

# Question Everything (Critical Common Sense)



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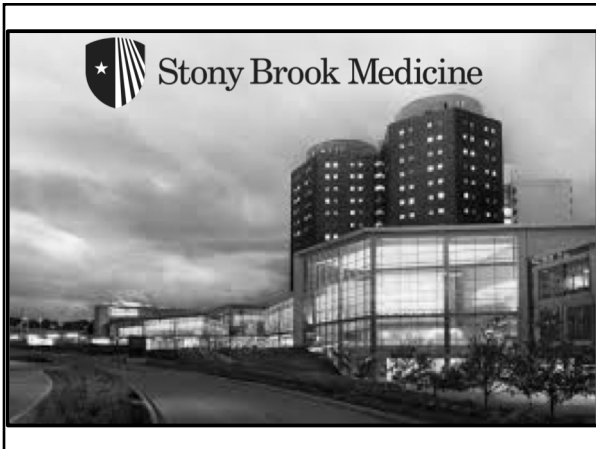
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## *Disclosures!*

### • Publications:

- Rockwood and Green, Tornetta and Einhorn; Subspecialty series, Court-Brown, Tornetta; Trauma, AAOs; OKU Trauma, ICL Trauma 1,2, Tornetta; Op Techn in Ortho Surg, OTA Slide project,
- Journals; JOT; Deputy editor, CORR, JAAOS, JBIS; Reviewer

### • Research:

- OTA, FOT, AIOD, DOD

### • Consultant / Designer

- Smith and Nephew, Exploramed

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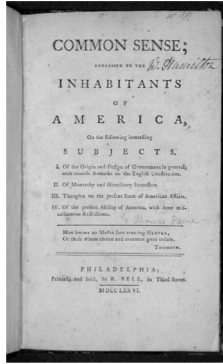
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# Common Sense



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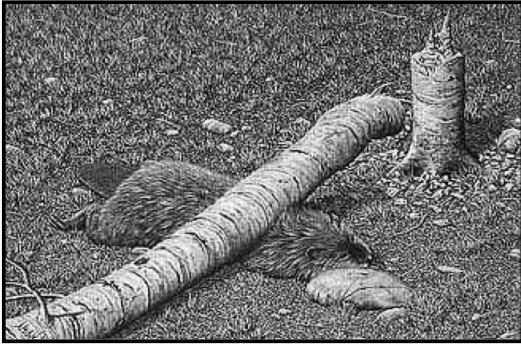
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# Common Sense



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# Common Sense



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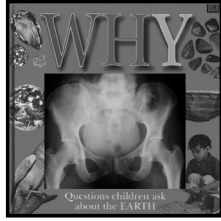
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## In Childhood

- Are we there yet?
- Why...
  - Is the sky blue?
  - Don't fish drown?
  - Do birds fly?
  - Do people operate on nondisplaced pelvic fractures?



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## School

- Taught to accept
- Told that there are correct answers
- Conform to established thoughts



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## Medicine

- Overload of information
- Accept established theories
- Facts
- Textbooks
- Journals



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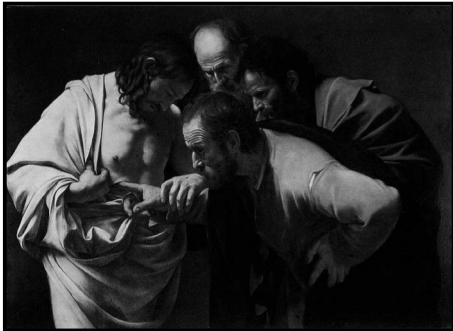
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## Doubting Thomas



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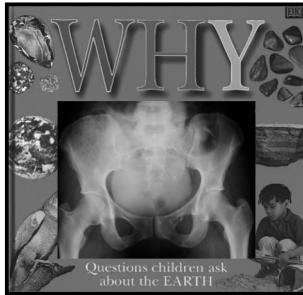
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## Healthy Skepticism

- Challenge opinion
- Ask....



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## Goals

- Help patients
- Restore anatomy
- Return to function



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## Do the Right Thing

- Best choice for each patient

- ◆ Available information
- ◆ Surgical skill
- ◆ Patient needs



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## Common Sense

- Available information

- ◆ Evaluation
- ◆ Flaws in what we think we know



- Surgical discipline

- ◆ Art
- ◆ Decision making



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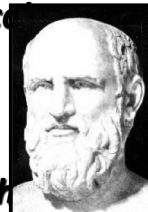
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## Hippocrates

*“One must attend in medical practice not primarily to plausible theories, but to experience combined with reason”*



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## How You Look at It



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## Information

- Is there any?
- *Plantar sensation*
- *Syndesmotoc fixation*
- *Cubitus varus*
- *Pilon fractures*
- *All of "sports medicine"*



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## Information

- Based on observation
- Hypothesis generation
- Hypothesis testing
- Objective evaluation of data
- Conclusions



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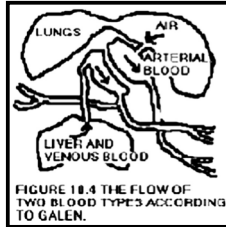
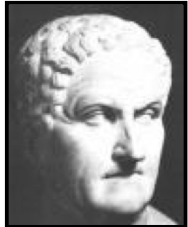
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# Galen

- Questioned how?
- Vivisections on primates




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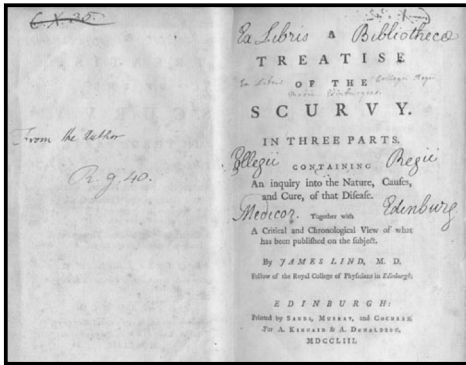
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# Lind 1747




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# Others

- Lister
  - ◆ Mortality after amputation
  - ◆ 1864-86: 46%
  - ◆ 1867-70: 15%
- Hill
  - ◆ Treatment of Tb
  - ◆ Sealed envelopes, eligibility
  - ◆ Independent evaluation




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## Evidence

- **Best available information**
- **Support clinical decisions**
- **“Evidence based medicine”**
- **Reality**
  - ♦ **Be able to critically analyze what we hear, read, and see**
  - ♦ **Apply to our patients’ specific needs**

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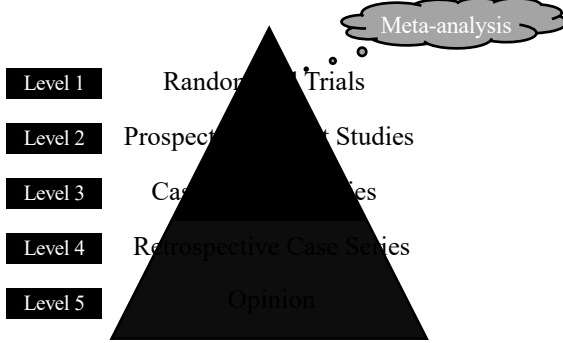
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## Hierarchy of Evidence




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## All Studies

- **Classification used**
- **Evaluation of “union”**
- **Follow up percentage**
- **Outcome measures**
- **Clinical relevance**




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## Audige, et al

Author	Year	Study Design	Number of Patients	Percentage of Patients with OA	Observer 1	Observer 2	Kappa
Wahlstrom et al. 1988	1988	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 1990	1990	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 1992	1992	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 1994	1994	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 1996	1996	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 1998	1998	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2000	2000	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2002	2002	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2004	2004	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2006	2006	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2008	2008	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2010	2010	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2012	2012	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2014	2014	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2016	2016	Prospective	100	100%	100%	100%	0.98
Wahlstrom et al. 2018	2018	Prospective	100	100%	100%	100%	0.98

- 15% observer agreement
- Kappa = .23




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## Union

- Bhandari, et al
- Nonunion 2 - 12 months
- 45% always use criteria to evaluate




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## Followup

- Significant problem in trauma studies
- 20% is significant!!
- Case series
- Comparative studies

80 Pts  
=86  
20 lost  
=40

**76**




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## Outcomes

- We assign values to scoring
- Motion?
- Alignment?
- Functional assessment?
- What matters to the patient?




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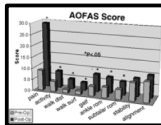
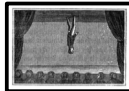
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## Summed Scores

- Floor and ceiling effects
- Multiple components
  - Subjective
  - Objective
- Importance of all components?




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## Materials



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55



56

Followup 51 mos (> 2 yr)

AOFAS, Maryland, SF36

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### Pain

AOFAS	83% - 86%
Maryland	80% - 86%
SF36 PCS	52% - 76%
SF36 MCS	18% - 36%

Regressing with ROM had no affect

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### So...

- Summed scores
  - Composite scores of measures
  - Relative weight of each measure based
- Overall assessment
- Comparative measure
- One factor may dominate

# Pain

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### Error

- All studies have error
- Critical analysis necessary
  - Appropriate question
  - Appropriate population
  - Selection bias
  - Technique bias
  - Outcomes measure

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## Standard Evaluation

- Just like an x-ray
- Same method each time
- Systematic approach

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## Standard Evaluation

- Study design (RCT, series)
- Methodology
  - Hypothesis (if there is one!)
  - Population
  - Intervention
- Outcomes assessed
- Results

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## Highest “levels”

- Comparative studies
- Specific types of error
  - Beta
  - Alpha
- Clinical relevance



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## Statistics

- Boring
- Facilitate lies!
- Data can be manipulated to say anything!



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## Randomization

- Balance
  - Known
  - Unknown



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## Hypothesis

- Basic element of any comparison study
- Clearly stated
  - Usually a "null" hypothesis
  - Assumption of NO difference
- Evaluated with as little bias as possible

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### Example: Tibia Fx

- Reamed vs unreamed nailing
  - Union (%)
  - Time to union (weeks)
- Null hypothesis:
  - *There is no difference in the union rate or time between the groups*

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### The "p" Value

- Probability
- Coin toss
  - Heads 50% ( $p = .5$ )
  - Heads twice 25% ( $p = .25$ )
  - Heads ten times  $< 1/1000$  ( $p < .001$ )



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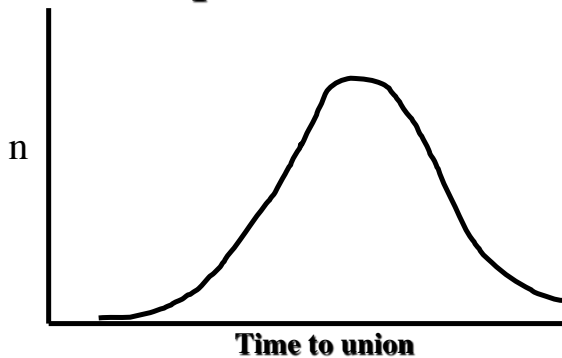
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### Populations....



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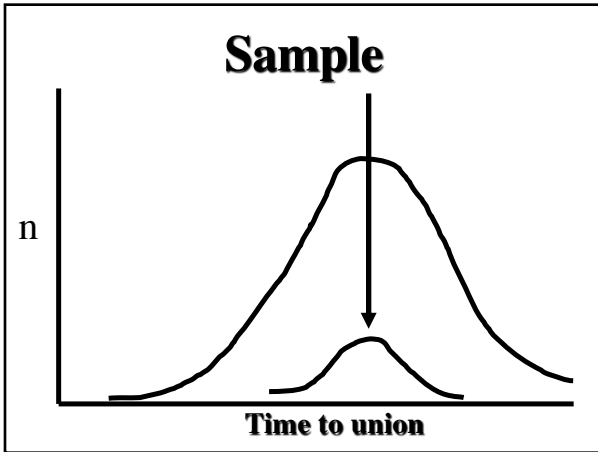
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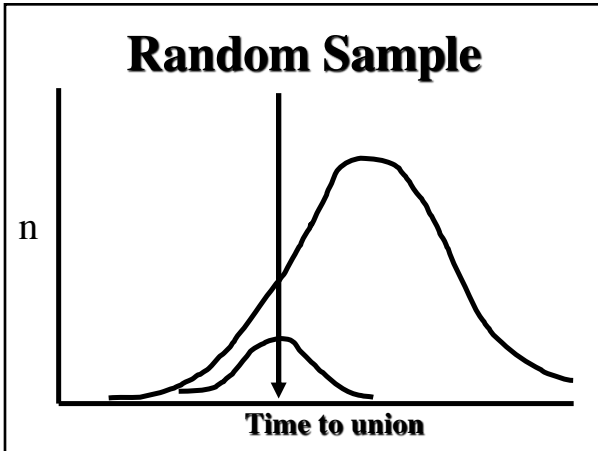
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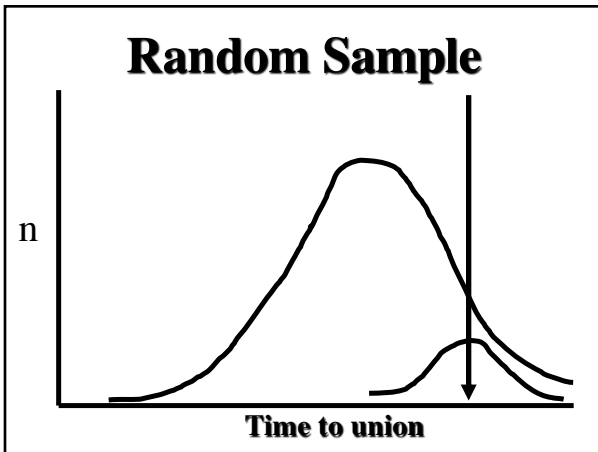
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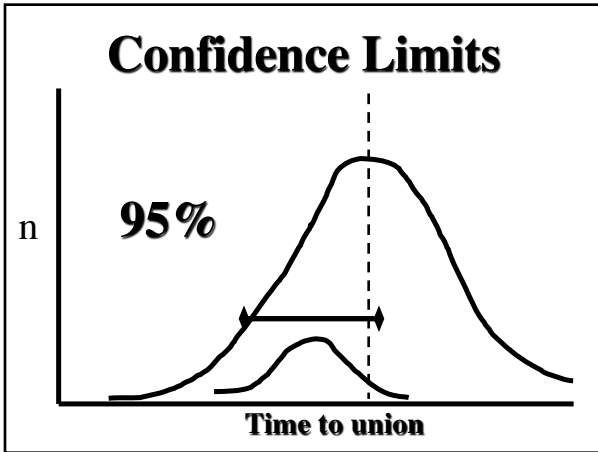
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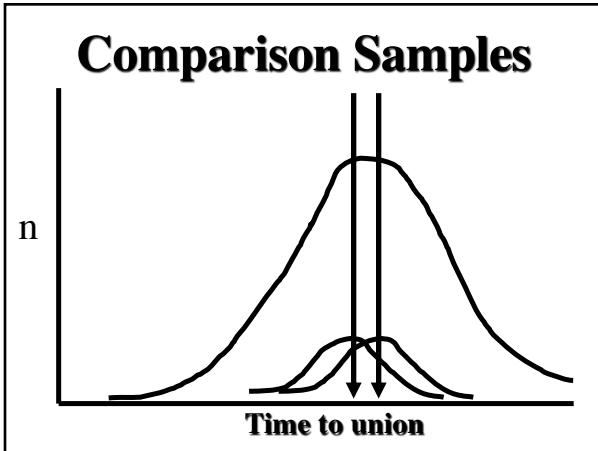
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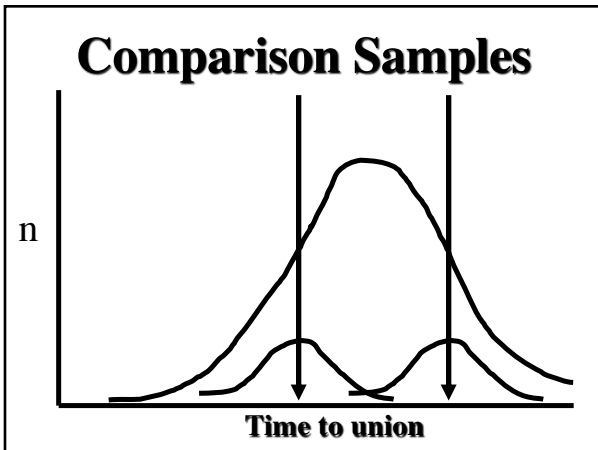
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### Conclusions of RCT's

Study	Truth	
	No Difference Hypothesis True	Difference Hypothesis False
Difference Reject Hypothesis	False Positive $\alpha$ error	Correct (1- $\beta$ )
No Difference Accept Hypothesis	Correct (1- $\alpha$ )	False Negative $\beta$ error

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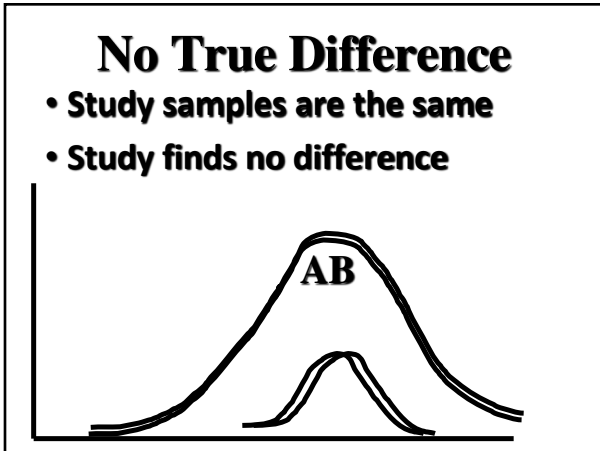
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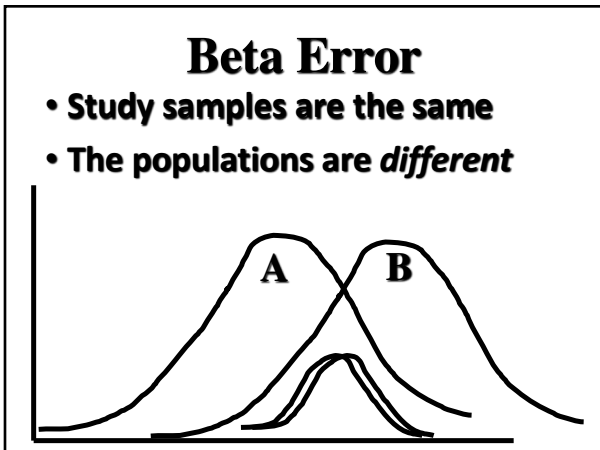
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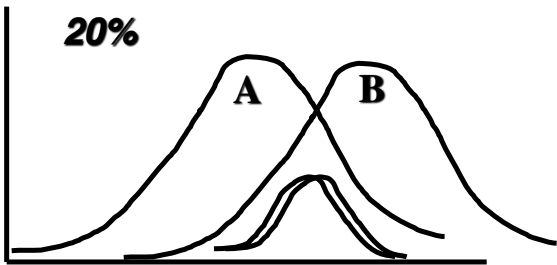
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### Beta Error (type 2)

- Concluding no difference when one does exist

20%



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### Power

- Power ( $1-\beta$ )
  - Strength of study
  - Desire > 80%
  - Determined by
    - Effect size (difference / SD)
    - Type 1 error rate
    - Sample size



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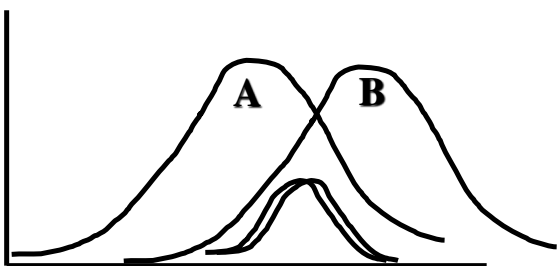
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### Power

- Related to "n"



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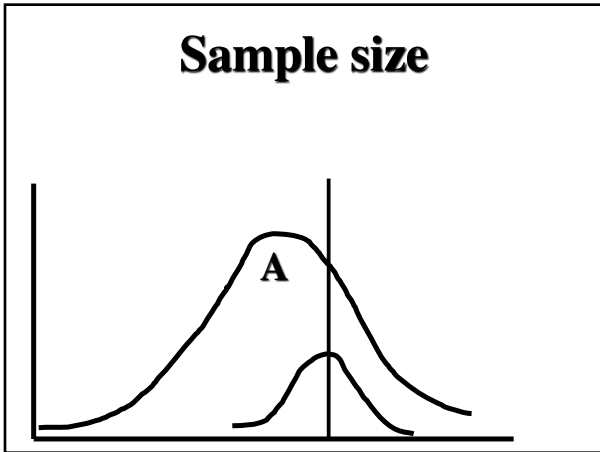
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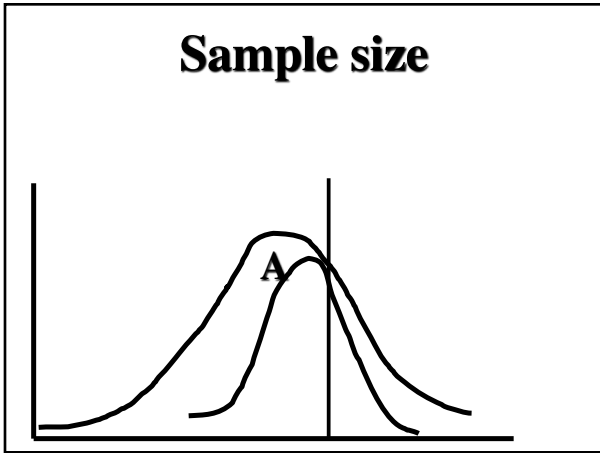
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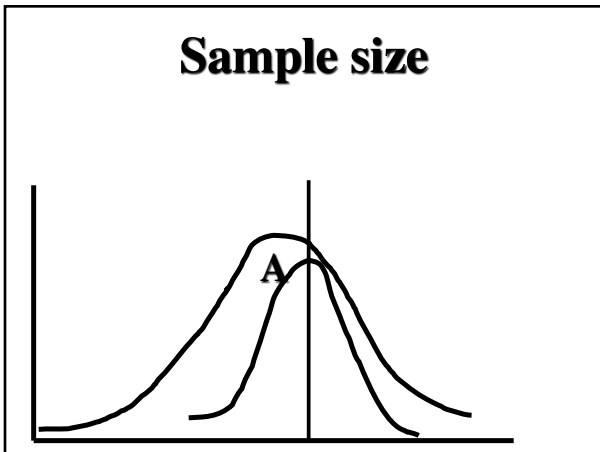
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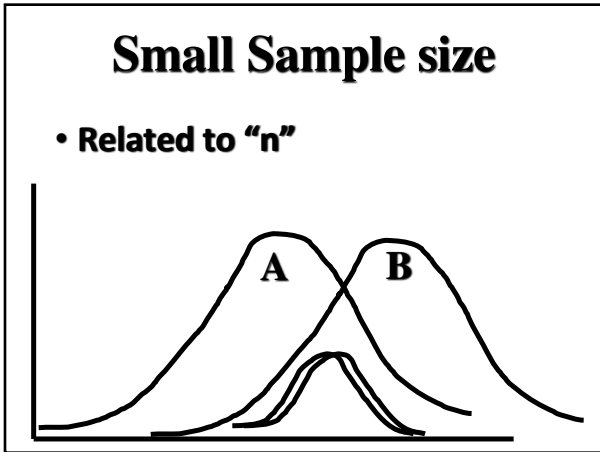
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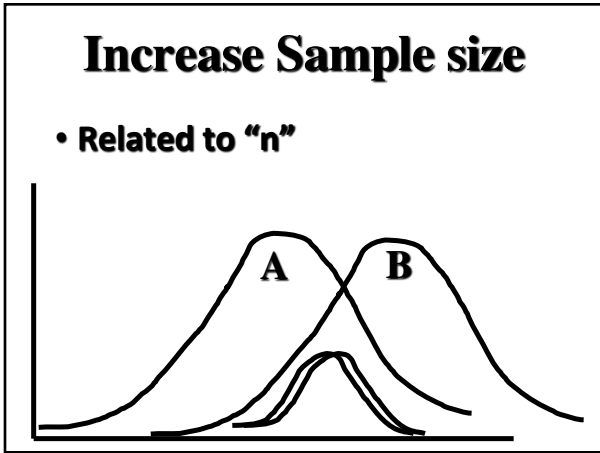
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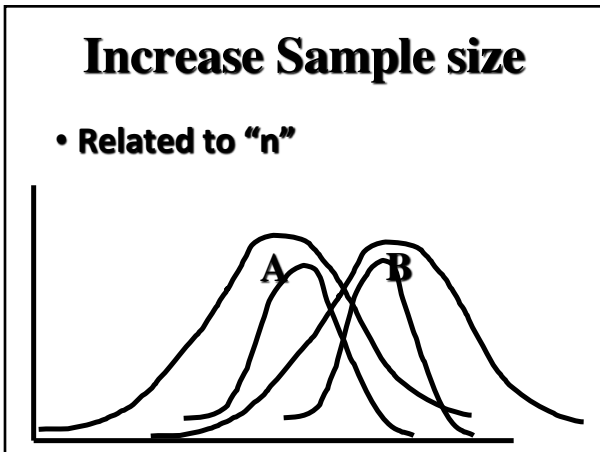
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## Power

- **Should be built in at the beginning**
  
- **Can be evaluated post-hoc**

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## Calculation of Power

- For continuous variables:

♦  $N = \{ [(Z\alpha - Z\beta) \sigma] / \Delta \}^2$

- N=sample size
- $Z\alpha=1.96$ , and
- $\Delta$ = difference b/n treatments.
- Standard deviation ( $\sigma$ )

$\sigma^2 = [ (N_{treatment}-1) \sigma_{treatment}^2 + (N_{control}-1) \sigma_{control}^2 ] / (N_{treatment} + N_{control})$

- For dichotomous variables:

♦  $Z\beta = [ \sqrt{n} / 2\sigma ] D - Z\alpha$

- $\sigma = \sqrt{Pr(1-Pr) + Pc(1-Pc)} / 2$
- Pr and Pc= proportion of events

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## Power

- **Very important concept!**
  
- **“No statistically significant difference”**
  
- **Need to demonstrate power there!**




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## Lochner, et al



- **196 Studies**
  - 79 Eliminated
  - 43 Reported positive result
- **117 Studies underwent power analysis**
  - “No statistically significant difference”

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### β Error Rates

Outcome Type	Power (1- β)			Type II Error Rate (β)
	Average	SD	Range	Total
<b>Primary n=213</b>	24.65%	27.21%	2.24%-99.9%	<b>90.61%</b>
<b>Secondary n=127</b>	19.66%	21.31%	2.24%-99.9%	<b>96.85%</b>

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### Example: Tibia Healing

Time To Healing Control Group	Time to Healing Treatment group	% Reduction in Time to healing	Number of patients needed per group
150 days	120	20%	16
150 days	135	10%	63
150 days	143	5%	289

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### Example: DVT

PE Rate Control Group	PE Rate Treatment group	% Reduction in PE Risk	Number of patients needed / group
10%	8%	20%	3213
1%	0.8%	20%	35,001
0.1%	0.08%	20%	352,881

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### Example: planning

• **Mortality in elderly trauma patients**

- ◆ 423 Patients...4 centers
- ◆ Early fixation = 11%
- ◆ Late fixation = 18%
- ◆ To prove it.... >1500
- ◆ Can use this to plan future work




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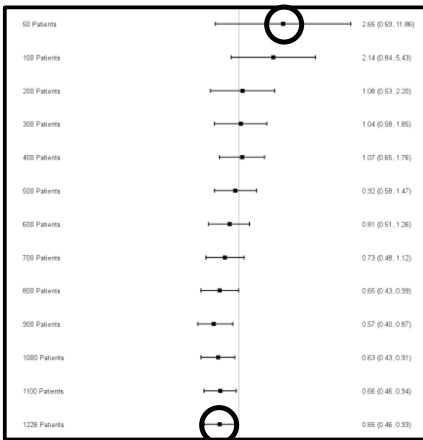
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### Conclusions of RCT's

Study	Truth	
	No Difference Hypothesis True	Difference Hypothesis False
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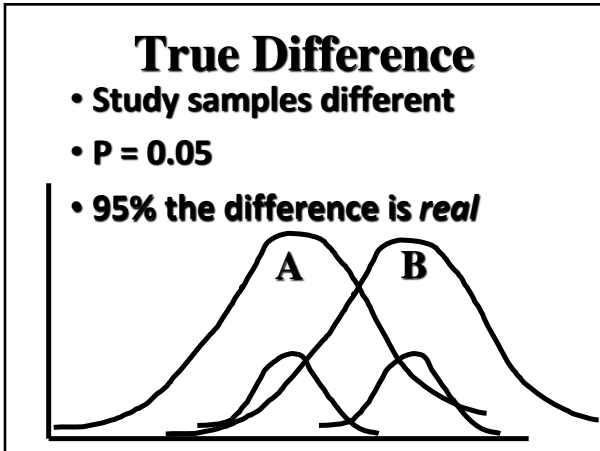
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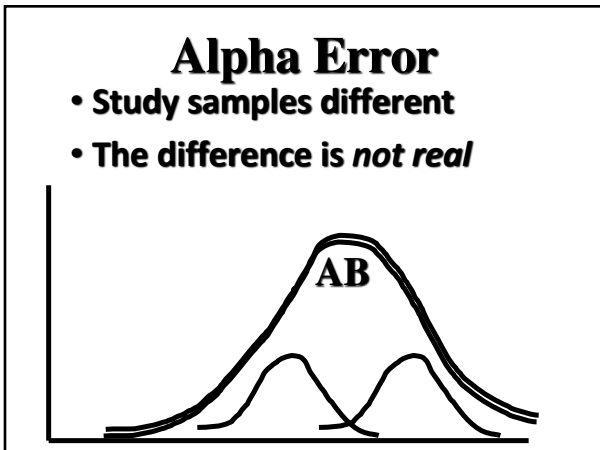
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### Alpha Error

- Study samples different
- The difference is *not real*
- Confidence limits don't overlap

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### Alpha Error

- Chance of incorrectly concluding a difference exists

5%

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### Alpha Error Rates

- 60 Orthopaedic journals
- 37% at risk for type 1 error
  - Conclusion that there is a difference when there is not
  - Primarily due to multiple evaluations
    - 20 endpoints
    - 1 / 20 chance.....
  - Fishing expedition

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Table III. Mean (± SD) scores for the SF36 health survey at 8,16 and 52 weeks of follow-up for both groups

Dimension	8 weeks (A = 43) (B = 40)	16 weeks (A = 42) (B = 39*)			52 weeks (A = 40*) (B = 40)		
		Mean difference in 16-weeks SF36 score (95% CI)	p value of difference	AUC	Mean AUC difference (95% CI)	p value of difference	
<b>Physical functioning</b>							
A	64.5 ± 25.3	69.9 ± 25.1	0.65 (-10.15 to 11.45)	0.90	65.4 ± 31.3	3370 ± 1271	-10 (-575 to 553) 0.97
B	59.4 ± 23.5	69.2 ± 23.6			68.4 ± 30.2	3381 ± 1229	
<b>Social functioning</b>							
A	82.5 ± 25.4	83.0 ± 26.7	0.95 (-10.12 to 12.01)	0.86	78.6 ± 26.6	4093 ± 1135	37 (-466 to 540) 0.88
B	78.6 ± 28.9	82.1 ± 23.0			80.0 ± 27.2	4056 ± 1095	
<b>Role limitation (physical)</b>							
A	48.8 ± 43.3	61.9 ± 43.6	22.2 (3.4 to 40.9)	0.02	60.0 ± 44.1	2872 ± 1874	727 (-71 to 1526) 0.07
B	25.6 ± 33.2	39.7 ± 40.8			54.4 ± 44.2	2144 ± 1655	
<b>Role limitation (emotional)</b>							
A	89.1 ± 27.0	78.6 ± 38.9	6.7 (-10.9 to 24.4)	0.45	80.8 ± 35.3	3966 ± 1320	579 (-62 to 1222) 0.07
B	68.3 ± 39.2	71.5 ± 40.9			68.3 ± 42.7	3386 ± 1526	
<b>Pain</b>							
A	65.8 ± 19.0	72.0 ± 20.6	12.2 (3.2 to 21.2)	<0.01	69.2 ± 27.2	3475 ± 949	486 (83 to 889) 0.01
B	50.5 ± 18.6	59.9 ± 20.0			65.6 ± 26.6	2989 ± 830	
<b>Mental health</b>							
A	72.9 ± 19.7	74.0 ± 17.3	2.8 (-5.7 to 11.3)	0.51	69.0 ± 22.1	3722 ± 904	80 (327 to 488) 0.69
B	69.1 ± 19.9	71.2 ± 21.1			70.7 ± 18.7	3641 ± 904	
<b>Vitality</b>							
A	54.8 ± 22.9	54.8 ± 23.3	-1.39 (-11.5 to 8.7)	0.78	55.4 ± 26.9	2796 ± 1127	-19 (-504 to 464) 0.93
B	52.7 ± 23.0	56.1 ± 22.4			56.2 ± 26.0	2816 ± 1013	
<b>General health perception</b>							
A	67.3 ± 19.2	64.6 ± 16.7	-0.94 (-9.7 to 7.8)	0.83	63.0 ± 19.2	3377 ± 857	-198 (-629 to 232) 0.36
B	67.1 ± 23.3	65.5 ± 22.7			69.3 ± 22.0	3576 ± 1049	

\*one patient in group B at 16 weeks and

**16 outcomes tested**

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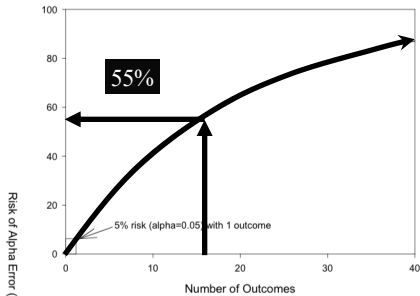
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## Risk of Alpha Error



Bhandari, et al

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## Multiple Testing

- Set p = 0.05 (alpha level)
- Assumes one outcome!
- 16 = 55% risk of alpha error



**Bonferroni Correction = 0.05/16 = 0.003**

**New level of statistical significance!**

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Table III. Mean (± SD) scores for the SF36 health survey at 8, 16 and 52 weeks of follow-up for both groups

Dimension	8 weeks (A n = 43) (B n = 40)	16 weeks (A = 42) (B = 39*)			52 weeks (A = 40*) (B = 40)			
		Mean difference in 16-weeks SF36 score (95% CI)	p value of difference	AUC	Mean AUC difference (95% CI)	p value of difference		
Physical functioning								
A	64.5 ± 25.3	69.9 ± 25.1	0.65 (-10.15 to 11.45)	0.90	65.4 ± 31.3	3370 ± 1271	-10 (-575 to 553)	0.97
B	59.4 ± 23.5	69.2 ± 23.6			68.4 ± 30.2	3381 ± 1229		
Social functioning								
A	82.5 ± 25.4	83.0 ± 26.7	0.95 (-10.12 to 12.01)	0.86	78.6 ± 26.6	4093 ± 1135	37 (-466 to 540)	0.88
B	78.6 ± 28.9	82.1 ± 23.0			80.0 ± 27.2	4056 ± 1095		
Role limitation (physical)								
A	48.8 ± 43.3	61.9 ± 43.6	22.2 (3.4 to 40.9)		60.0 ± 44.1	2872 ± 1874	727 (-71 to 1526)	0.07
B	25.6 ± 33.2	39.7 ± 40.8			54.4 ± 44.2	2144 ± 1655		
Role limitation (emotional)								
A	89.1 ± 27.0	78.6 ± 38.9	6.7 (-10.9 to 24.4)	0.45	80.8 ± 35.3	3966 ± 1320	579 (-62 to 1222)	0.07
B	68.3 ± 39.2	71.8 ± 40.9			68.3 ± 42.7	3386 ± 1526		
Pain								
A	65.8 ± 19.0	72.0 ± 20.6	12.2 (3.2 to 21.2)		69.2 ± 27.2	3475 ± 949	486 (83 to 889)	
B	50.5 ± 18.6	59.9 ± 20.0			65.6 ± 26.6	2989 ± 830		
Mental health								
A	72.9 ± 19.7	74.0 ± 17.3	2.8 (-5.7 to 11.3)	0.51	69.0 ± 22.1	3722 ± 904	80 (327 to 488)	0.69
B	69.1 ± 19.9	71.2 ± 21.1			70.7 ± 18.7	3641 ± 904		
Vitality								
A	54.8 ± 22.9	54.8 ± 23.3	-1.39 (-11.5 to 8.7)	0.78	55.4 ± 26.9	2796 ± 1127	-19 (-504 to 464)	0.93
B	52.7 ± 23.0	56.1 ± 22.4			56.2 ± 26.0	2816 ± 1013		
General health perception								
A	67.3 ± 19.2	64.6 ± 16.7	-0.94 (-9.7 to 7.8)	0.83	63.0 ± 19.2	3377 ± 957	-198 (-629 to 232)	0.36
B	67.1 ± 22.3	65.5 ± 22.7			69.3 ± 22.0	3576 ± 1049		

\*one patient in group B at 16 weeks and one in group A at 52 weeks did not complete the SF36 questionnaire

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## Assume the Best...

- **Randomized**
- **Well powered**
- **True differences found**
- **Single outcome**




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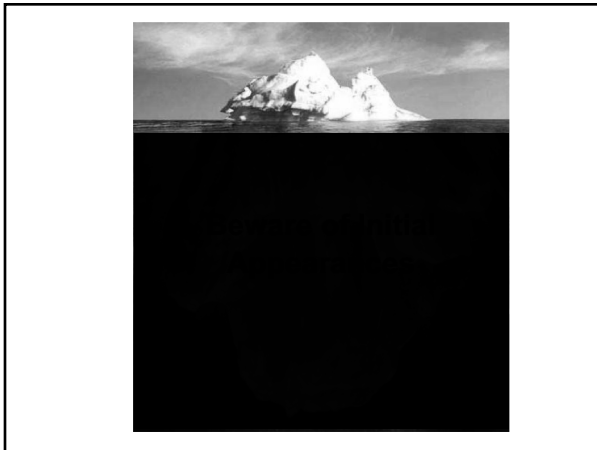
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## Even When “Significant”

- Can we trust the p value?
- Discreet outcomes
  - ◆ Infection
  - ◆ Union
  - ◆ Number of Events

**P**

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RECOMBINANT HUMAN BONE MORPHOGENETIC PROTEIN-2 FOR TREATMENT OF				
TABLE V. Number of Secondary and Subsequent Interventions*				
Invasiveness†	Standard Care (N = 139†)	rhBMP-2		P Value
		0.75 mg/mL (N = 130†)	1.50 mg/mL (N = 135†)	
Most invasive	29 (43)	26 (39)	12 (18)	0.0264§
Less invasive	29 (43)	21 (31)	18 (26)	0.3074
Noninvasive	0	0	2 (100)	
Total	58 (42)	47 (34)	32 (23)	0.0325§

\*The values are given as the number of procedures with the percentage of the total number of procedures of the specified degree of invasiveness in parentheses. †Most invasive = bone graft, exchange nailing, plate fixation, fibular osteotomy, or bone transport; less invasive = nail dynamization or exchange from internal fixation to functional brace; and noninvasive = ultrasound, electrical stimulation, or magnetic field stimulation. ‡Evaluable patient population who received treatment as randomized. §Chi-square test for goodness of fit.

**RRR= 59%**

**12/135 vs 29/139 events**

**P=0.02**

**41**

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## Study Stability

- 12/135 vs 29/139 events
- ↓
- JUST 3 EVENTS**
- 15/135 vs 26/139 events

**RRR=40%, P=0.08**

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March 2011

Recombinant Human Bone Morphogenetic Protein-2: A Randomized Trial in Open Tibial Fractures Treated with Reamed Nail Fixation

By Hanna T. An, MD, PhD, Shanmugan Govender, MBS, MD, FRCS, Amralfal D. Patel, FRCS, Philippe Homigois, MD, Antonio Ferrer de Gregorio, MD, Georgeios Louopoulos, MD, Isaac Duenas-Goldin, MD, Brent Christensen, PhD, and Alexander Martin, MD

“The healing of open fractures treated with reamed IM nails was not significantly improved by BMP-2”

Background: The healing of open tibial fractures treated with reamed intramedullary nail fixation was not significantly accelerated by the addition of an absorbable collagen sponge containing recombinant human bone morphogenetic protein-2 (rhBMP-2) compared with the standard of care plus an absorbable collagen sponge implant containing 1.5 mg/mL of rhBMP-2 (total, 12.0 mg) (the rhBMP-2/ACS group). Randomization was stratified by fracture severity. The absorbable collagen sponge was placed over the fracture at wound closure. The primary efficacy end point

Total Events: 23 BMP vs 21 Controls (44 events)

was the proportion of patients who achieved complete fracture healing at 24 weeks. At 24 weeks, 60% and 48% of the patients in the rhBMP-2/ACS and SOC groups, respectively, had achieved complete fracture healing. At 20 weeks, 68% and 67% of the patients in the rhBMP-2/ACS and SOC groups, respectively, had achieved complete fracture healing. Twelve percent of the patients underwent secondary procedures in each group; more invasive procedures (e.g., exchange nailing) accounted for 30% of the procedures in the rhBMP-2/ACS group and 57% in the SOC group (p = 0.227). Infection was seen in twenty-seven (29%) of the patients in the rhBMP-2/ACS group and fifteen (13%) in the SOC group (p = 0.0645; difference in infection risk = 0.09 [95% confidence interval, 0.0 to 0.17]). The adverse event incidence was otherwise similar between the treatment groups.

Conclusions: The healing of open tibial fractures treated with reamed intramedullary nail fixation was not significantly accelerated by the addition of an absorbable collagen sponge containing rhBMP-2.

Level of Evidence: Therapeutic Level I. See Instructions to Authors for a complete description of levels of evidence.

Horizontal lines for notes.

Study Stability

- Parisien, et al
- 198 Studies 769 outcomes
- <0.05 → ≥0.05
  - ◆ 4 events, 6.8% of one arm
- >0.05 → ≤0.05
  - ◆ 5 events, 9% of one arm



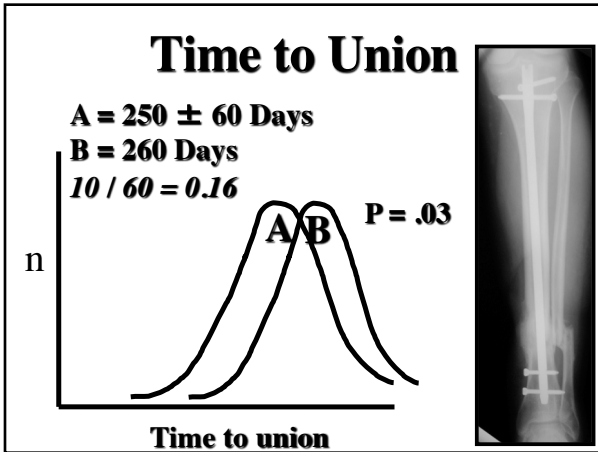
Horizontal lines for notes.

Clinical ‘Significance’

- Reaching statistical significance is not all!
- Must ask...does it matter?
- Clinically important
- Effect Size..



Horizontal lines for notes.




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### Clinically Relevant

- **Effect size**
  - ◆ > 0.8
- **Relative risk reduction**
  - ◆ > 50%
- **76 RCT's; 185 outcomes**
  - ◆ **Effect size: 30%**
  - ◆ **RRR: 47%**



Sung, Siegel, et al

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### Clinical Irrelevance

Biomechanical Analysis of Bicondylar Tibial Plateau Fixation: How Does Lateral Locking Plate Fixation Compare to Dual Plate Fixation?

Thomas F. Higgins, MD, Joshua Klatt, MD, and Kent N. Bachus, PhD

**Conclusions:** The results of this study demonstrate that dual-plate fixation allows less subsidence in this bicondylar tibial plateau cadaveric model when compared to isolated locked lateral plates. This may raise concerns about the widespread use of isolated lateral locked plate constructs in bicondylar tibial plateau fractures.

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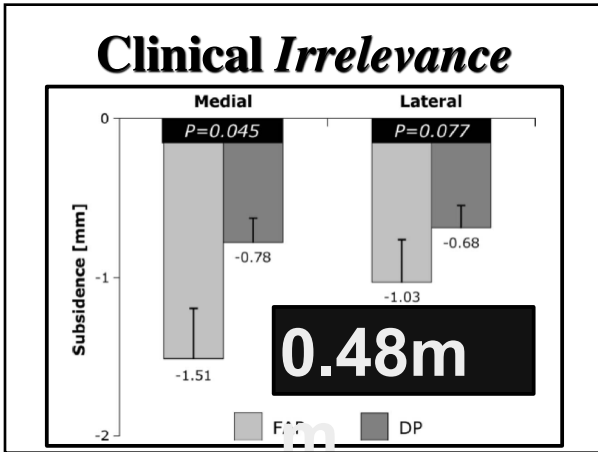
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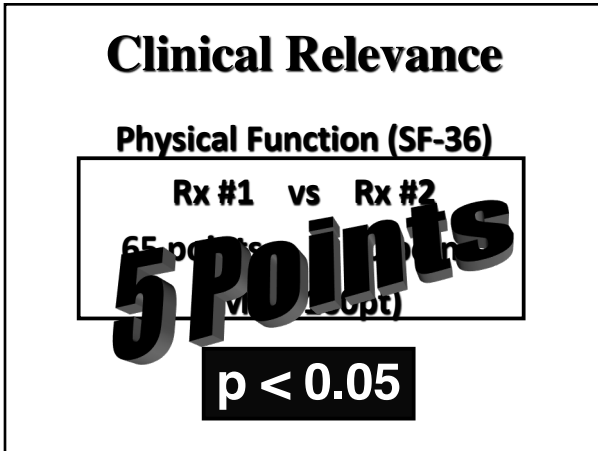
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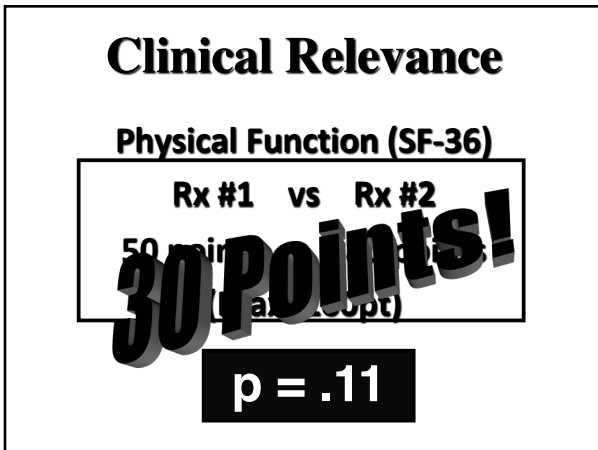
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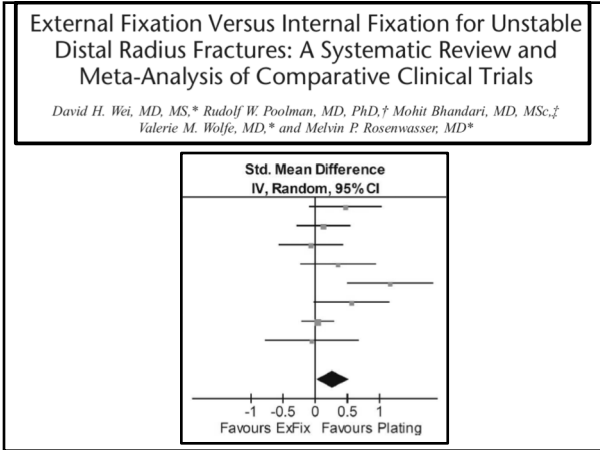
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## But...Important?

- **No report of the actual difference**
- **Only statistical**
- **Need the real #'s to decide importance**

Std. Mean Difference  
IV, Random, 95% CI

-1 -0.5 0 0.5 1

Favours ExFix Favours Plating

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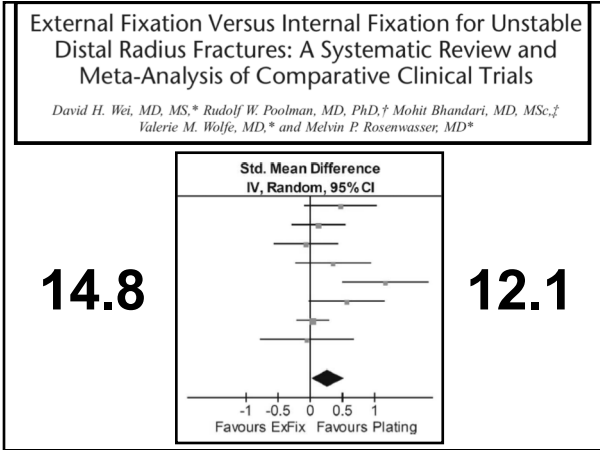
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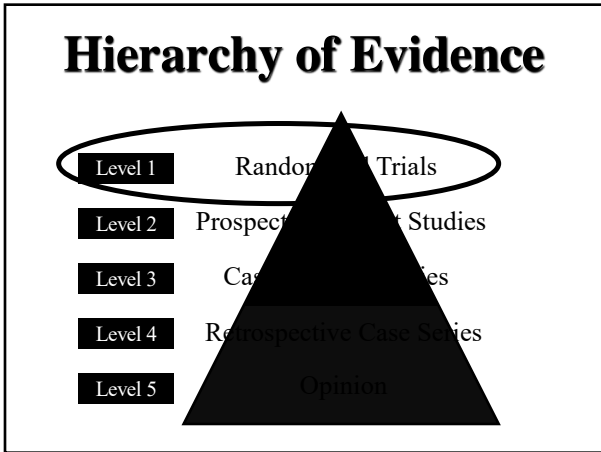
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### So...Do We Believe??

**The Effect of Level I Evidence on Surgical Decision Making**

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- ### Methods
- 2 Multicenter level one RCT's
  - Operative vs nonoperative
  - > 2 years since publication
  - Equal in quality
  - Survey
    - ◆ Knowledge of the article
    - ◆ Practice modification
    - ◆ Examples of patients
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## Operative

Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures  
A Multicenter, Randomized Clinical Trial

By the Canadian Orthopaedic Trauma Society



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## Non-Operative

Operative versus Nonoperative Treatment of Acute Achilles Tendon Ruptures

A Multicenter Randomized Trial Using Accelerated Functional Rehabilitation

By Kevin Willits, MA, MD, FRCSC, Annunziato Amendola, MD, FRCSC, Dianne Bryant, MSc, PhD, Nicholas G. Mohtadi, MD, MSc, FRCSC, J. Robert Giffin, MD, FRCSC, Peter Fowler, MD, FRCSC, Crystal O. Kean, MSc, PhD, and Alexandra Kirkley, MD, MSc, FRCSC



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## Survey

- **19,574 Orthopaedic Surgeons**
  - ◆ 18,843 in U.S.
  - ◆ 731 in Canada
- **1 of 2 Surveys**
  - ◆ Practice demographics
  - ◆ Familiarity with RCT
  - ◆ Change in practice
  - ◆ 5 patient scenarios (fit into studies)



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## Patients

- 20 male Division I athlete
- 35 male day laborer
- 50 male Orthopaedic Surgeon
- 40 male (BMI 35)
- 65 female (lives alone)




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## Clavicle Survey



- Of the 1,546 respondents
  - ◆ Majority (64.8%) Non-academic
  - ◆ 72.3% familiar with RCT
  - ◆ Majority fixed 3 of 5 patients
  - ◆ 64.6% increased operative treatment

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## Achilles Survey



- Of the 1,128 respondents
  - ◆ Majority (64.2%) Non-academic
  - ◆ 78% familiar with RCT
  - ◆ Majority fixed 4 of 5 patients
  - ◆ 32.4% increased non-op treatment

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### Only Nonop



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### Influence?

<b>Clavicle</b>	<b>Achilles</b>
<b>58%</b>	<b>42%</b>

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### Surgical Discipline

• Not all questions can be answered with RCT!!

- Surgical skill
- Learning curve
- Unethical



• Best available information

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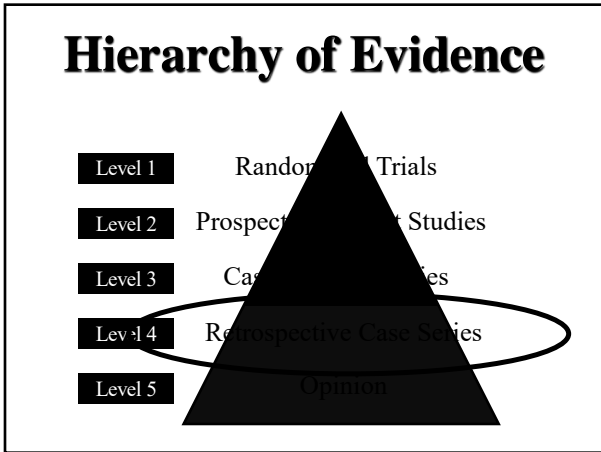
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### Case Series

- Very valuable if....
  - ◆ Same population
  - ◆ Reproducible intervention
  - ◆ High percentage f/u
  - ◆ Outcome measures important
- Arthritis after acetabular ORIF



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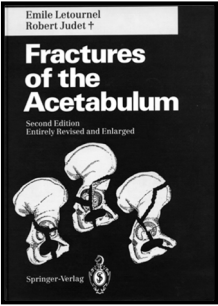
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### Acetabulum Fractures

- Best available information



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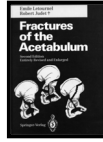
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# Prognosis



**Table 26.4**

Type of fracture	Clinical result					Total	Percentage of excellent results
	Excellent	Very good	Good	Fair	Poor		
Posterior wall	87	6	3	4	17	117	74%
Posterior column	9	—	1	1	—	11	81.82%
Anterior wall	6	—	1	1	1	9	66.67%
Anterior column	12	1	1	—	2	16	75.00%
Transverse	17	1	—	—	1	19	89.47%
T-shaped	20	3	—	—	3	26	76.92%
Transverse and posterior wall	49	16	10	9	17	101	48.51%
Posterior column and posterior wall	5	1	2	1	8	17	29.41%
Anterior column and posterior hemitransverse	26	5	4	3	3	41	63.41%
Both-column	76	21	14	11	13	135	56.30%
Total	307	54	36	30	65	492	62.40%
	62.40%	10.98%	7.32%	6.10%	13.21%	100%	

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# Mangled Extremity




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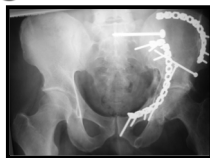
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# Case Series

- **Prognostic information**
- **Important for patients**
- **Guide decision making**
  - ◆ **Population**
  - ◆ **Reproducible**
  - ◆ **Outcomes important**




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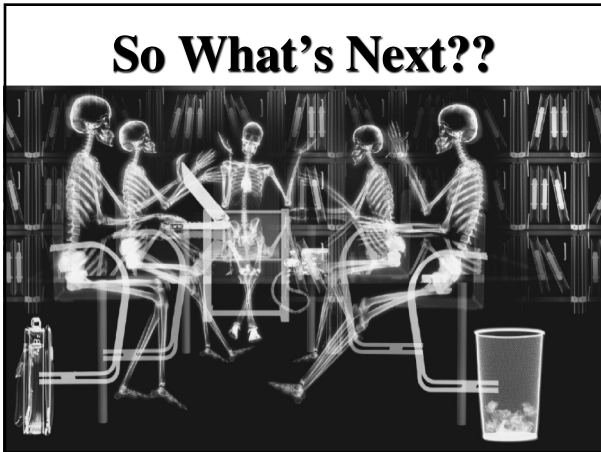
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**So What's Next??**

- **Collectively**
  - ◆ Consider the big questions
  - ◆ Put egos aside
  - ◆ Organize well designed trials
  - ◆ Get real answers
  - ◆ Benefit our patients

**SPRINT**  
**LEAP**  
**METRC**

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**So What's Next??**

- **Individually**
  - ◆ Question everything
  - ◆ Listen to our patients carefully
  - ◆ Consider better ways
- **Tell everyone!!**

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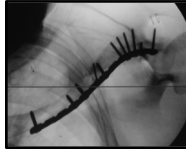
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## Our Responsibility

- Read and interpret
- Stay current!
- Act on *REAL* evidence
  - Self appraisal
  - Benchmarking
  - Re-evaluation



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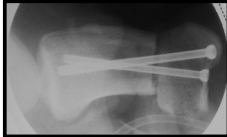
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## Above All Else

- Surgery
  - Art
  - Science
- Make the best decision
- Each individual patient
- Don't know the right choice



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## Individual Needs



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# Orthopaedic Surgery

- Art
- Patients are all individuals
- Goals
  - Return to function
- Healthy skepticism
- Look for better ways
- Prove that they are better!!




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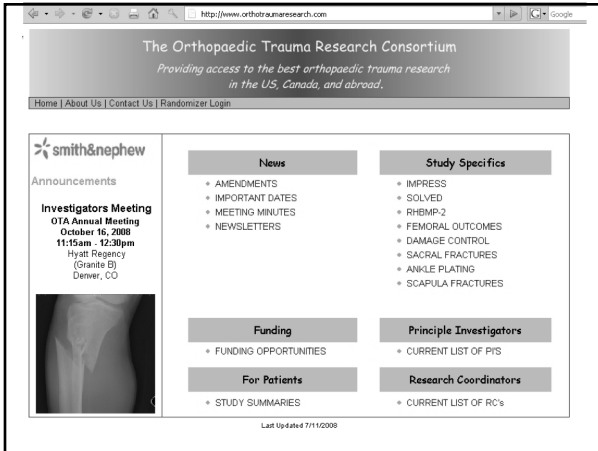
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The Orthopaedic Trauma Research Consortium  
*Providing access to the best orthopaedic trauma research in the US, Canada, and abroad.*

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**smith&nephew**

Announcements

**Investigators Meeting**  
 OTA Annual Meeting  
 October 16, 2008  
 11:55am - 12:20pm  
 Hyatt Regency  
 (Granite B)  
 Denver, CO

**News**

- AMENDMENTS
- IMPORTANT DATES
- MEETING MINUTES
- NEWSLETTERS

**Study Specifics**

- IMPRESS
- SOLVED
- RHEIMP-2
- FEMORAL OUTCOMES
- DAMAGE CONTROL
- SACRAL FRACTURES
- ANKLE PLATING
- SCAPULA FRACTURES

**Funding**

- FUNDING OPPORTUNITIES

**For Patients**

- STUDY SUMMARIES

**Principle Investigators**

- CURRENT LIST OF PIS

**Research Coordinators**

- CURRENT LIST OF RC's

Last Updated 7/11/2008

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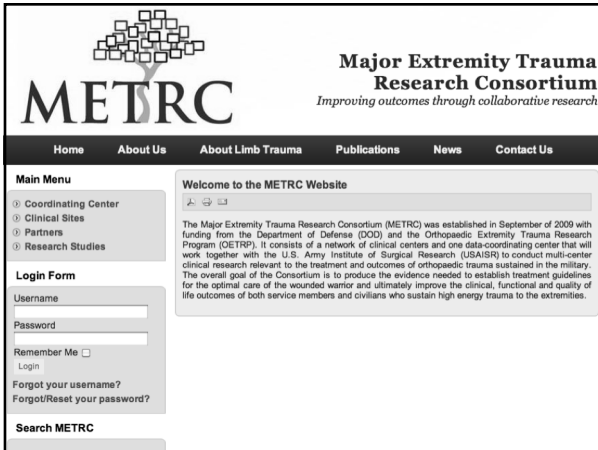
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**METRC**

**Major Extremity Trauma Research Consortium**  
*Improving outcomes through collaborative research*

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**Welcome to the METRC Website**

The Major Extremity Trauma Research Consortium (METRC) was established in September of 2009 with funding from the Department of Defense (DOD) and the Orthopaedic Extremity Trauma Research Program (OETRP). It consists of a network of clinical centers and one data-coordinating center that will work together with the U.S. Army Institute of Surgical Research (USAISR) to conduct multi-center clinical research relevant to the treatment and outcomes of orthopaedic trauma sustained in the military. The overall goal of the Consortium is to produce the evidence needed to establish treatment guidelines for the optimal care of the wounded warrior and ultimately improve the clinical, functional and quality of life outcomes of both service members and civilians who sustain high energy trauma to the extremities.

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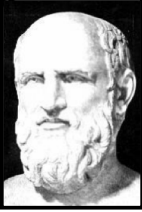
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## Hippocrates

*"One must attend in medical practice not primarily to plausible theories, but to experience combined with reason"*



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# *Thank You*



*Boston Medical Center*

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