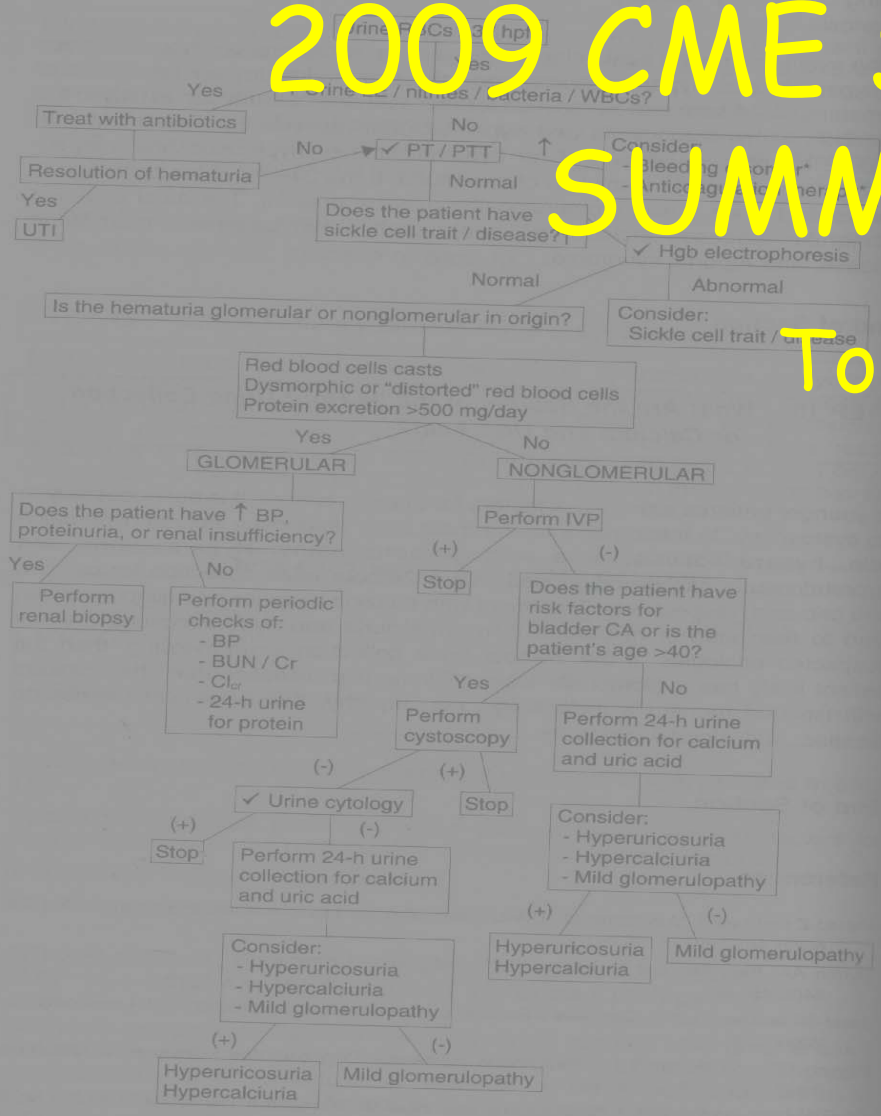


# 2009 CME SYMPOSIUM SUMMING UP

## HEMATURIA



\*Hematuria that occurs in the patient with an elevated PT / PTT may be the result of anticoagulation therapy or a bleeding disorder. However, an underlying structural etiology cannot be excluded.  
 †Sickle cell trait/disease may be the sole cause of hematuria; however, this diagnosis must be one of exclusion.

## PROTEINURIA

is important to identify proteinuria. While it is true that proteinuria may represent a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <15 mg of protein excreted in the urine over a 24-hour period.

### What Different Types of Protein Are Normally Excreted in the Urine?

Excreted protein comes from plasma and the urinary tract. Plasma proteins include albumin and a globulin fraction. The major constituent of protein derived from the urinary tract is the Tamm-Horsfall protein, which is secreted by the cells of the ascending limb of the loop of Henle and the distal tubule.

CONSTITUENTS OF NORMAL URINE PROTEIN	
ALBUMIN	30%
GLOBULINS	30%
TAMM-HORSFALL PROTEIN	40%

### How Is Protein Handled by the Kidneys?

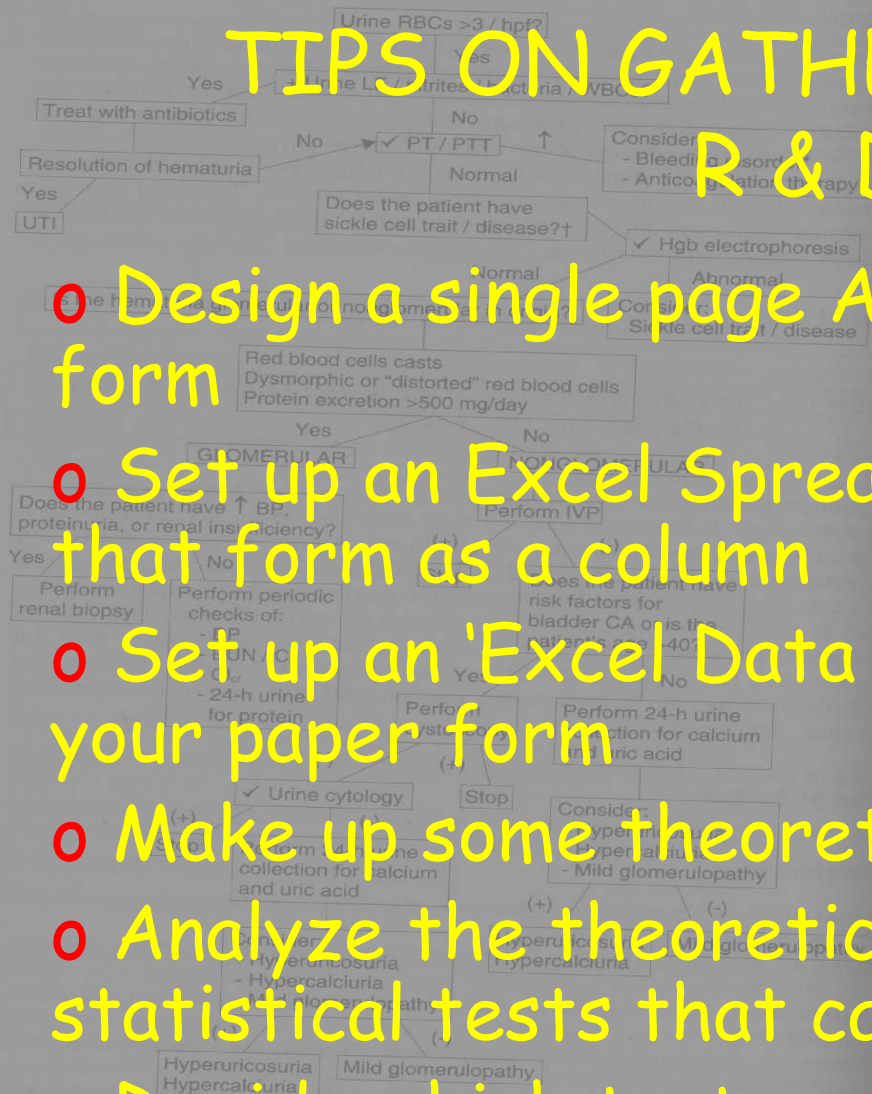
Plasma protein must traverse the glomerular barrier to enter the urine. In general, proteins with a molecular weight >20,000 daltons have considerable difficulty passing through glomerular capillary walls. The glomerular basement membrane is also negatively charged, and therefore impedes the passage of negatively charged plasma proteins such as albumin. Filtered protein may be reabsorbed by tubular cells. Proteins that are absorbed by tubular cells are generally low molecular weight in nature.

With this in mind, proteinuria can be classified as follows.

- **Glomerular**  
Glomerular proteinuria is the most common type of proteinuria, and may vary from several hundred milligrams to >100 grams of protein per day. It occurs as a result of increased glomerular permeability, which may be due to a variety of processes.
- **Tubular**  
Any process that damages the proximal tubular epithelium will allow low molecular weight proteins to be excreted in the urine.
- **Overflow**  
Overflow proteinuria is the result of overproduction of a particular protein. This overproduction leads to an increase in plasma protein concentration, which is then filtered at the glomerulus. The increased amount overwhelms the ability of the proximal tubular epithelium to catabolize filtered protein, resulting in urinary excretion of excess protein. In clinical practice, this occurs in multiple myeloma, where immunoglobulin light chains are excreted, or in myelomonocytic leukemia, where excessive lysozyme is excreted.

# TIPS ON GATHERING YOUR OWN R & D DATA

## HEMATURIA



- o Design a single page A4 'portrait' data collection form
- o Set up an Excel Spreadsheet with each field on that form as a column
- o Set up an 'Excel Data Entry' form that matches your paper form
- o Make up some theoretical data
- o Analyze the theoretical data with various statistical tests that can detect your hypothesis
- o Decide which tests you will use on the real data

\*Hematuria that occurs in a patient with an elevated PT / PTT may be the result of anticoagulation therapy or a bleeding disorder. However, an underlying structural etiology cannot be excluded.  
 †Sickle cell trait/disease may be the sole cause of hematuria; however, this diagnosis must be one of exclusion.

## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may represent a benign finding, it may also indicate the presence of serious underlying renal or systemic diseases.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <150 mg of protein excreted in the urine over a 24-hour period.

### What Different Types of Protein Are Normally Excreted in the Urine?

Excreted protein comes from plasma and the urinary tract. Plasma proteins include albumin and a globulin fraction. The major constituent of protein derived from the urinary tract is the Tamm-Horsfall protein, which is secreted by the cells of the ascending limb of the loop of Henle and the distal tubule.

CONSTITUENTS OF NORMAL URINE PROTEIN	
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### How Is Protein Handled by the Kidneys?

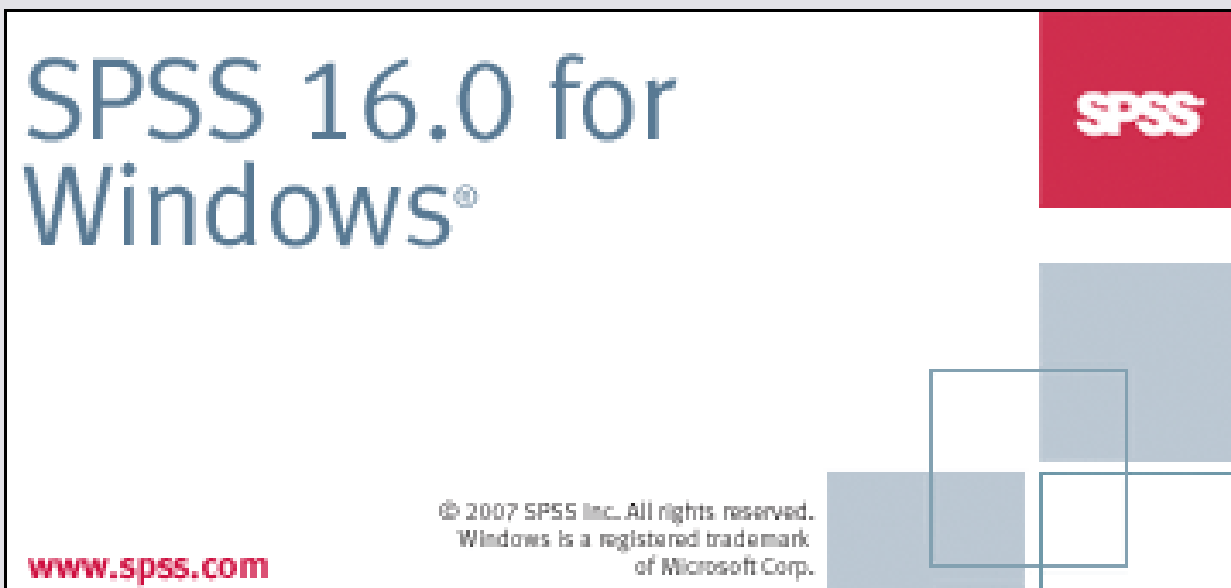
Plasma protein must traverse the glomerular barrier to enter the urine. In general, proteins with a molecular weight >20,000 daltons have considerable difficulty passing through glomerular capillary walls. The glomerular basement membrane is also negatively charged, and therefore impedes the passage of negatively charged plasma proteins such as albumin. Filtered protein may be reabsorbed by tubular cells. Proteins that are absorbed by tubular cells are generally of low molecular weight in nature.

- With this in mind, proteinuria can be classified as follows.
- Glomerular
    - All in glomerular proteinuria is the result of one type of proteinuria, and may vary from several hundred milligrams to >100 grams of protein per day. It occurs as a result of increased glomerular permeability, which may be due to a variety of mechanisms.
  - Tubular
    - Any process that damages the proximal tubular epithelium will allow low molecular weight proteins to be excreted in the urine.

**Overflow**  
 Overflow proteinuria is the result of overproduction of a particular protein. This overproduction leads to an increase in plasma protein concentration, which is then filtered at the glomerulus. The increased amount overwhelms the ability of the proximal tubular epithelium to catabolize filtered protein, resulting in urinary excretion of excess protein. In clinical practice, this occurs in multiple myeloma, where immunoglobulin light chains are excreted, or in myelomonocytic leukemia, where excessive lysozyme is excreted.

# SPSS - Statistical Package for the Social Sciences

Statistical Package for Students Searching for Significance



This copy of SPSS 16.0 for Windows is licensed to:  
NT96V2JD1  
UNT  
9793390

## PROTEINURIA

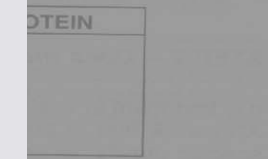
It is important not to ignore proteinuria. While it is true that proteinuria may resolve spontaneously, it may also indicate the presence of a serious underlying renal or systemic disease.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <math>< 150\text{ mg}</math> of protein excreted in the urine over a 24-hour period.

### Protein Normally Excreted in the Urine

act. Plasma proteins constitute of protein in, which is secreted and the distal tubule.

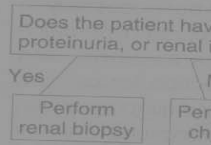
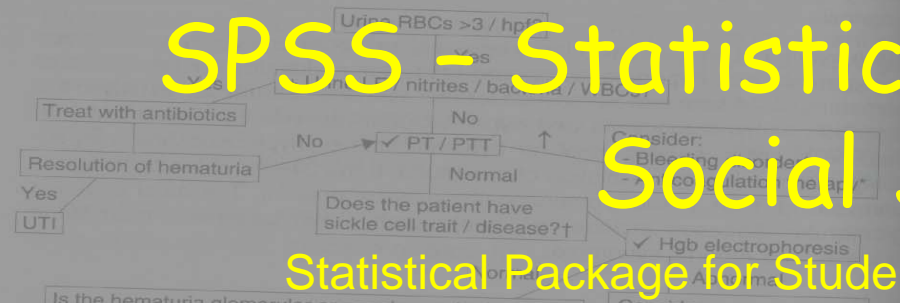


enter the urine. In s have considerable glomerular basement mes the passage of er protein may be by tubular cells are

proteinuria, and may of protein per day. It ility, which may be

elium will allow low

a particular protein. otein concentration, sed amount over- o catabolize filtered . In clinical practice, lin light chains are ressive lysozyme is



(+)  
Stop

Hype  
Hype

\*Hematuria that occurs in therapy or a bleeding disorder  
†Sickle cell trait/disease not of exclusion.



# EXCEL IS RECOMMENDED

## Version 2003

15:42

Microsoft Excel - Xylose BMI above-below 27-modelling.xls

	G	H	I	J	K	L	M	N	O	P	Q	R
1												
2	<b>Time</b>	<b>Subject 2</b>	<b>Subject 4</b>	<b>Subject 6</b>	<b>Subject 10</b>	<b>Subject 11</b>	<b>Subject 12</b>	<b>Subject 14</b>	<b>Subject 15</b>	<b>Subject 20</b>		
3	0	0.0174	0.2078	0.1845	0.1645	0.1775	0.1825	0.3682	0.0901	0.1623		
4	20	0.2384	0.7771	0.5155	0.5790	0.3523	0.5660	0.5943	0.9363	0.6222		
5	40	0.5067	1.2003	0.8123	0.6913	0.6438	0.8022	0.9536	1.2736	1.1015		
6	60	0.5541	0.7794	0.8930	0.7150	0.7064	0.8143	0.8829	1.0641	0.8942		
7	90	0.3883	0.8569	0.6346	0.7776	0.7776	0.8547	0.8849	0.8463	1.1446		
8	120	0.4968	0.7461	0.5902	0.7906	0.7237	0.8183	0.9172	0.6158	1.0540	<b>MEANS</b>	
9	Offset	25	15	24	10	20	13	7	17	17		<b>16</b>
10	Span	0.61	1.45	1.32	0.76	0.80	0.83	0.90	1.55	1.12		<b>1.04</b>
11	k	0.130	0.125	0.070	0.120	0.065	0.100	0.060	0.150	0.100		<b>0.102</b>
12	KR	0.040	0.066	0.090	0.000	0.005	0.000	0.000	0.090	0.000		<b>0.032</b>
13	Slope	1.143	1.056	1.014	0.973	1.040	0.996	0.857	0.981	0.961		<b>1.002</b>
14	Intercept	0.0125	0.0398	0.0106	0.0229	0.0033	0.0012	0.0735	0.0107	0.0594		<b>0.0260</b>
15	R2	0.8857	0.8334	0.9649	0.9819	0.9831	0.9951	0.9307	0.9948	0.9319		<b>0.9446</b>
16	R	0.9411	0.9129	0.9823	0.9909	0.9915	0.9975	0.9647	0.9974	0.9653		<b>0.9715</b>
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Model

Curve for Mean Parameters  
Offset = 16, Span = 1.04, k = 0.102,  
KR = 0.032

Obs versus Model Plasma Xylose

$y = 0.9608x + 0.0594$   
 $R^2 = 0.9319$

Subject 20

### PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may represent a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

How Much Protein is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <150 mg of protein excreted in the urine over a 24-hour period.

### Normally Excreted

ary tract. Plasma proteins or constituent of protein protein, which is secreted into the distal tubule.

### E PROTEIN

er to enter the urine. In normal persons have considerable protein. The glomerular basement membrane impedes the passage of protein. Filtered protein may be reabsorbed by tubular cells are

flows. The amount of proteinuria, and may vary from a few grams of protein per day. It is a measure of proteinuria, which may be

epithelium will allow low protein to pass into the urine.

on of a particular protein. In clinical practice, protein concentration, increased amount of protein to catabolize filtered protein. In clinical practice, protein, globulin light chains are excreted in the urine as excessive lysozyme is

# DATA ENTRY FORM - DIY with VBA

CLINICAL DATA ENTRY FORM - DEMO ONE

UR Number

Surname  Given Name

Gender  Male  Female  
DOB, dd/mm/yyyy

Age today in years

Baseline Observations

Drug Prescribed

Starting Dose  Maintenance Dose

Start wt, kg  Start Ht, m

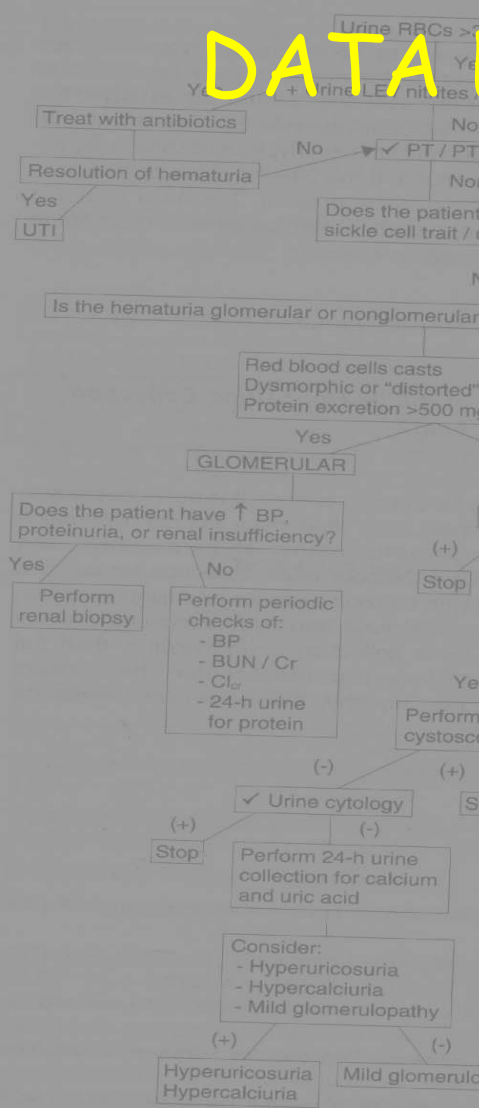
Start BMI

6 months Wt, kg  Wt Change, kg

6 months BMI  Change in BMI

Adverse Events

## HEMATURIA



## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may present a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

of protein excreted in the urine over a 24-hour

### of Protein Are Normally Excreted

plasma and the urinary tract. Plasma proteins in urine fraction. The major constituent of proteinuria is the Tamm-Horsfall protein, which is secreted from the limb of the loop of Henle and the distal tubule.

### PERCENTAGES OF NORMAL URINE PROTEIN

PROTEIN 40%
-------------

### Proteinuria Classified by the Kidneys?

Proteinuria is the glomerular barrier to enter the urine. In normal individuals, only small molecules (molecular weight >20,000 daltons) have considerable permeability through the glomerular capillary walls. The glomerular basement membrane is negatively charged, and therefore impedes the passage of proteins such as albumin. Filtered protein may be reabsorbed in the proximal tubule. Proteins that are absorbed by tubular cells are metabolized in nature.

Proteinuria can be classified as follows.

The most common type of proteinuria, and may be defined as the excretion of >100 milligrams of protein per day. It is caused by increased glomerular permeability, which may be seen in various conditions.

As the proximal tubular epithelium will allow low molecular weight proteins to be excreted in the urine.

Proteinuria may be the result of overproduction of a particular protein. This may lead to an increase in plasma protein concentration, which increases the oncotic pressure in the glomerulus. The increased amount of protein in the proximal tubular epithelium to catabolize filtered protein, leading to the excretion of excess protein. In clinical practice, proteinuria is seen in conditions such as nepheloma, where immunoglobulin light chains are excreted, and in acute myelocytic leukemia, where excessive lysozyme is excreted.

# DATA ENTRY FORM - Use an AddIn dataform3.xla

	A	B	C	D	E	F
1	UR Number	Surname	Given Names	Gender	DOB dd/mm/yyyy	Baseline Observations
2	789456	Morris	Kevin	Male	29/08/1995	Overweight asthmatic
3	417896	Hughes	Wendy	Female	5/12/1985	Truncal obesity
4	127489	Keeler	Jackie	Female	29/09/2000	Obese child from an obese family

**J-Walk Enhanced Data Form**

Data      Criteria

UR Number: 127489     

Surname: Keeler     

Given Names: Jackie     

Gender: Female

DOB dd/mm/yyyy: 29/09/2000

Baseline Observ: Obese child from an obese family     

Starting Dose: 80     

Maintenance Dos: 50

Start Wt, kg: 55

Start Ht, m: 1.2

Start BMI: 38.1944444444444

6 months Wt, kg: 50

6 months BMI: 34.7222222222222

Adverse events: Poor compliance due to recurrent illness

Record 3 of 3     

## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may present a benign finding, it can also indicate the presence of serious underlying renal or systemic disease.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <150 mg of protein excreted in the urine over a 24-hour period.

### Are Normally Excreted

the urinary tract. Plasma proteins The major constituent of protein is albumin, which is secreted at the apical end of the apical part of Henle and the distal tubule.

### AL URINE PROTEIN

### Kidneys?

barrier to enter the urine. In normal kidneys, proteins of less than 20,000 daltons have considerable difficulty passing through the glomerular walls. The glomerular basement membrane therefore impedes the passage of albumin. Filtered protein may be reabsorbed by tubular cells and

ed as follows.

non type of proteinuria, and may excrete >100 grams of protein per day. It is caused by increased glomerular permeability, which may be

tubular epithelium will allow low levels of protein to pass in the urine.

production of a particular protein. In plasma protein concentration, the increased amount of protein is due to the increased amount of protein in the plasma. The increased amount of protein is due to the increased amount of protein in the plasma. The increased amount of protein is due to the increased amount of protein in the plasma.

# J-Walk AddIn for Excel

<http://spreadsheetspage.com/index.php/dataform/home/>

## The J-Walk Enhanced Data Form

The J-Walk Enhanced Data Form is a **FREE** Excel add-in that provides a general-purpose data entry dialog box. The Enhanced Data Form adjusts to any database table in any worksheet. It's a significantly enhanced alternative to Excel's built-in Data Form (which is not even part of the user interface in Excel 2007).

**Very Important:** This add-in comes in two sub-versions, and both are included in the download:

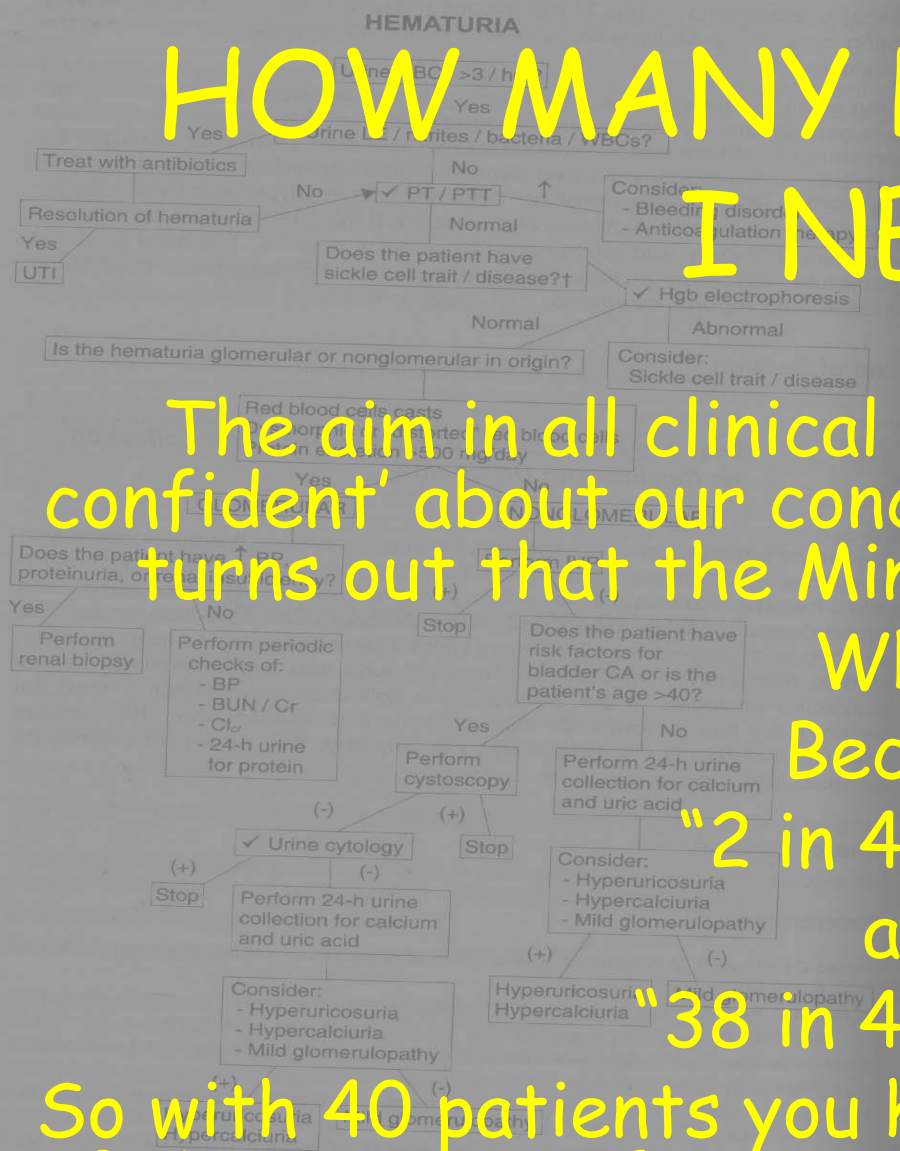
- **Version 3a** - for Excel 97, 2000, 2002, and 2003
- **Version 3b** - for Excel 2007

← Not sure that this works

This add-in does *not* work with any version of Excel for Macintosh.



# HOW MANY PATIENTS DO I NEED?



The aim in all clinical research is to be '95% confident' about our conclusions. To achieve this it turns out that the Minimum Group Size is 40.

Why?  
Because  
"2 in 40 = 5%"  
and  
"38 in 40 = 95%"

So with 40 patients you have a reasonable chance of obtaining a reference interval that you can have a "95% confidence" about.

## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may present a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is  $<150$  mg of protein excreted in the urine over a 24-hour period.

### What Different Types of Protein Are Normally Excreted in the Urine?

Excreted protein comes from plasma and the urinary tract. Plasma proteins include albumin and a globulin fraction. The major constituent of protein comes from the urinary tract is the Tamm-Horsfall protein, which is secreted by the cells of the ascending limb of the loop of Henle and the distal tubule.

CONSTITUENTS OF NORMAL URINE PROTEIN	
ALBUMIN	5%
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TAMM-HORSFALL PROTEIN	40%

### How Is Protein Handled by the Kidneys?

Plasma protein must traverse the glomerular barrier to enter the urine. In general, proteins with a molecular weight  $>20,000$  daltons have considerable difficulty passing through glomerular capillary walls. The glomerular basement membrane is also negatively charged, and therefore impedes the passage of negatively charged plasma proteins such as albumin. Filtered protein may be reabsorbed by tubular cells. Proteins that are absorbed by tubular cells are generally low molecular weight in nature.

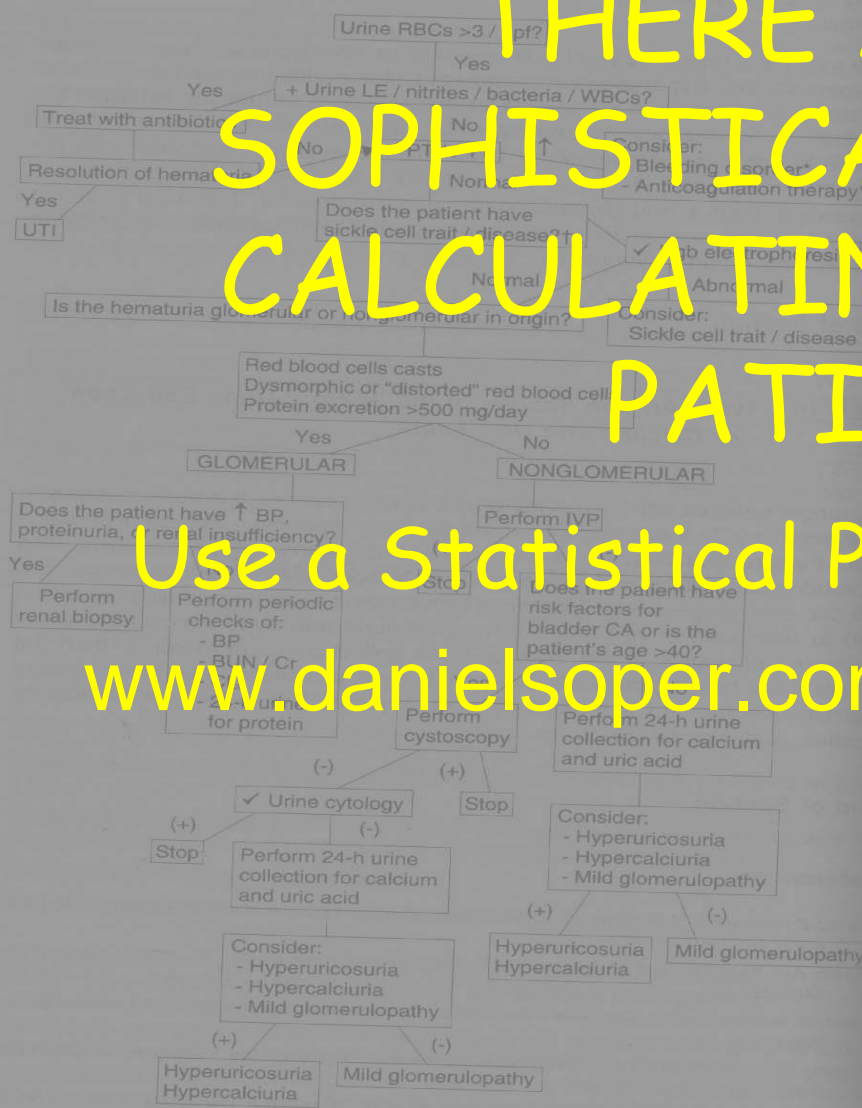
With this in mind, proteinuria can be classified as follows.

- Glomerular**  
Glomerular proteinuria is the most common type of proteinuria, and may vary from several hundred milligrams to  $>100$  grams of protein per day. It occurs as a result of increased glomerular permeability, which may be due to a variety of processes.
- Tubular**  
Any process that damages the proximal tubular epithelium will allow low molecular weight proteins to be excreted in the urine.
- Overflow**  
Overflow proteinuria is the result of overproduction of a particular protein. This overproduction leads to an increase in plasma protein concentration, which is then filtered at the glomerulus. The increased amount overwhelms the ability of the proximal tubular epithelium to catabolize filtered protein, resulting in urinary excretion of excess protein. In clinical practice, this occurs in multiple myeloma, where immunoglobulin light chains are excreted, or in myelomonocytic leukemia, where excessive lysozyme is excreted.

\*Hematuria that is associated with urinalysis and PT/PTT may be the result of a benign or a bleeding disorder. However, underlying structural etiology cannot be excluded.  
†Sickle cell trait/disease may be the sole cause of hematuria; however, this diagnosis must be one of exclusion.



## HEMATURIA



## PROTEINURIA

It is important to identify proteinuria. While it is true that proteinuria may present a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

### How Much Protein is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <150 mg of protein excreted in the urine over a 24-hour period.

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Plasma protein must traverse the glomerular barrier to enter the urine. In general, proteins with a molecular weight >20,000 daltons have considerable difficulty passing through glomerular capillary walls. The glomerular basement membrane is also negatively charged, and therefore impedes the passage of negatively charged plasma proteins such as albumin. Filtered protein may be reabsorbed by tubular cells. Proteins that are absorbed by tubular cells are generally low molecular weight in nature.

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THERE ARE MORE SOPHISTICATED WAYS OF CALCULATING HOW MANY PATIENTS ...

Use a Statistical Power Calculator eg :

[www.danielsoper.com/statcalc/calc01.aspx](http://www.danielsoper.com/statcalc/calc01.aspx)

\*Hematuria that occurs in the patient with an elevated PT / PTT may be the result of anticoagulation therapy or a bleeding disorder. However, an underlying structural etiology cannot be excluded.  
†Sickle cell trait/disease may be the sole cause of hematuria; however, this diagnosis must be one of exclusion.

**Statistics software**

Data analysis and model building with neural nets. Free trial.

[www.peltarion.com](http://www.peltarion.com)

**FitAll™ fitting solutions**

for (multiple) linear, nonlinear & transcendental functions.

[www.fitall.com](http://www.fitall.com)

**StatWorker**

Web based statistical package.

Tests, Regression, ANOVA, GLM

[statfactory.co.uk](http://statfactory.co.uk)

Ads by Google

## A-priori Sample Size Calculator for Multiple Regression

This calculator will tell you the minimum required sample size for your study, given the alpha level, the number of predictors, the anticipated effect size, and the desired statistical power level.

For more information about this calculator, including method, formulae, and references, please click [here](#).

Please supply the necessary parameters, and then click the 'Calculate' button.

**Alpha Level:**

Also known as the p-value, probability, or type I error rate. By convention, this value should be less than or equal to 0.05 to claim statistical significance.

**Number of Predictors:**

The total number of predictors in the model, not including the regression constant.

**Anticipated Effect Size ( $f^2$ ):**

By convention, effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. To compute an effect size from an  $R^2$ , click [here](#).

**Desired Statistical Power Level:**

By convention, this value should be greater than or equal to 0.80.

Calculate

**Alpha Level:** 0.05 Also known as the p-value, probability, or type I error rate. By convention, this value should be less than or equal to 0.05 to claim statistical significance.

**Number of Predictors:** 1 The total number of predictors in the model, not including the regression constant.

**Anticipated Effect Size ( $f^2$ ):** 0.15 By convention, effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. To compute an effect size from an  $R^2$ , [click here](#).

**Desired Statistical Power Level:** 0.8 By convention, this value should be greater than or equal to 0.80.

**Minimum Required Sample Size:** 54

**Alpha Level:**  Also known as the p-value, probability, or type I error rate. By convention, this value should be less than or equal to 0.05 to claim statistical significance.

**Number of Predictors:**  The total number of predictors in the model, not including the regression constant.

**Anticipated Effect Size ( $f^2$ ):**  By convention, effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. To compute an effect size from an  $R^2$ , click [here](#).

**Desired Statistical Power Level:**  By convention, this value should be greater than or equal to 0.80.

**Minimum Required Sample Size:**



**Alpha Level:** 0.05 Also known as the p-value, probability, or type I error rate. By convention, this value should be less than or equal to 0.05 to claim statistical significance.

**Number of Predictors:** 1 The total number of predictors in the model, not including the regression constant.

**Anticipated Effect Size ( $f^2$ ):** 0.35 By convention, effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively. To compute an effect size from an  $R^2$ , click [here](#).

**Desired Statistical Power Level:** 0.8 By convention, this value should be greater than or equal to 0.80.

**Minimum Required Sample Size:** 25

## HEMATURIA

Urine RBCs >3 / hpf?

# THE ROC CURVE

## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may represent a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

**How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?**

Normally, there is <150 mg of protein excreted in the urine over a 24-hour period.

**Specificity : the probability that a laboratory test will be negative in the absence of a disease**

**What Different Types of Protein Are Normally Excreted in the Urine?**  
Excreted protein comes from plasma and the urinary tract. Plasma proteins include albumin and a significant fraction of the normal constituent of protein derived from the urinary tract is the Tamm-Horsfall protein, which is secreted by the cells of the ascending limb of the loop of Henle and the distal tubule.

**CONSTITUENTS OF NORMAL URINE PROTEIN**

= # of true negatives divided by (# of true negative + # of false positives)

**How Is Protein Handled by the Kidneys?**

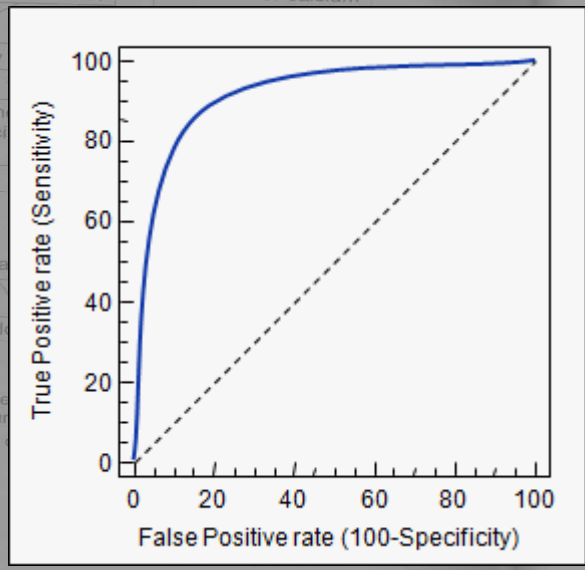
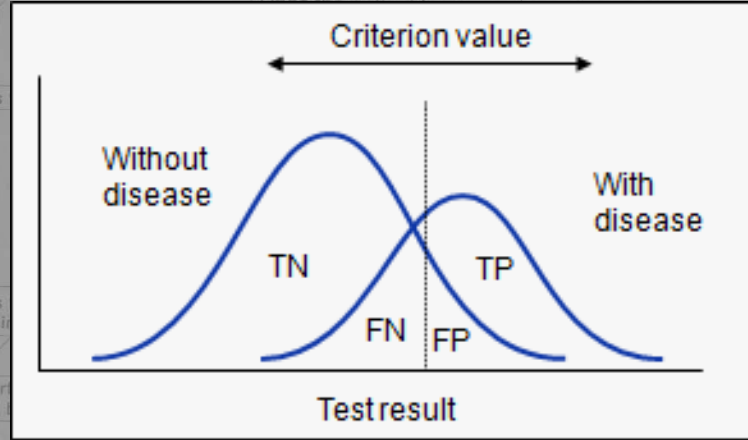
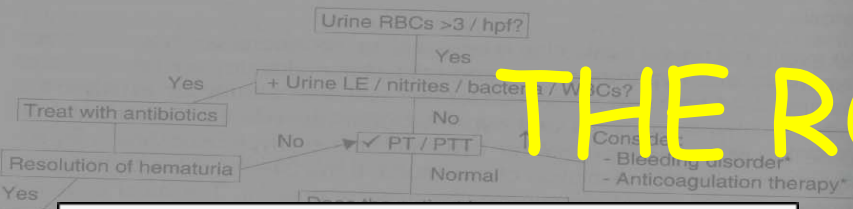
Plasma protein must traverse the glomerular barrier to enter the urine. In general, proteins with a molecular weight >20,000 daltons have considerable difficulty passing through glomerular capillary walls. The glomerular basement membrane is also negatively charged, and therefore impedes the passage of negatively charged plasma proteins such as albumin. Filtered protein may be reabsorbed by the tubules. Protein that is not reabsorbed by tubule cells are generally low molecular weight in nature.

**Sensitivity : the probability that a laboratory test is positive in the presence of disease**

**Glomerular**  
Glomerular proteinuria is the most common type of proteinuria, and may vary from several hundred milligrams to >100 grams of protein per day. It occurs as a result of increased glomerular permeability, which may be due to a variety of processes.

**Tubular**  
Any process that damages the proximal tubular epithelium will allow low molecular weight proteins to be excreted in the urine.

**Overflow**  
Overflow proteinuria is the result of overproduction of a particular protein. This overproduction is due to an increase in plasma protein concentration, which is then filtered at the glomerulus. The increased amount overwhelms the normal tubular epithelium to catabolize filtered protein, resulting in urinary excretion of excess protein. In clinical practice, this occurs in multiple myeloma, where immunoglobulin light chains are excreted, or in myelomonocytic leukemia, where excessive lysozyme is excreted.



\*Hematuria that occurs in the patient with an elevated PT or PTT may be the sole cause of exclusion.

# Generate Some Test Data Before You Collect Real Data

## Use the Data Generator Inside Excel

**Data Analysis**

Analysis Tools

- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram
- Moving Average
- Random Number Generation

OK  
Cancel  
Help

**Random Number Generation**

Number of Variables: 1

Number of Random Numbers: 40

Distribution: Discrete

Parameters

Value and Probability Input

- Discrete
- Uniform
- Normal
- Bernoulli
- Binomial
- Poisson
- Patterned
- Discrete

**Random Number Generation**

Number of Variables: 1

Number of Random Numbers: 40

Distribution: Normal

Parameters

Mean = 15

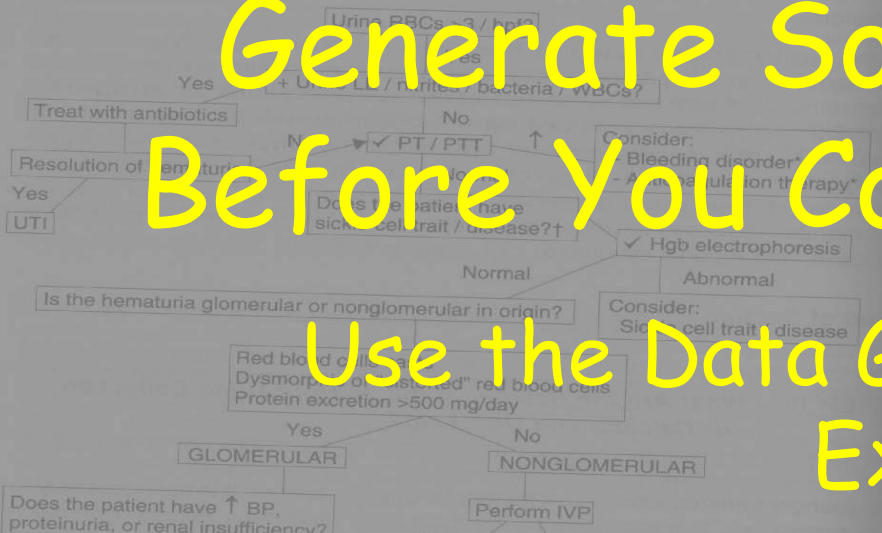
Standard deviation = 2.5

Random Seed: 8

Output options

- Output Range:
- New Worksheet Ply:
- New Workbook

### HEMATURIA



### PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may present a benign condition, it may also indicate the presence of serious underlying renal or systemic disease.

**How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?**

Normally, there is a small amount of protein excreted in the urine over a 24-hour period.

**What Different Types of Protein Are Normally Excreted in the Urine?**

Excreted proteins come from plasma and the urinary tract. Plasma proteins include albumin and a globulin fraction. The major constituent of protein derived from the urinary tract is the Tamm-Horsfall protein, which is secreted by the cells of the ascending limb of the loop of Henle and the distal tubule.

**CONSTITUENTS OF NORMAL URINE PROTEIN**

ALBUMIN	30%
GLOBULINS	30%
TAMM-HORSFALL PROTEIN	

### How Is

Plasma protein general, p difficulty p membrane negatively reabsorbe generally

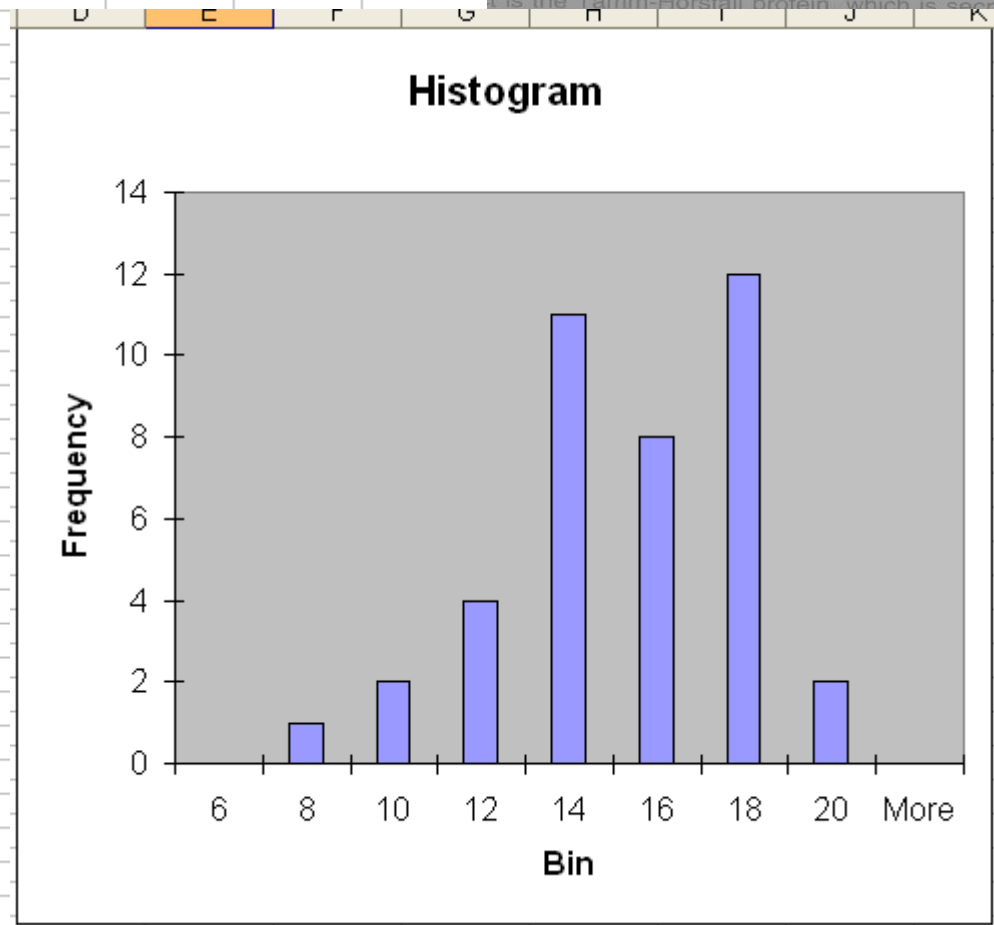
\*Hematuria that occurs in the patient with an elevated therapy or a bleeding disorder. However, an underlying Sick cell trait/disease may be the sole cause of hem of exclusion.

	A	B	C	D	E	F	G	H	I	J
1	7.8									
2	9.1		Bins							
3	9.6		6							
4	10.8		8							
5	10.8		10							
6	11.5		12							
7	11.7		14							
8	12.2		16							
9	12.3		18							
10	12.7		20							
11	12.8									
12	13.1									
13	13.2									
14	13.5									
15	13.7									
16	13.8									
17	13.9									
18	13.9									
19	14.0									
20	14.5									
21	14.5									
22	14.6									
23	14.6									
24	15.0									
25	15.0									
26	15.2									
27	16.4									
28	16.5									
29	16.6									
30	16.6									
31	16.7									
32	17.0									
33	17.2									
34	17.3									
35	17.5									
36	17.6									
37	17.7									
38	17.8									
39	19.1									
40	19.4									
41										

**Data Analysis** ✖

Analysis Tools

- Anova: Two-Factor Without Replication
- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram**
- Moving Average
- Random Number Generation



**PROTEINURIA**

proteinuria. While it is true that proteinuria may also indicate the presence of serious under-

*Excreted Over a 24-Hour Period in*

of protein excreted in the urine over a 24-hour

*of Protein Are Normally Excreted*

in plasma and the urinary tract. Plasma proteins

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is the Tamm-Horsfall protein, which is secreted

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## Random Number Generation

Number of Variables:



Number of Random Numbers:



Distribution:



### Parameters

Mean =

Standard deviation =

Random Seed:

### Output options

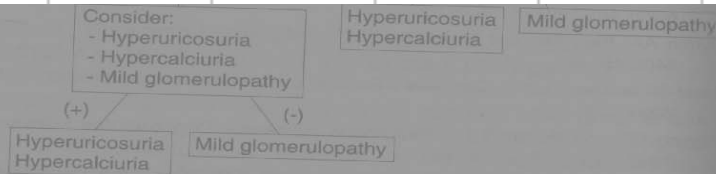
Output Range:

New Worksheet Ply:

New Workbook

## ACTUAL STATS

Mean	14.43
Standard Error	0.43
Median	14.54
Mode	
Standard Deviation	2.75
Sample Variance	7.54
Kurtosis	-0.28
Skewness	-0.34
Range	11.65
Minimum	7.79
Maximum	19.43
Sum	577.27
Count	40.00



\*Hematuria that occurs in the patient with an elevated PT / PTT may be the result of anticoagulation therapy or a bleeding disorder. However, an underlying structural etiology cannot be excluded.

†Sickle cell trait/disease may be the sole cause of hematuria; however, this diagnosis must be one of exclusion.

## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may represent a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

*How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?*

Normally, there is only 50 mg of protein excreted in the urine over a 24-hour period.

*What Do the Urinary Proteins Tell Us About the Urinary Tubule?*

Proteins that are excreted in the urine provide additional information about the tubular cells. The presence of proteinuria is a sign of tubular damage.

*What Is Proteinuria?*

Proteinuria is defined as the presence of protein in the urine. In normal individuals, the amount of protein excreted in the urine is less than 300 mg per day.

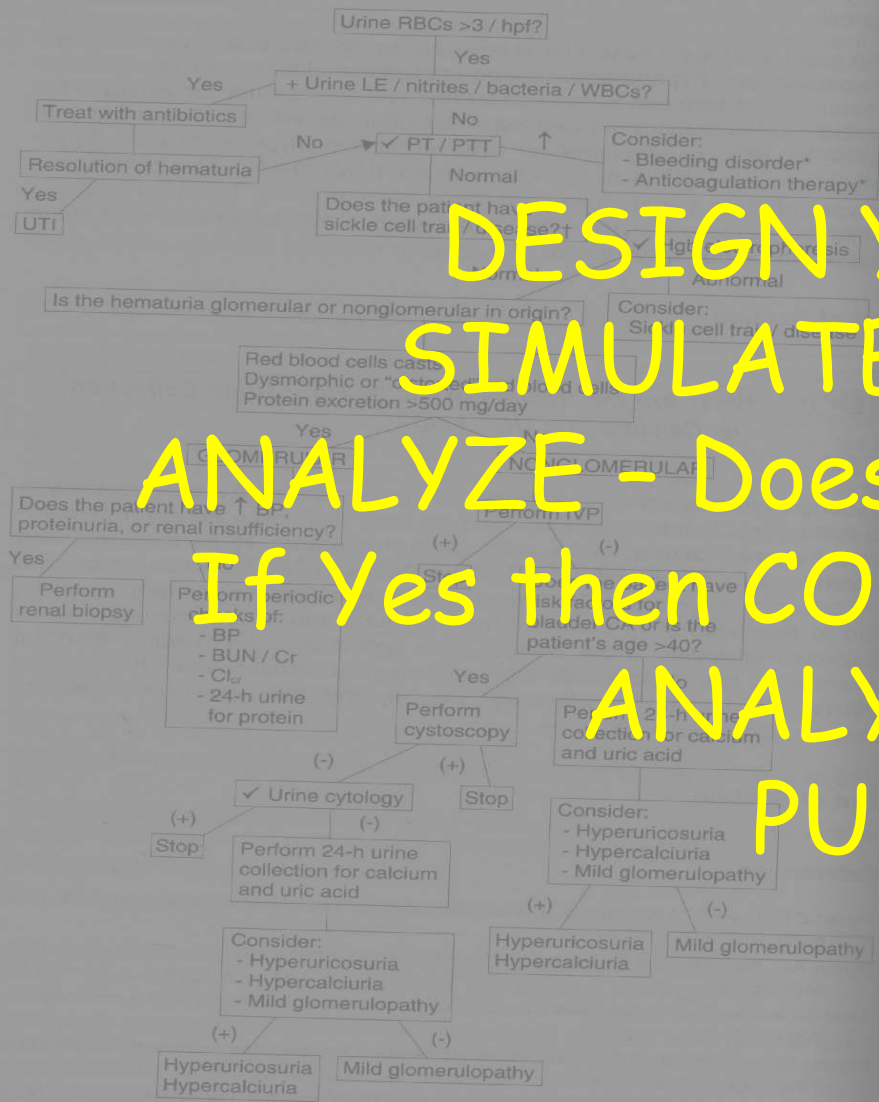
Proteinuria can be classified as glomerular, tubular, or overflow. In glomerular proteinuria, the glomerular barrier is damaged, allowing protein to pass into the urine. In tubular proteinuria, the tubular cells are damaged, allowing protein to be excreted in the urine. In overflow proteinuria, the tubular cells are overwhelmed by a large amount of protein, leading to its excretion in the urine.

Glomerular proteinuria is the most common type of proteinuria. It is caused by damage to the glomerular barrier, which allows protein to pass into the urine. This can be caused by a variety of conditions, including diabetes, hypertension, and glomerulonephritis. Tubular proteinuria is caused by damage to the tubular cells, which allows protein to be excreted in the urine. This can be caused by conditions such as Fanconi syndrome and multiple myeloma. Overflow proteinuria is caused by an excessive amount of protein being produced by the body, leading to its excretion in the urine. This can be caused by conditions such as multiple myeloma and Waldenström macroglobulinemia.

- Tubular
- Overflow

Overflow proteinuria is the result of overproduction of a particular protein. This overproduction leads to an increase in plasma protein concentration, which is then filtered at the glomerulus. The increased amount overwhelms the ability of the proximal tubular epithelium to catabolize filtered protein, resulting in urinary excretion of excess protein. In clinical practice, this occurs in multiple myeloma, where immunoglobulin light chains are excreted, or in myelomonocytic leukemia, where excessive lysozyme is excreted.

## HEMATURIA



DESIGN YOUR STUDY

SIMULATE SOME DATA

ANALYZE - Does the design "work"?

If Yes then COLLECT REAL DATA

ANALYZE THEM

PUBLISH

## PROTEINURIA

It is important not to ignore proteinuria. While it is true that proteinuria may represent a benign finding, it may also indicate the presence of serious underlying renal or systemic disease.

### How Much Protein Is Excreted Over a 24-Hour Period in the Normal Individual?

Normally, there is <150 mg of protein excreted in the urine over a 24-hour period.

### What Different Types of Protein Are Normally Excreted in the Urine?

Excreted protein comes from plasma and the urinary tract. Plasma proteins include albumin and a globulin fraction. The major constituent of protein excreted from the urinary tract is the Tamm-Horsfall protein, which is secreted by the cells of the ascending limb of the loop of Henle and the distal tubule.

CONSTITUENTS OF NORMAL URINE PROTEIN	
ALBUMIN	30%
GLOBULIN	3%
TAMM-HORSFALL PROTEIN	40%

### How Is Protein Handled by the Kidneys?

Plasma protein must traverse the glomerular barrier to enter the urine. In general, proteins with a molecular weight >20,000 daltons have considerable difficulty passing through glomerular capillary walls. The glomerular basement membrane is also negatively charged, and therefore impedes the passage of negatively charged plasma proteins such as albumin. Filtered protein may be reabsorbed by tubular cells. Proteins that are absorbed by tubular cells are generally of low molecular weight in nature.

With this in mind, proteinuria can be classified as follows.

- Glomerular
  - Glomerular proteinuria is the most common type of proteinuria, and may vary from several hundred milligrams to >100 grams of protein per day. It occurs as a result of increased glomerular permeability, which may be due to a variety of processes.
- Tubular
  - Any process that damages the proximal tubular epithelium will allow low molecular weight proteins to be excreted in the urine.
- Overflow
  - Overflow proteinuria is the result of overproduction of a particular protein. This overproduction leads to an increase in plasma protein concentration, which is then filtered at the glomerulus. The increased amount overwhelms the ability of the proximal tubular epithelium to catabolize filtered protein, resulting in urinary excretion of excess protein. In clinical practice, this occurs in multiple myeloma, where immunoglobulin light chains are excreted, or in myelomonocytic leukemia, where excessive lysozyme is excreted.

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 †Sickle cell trait/disease may be the sole cause of hematuria; however, this diagnosis must be one of exclusion.