

# From Bloodletting to Evidence-Based Medicine

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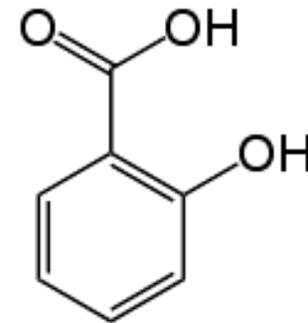
US National Library of Medicine

# Why consider alternative/complementary/integrative medicine?

- Approached by DVM students
  - “*Why don't you teach us homeopathy? You must be close-minded*”
- Initially curious, optimistic
  - most modern medicines are derived from natural sources (plants, fungi)



*Salix spp.*  
(Willow)



Salicylic acid

Consider traditional “Western” medicine:



- Boston Medical Library



Hippocrates (400 BC Greece) & **Galen** (2<sup>nd</sup> century AD Rome)

Adopted ideas of the philosopher Empedocles:

Universe is made up of 4 elements

- Earth
- Wind
- Fire
- Water

Applied this notion to medicine



CLAUDE GALIEN.

Galen

- NIH

Elements correspond to cold, hot, dry, & moist  
**humours** in the body

- decided that health results when these are in  
“balance”

- |         |              |             |
|---------|--------------|-------------|
| • Wind  | hot & moist  | blood       |
| • Water | cold & moist | phlegm      |
| • Fire  | hot & dry    | yellow bile |
| • Earth | cold & dry   | black bile  |

Imbalance → disease



CLAUDE GALIEN.

Galen

- NIH

Lacking better technology (microscope, etc.)  
Hippocrates and Galen knew essentially nothing about  
physiology or pathology

- could not have conceived rational treatments for most  
diseases

For example, Hippocrates believed that:

*Sneezing arises from the head, owing to the brain being  
heated, or the cavity in the head being filled with  
humours.*

- *Source Book of Medical History*, L Clendening (ed), p. 19. Dover  
Publications, New York.

Galen's writings on human anatomy contain hundreds  
of errors

Persian physician Al Razi (865-925 AD) recognized many  
errors in Galen's views on the treatment of fevers,  
urinary tract diseases, etc.



Galen

- NIH

**Galen's opinions on the treatment of essentially every disease were applied rigidly in Western medicine for almost 2,000 years.**

Historians suspect that Galen would have disapproved (was more progressive)

→ justification for use of bleeding, firing/blistering, etc. to drive out bad humours

e.g. 2<sup>nd</sup> degree burn → infection → pus → proof that bad humours needed to come out

- *Source Book of Medical History*, L Clendening (ed), p. 41. Dover Publications, New York.

# Bloodletting

French physician P.C.A. Louis routinely bled patients suffering from pneumonia

Decided to assess bloodletting's efficacy using the new "numerical method" (statistics) to see how many lives he was saving



Pierre Charles Alexandre Louis,  
French physician  
1787-1872

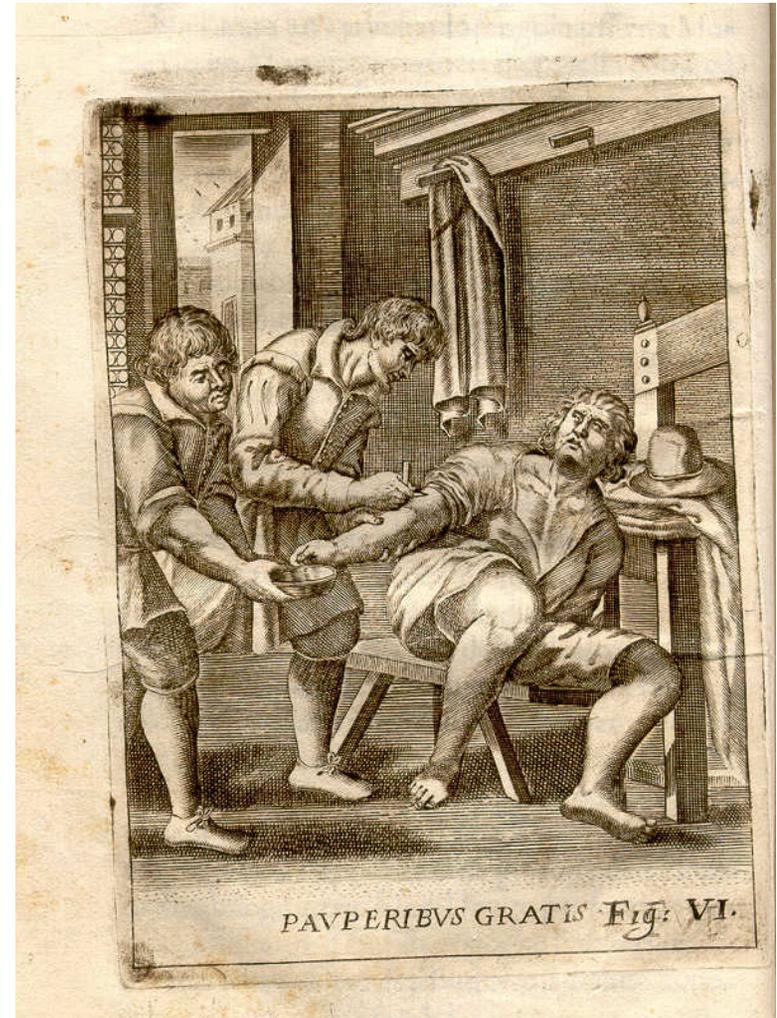
# Bloodletting

Bloodletting was not considered archaic or harmful: in 1833 France imported 42 million leeches for medical use

According to American physician J.J. Jackson (1836):

*If anything may be regarded as settled in the treatment of diseases, it is that bloodletting is useful in the class of diseases called inflammatory; and especially in inflammations of the thoracic viscera.*

- A Morabia (1996). P. C. A. Louis and the Birth of Clinical Epidemiology. J Clin Epidemiol 49:1327-1333.



Physicians' daily application of the therapy, followed by numerous recoveries, provided all the proof they needed that bloodletting was effective

# Bloodletting

To his dismay, Louis's statistical analyses showed that bloodletting increased, rather than decreased, mortality

TABLE 1. Age, number of bleedings, duration of illness, and risk of death according to day of first bleeding in Pierre-Charles-Alexandre Louis's "Researches on the effects of bloodletting . . . ."

Day of first bleeding	No. of subjects	Mean age (years)	No. of bleedings	Duration of disease (days)	Mortality (%)	Relative risk* (95% CI <sup>b</sup> )
1-4	41	41	2.8	17.8	44	1.8 (0.9-3.5)
5-9	36	38	2.3	20.8	25	1.0 (reference)
Total	77	40	2.6	19.2	35	—

Sources: [16, 17].

\*Not computed by Louis.

<sup>b</sup>CI = confidence interval.



P.C.A. Louis, French physician  
1787-1872

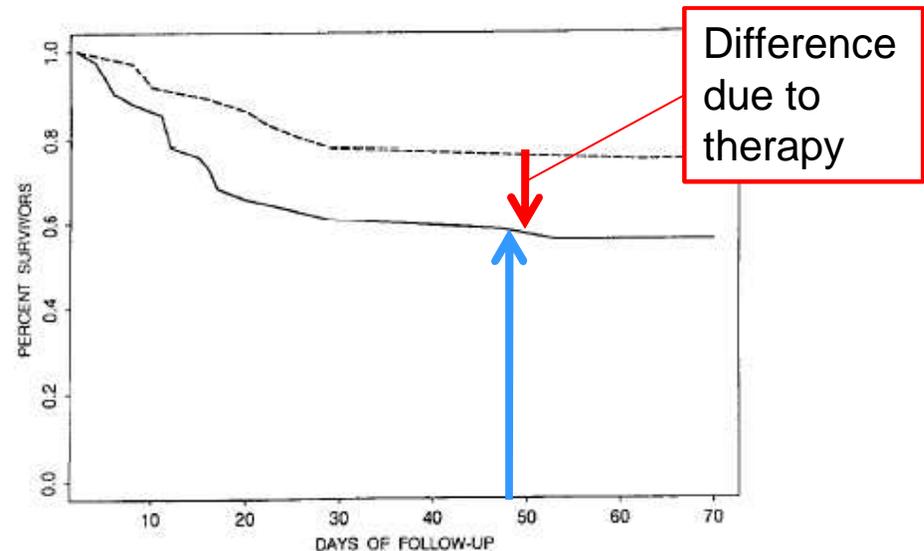


FIGURE 4. Survival by day of first bleeding, using data presented in Figures 2 and 3. Bled Days 1-4 (*solid line*), bled Days 5-9 (*dashed line*), log rank  $p = 0.07$ .

# Bloodletting

Louis considered his findings

*“Startling and apparently absurd...”*

but eventually accepted them



Pierre Charles Alexandre Louis,  
French physician  
1787-1872

# Bloodletting

J.J. Jackson of the Massachusetts General Hospital doubted Louis's results

...but found similar results with his own patients when he did a statistical comparison (1825-1834)



# Bloodletting

*“Dr Jackson himself, one of the most careful, and accurate, and sagacious, and matter of fact observers, **did not know the results of his experience in the treatment of pneumonitis, till he adopted this system, had counted and analyzed his cases.**”*

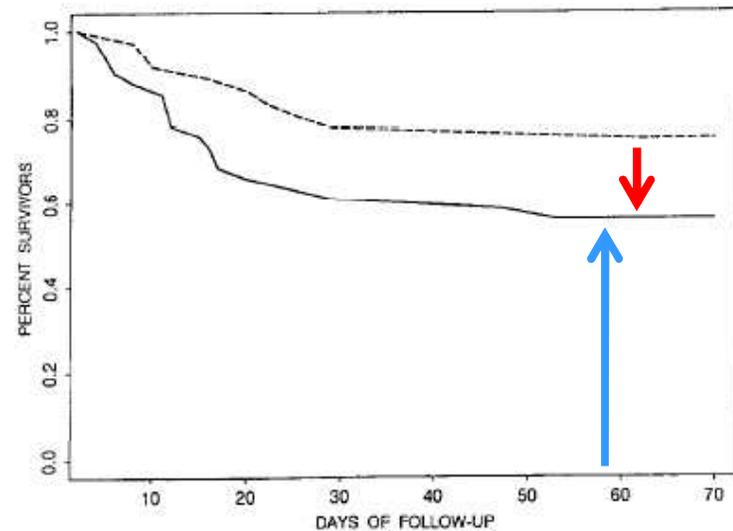
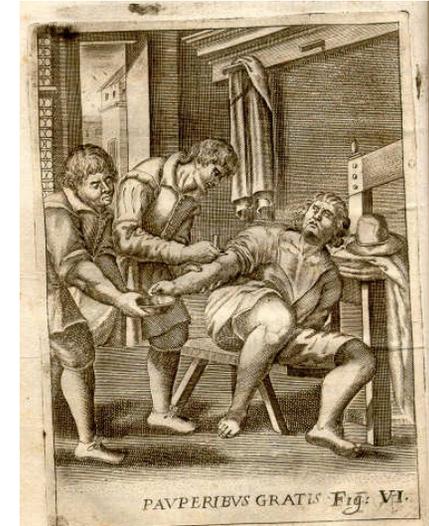
- Contemporary news report, cited by A. Morabia (1996).



# Bloodletting

Thousands of years of direct clinical experience with phlebotomy accomplished two things:

- (1) It **increased mortality** among patients with systemic diseases such as pneumonia, and
- (2) It **convinced millions** of physicians and their patients that it was saving lives.



# Bloodletting

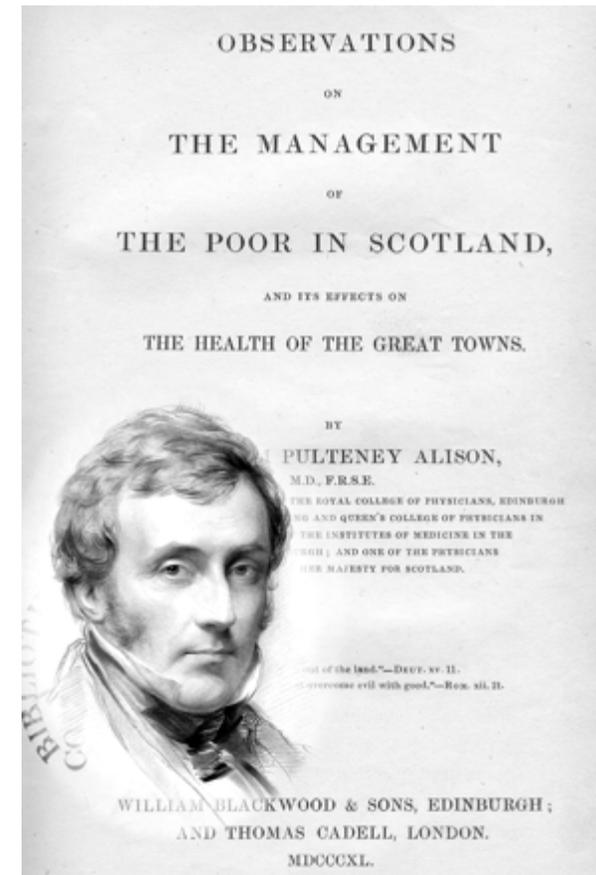
How did physicians respond to this information?

Not much changed.

Many physicians insisted that clinical experience and tradition were all that mattered, and continued to believe that bloodletting “worked.”

*“Bloodletting dominated therapeutics because its success was proven through clinical experience, it satisfied the expectations of patients and physicians, and it was supported by medical theory and tradition.”*

- Kerridge & Lowe (1995) Med J Austral 163:631-633.



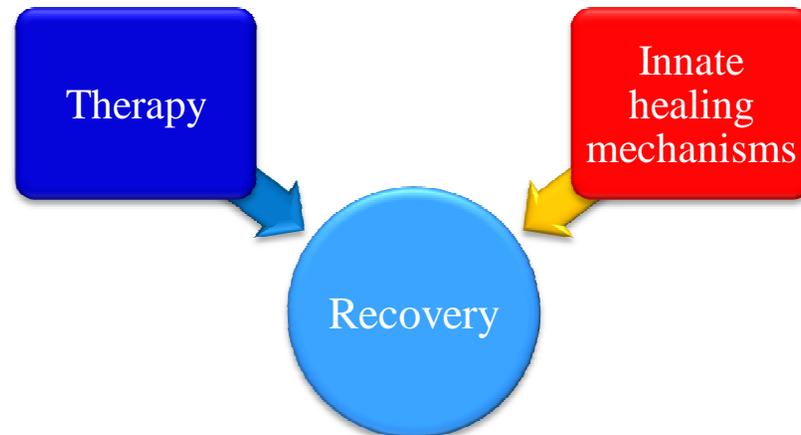
Dr Wm Alison  
(1790-1855)

- Johns Hopkins U Library

When practitioners claim to have seen any treatment “work” they essentially always mean the same thing:

*“I administered a treatment, sometime after which the patient recovered, therefore my treatment caused the recovery.”*

This line of thinking completely ignores the role of natural healing.



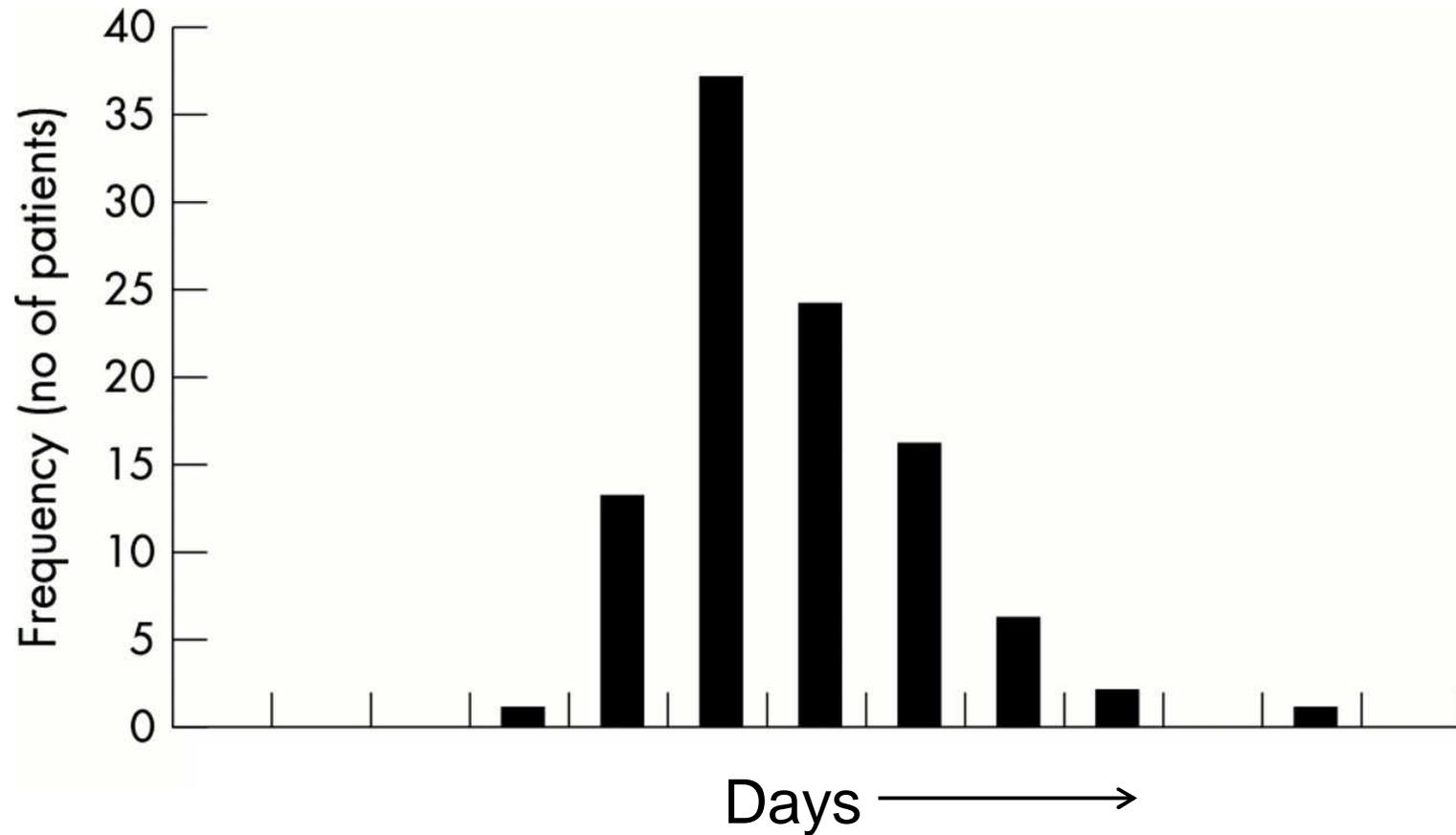
How do we know that the patient’s body did not heal itself?

# Bloodletting

Until recently **all** medicine was based on similar personal experiences



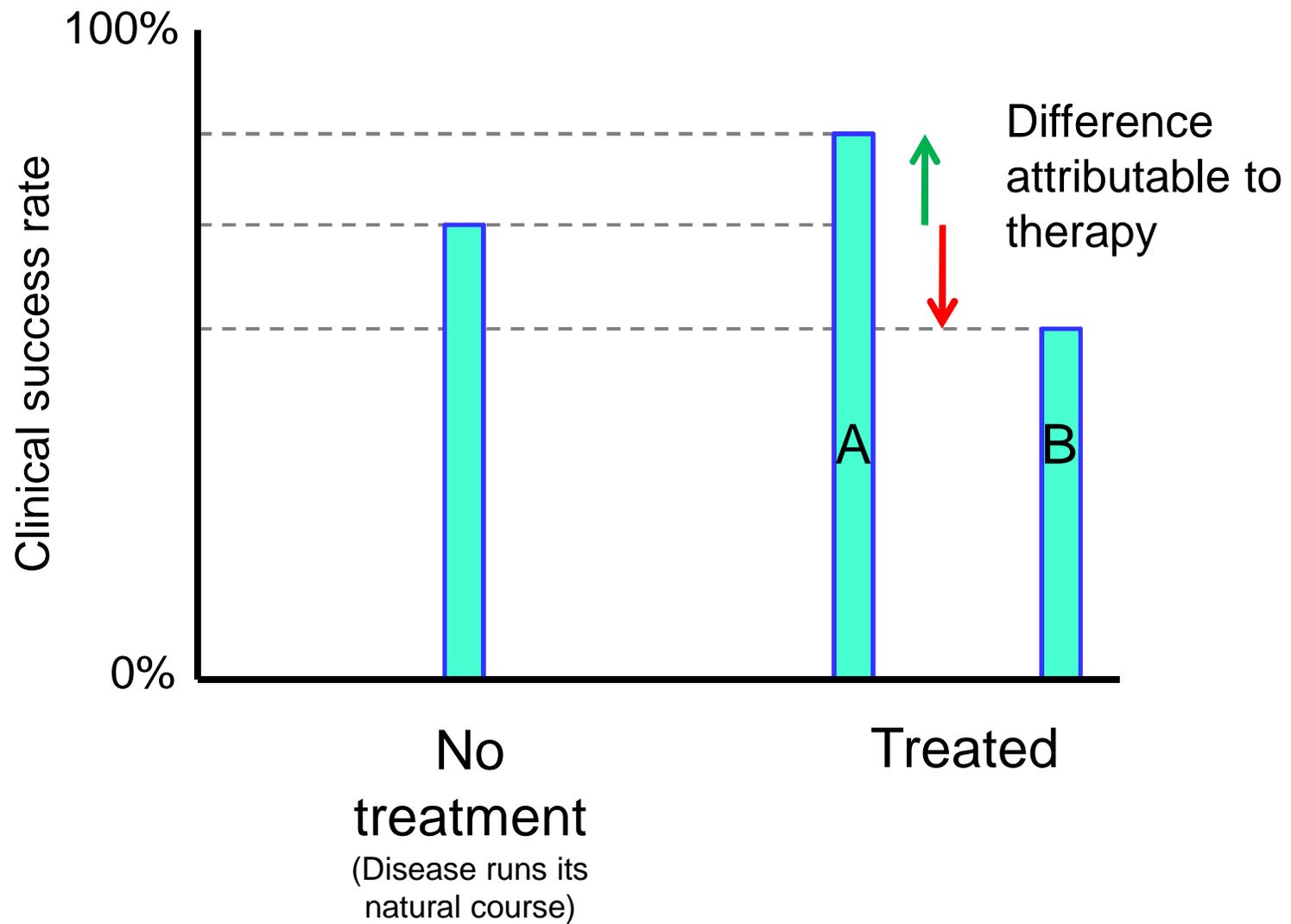
Personal experience can make both effective **AND** ineffective therapies appear to work, so how can we tell which are truly beneficial?



**Not** from experiences with individual patients, even millions of them

Individual variation is so great that we can only see changes due to therapy by looking at **groups**

(How long does a cold last? I cannot know how long/severe my next cold will be, only the **average** behaviour of colds in people)



# The study of nature

Over time we have realized that we cannot control our own biases/wishful thinking

- Has led to the randomized, blinded clinical trial
- Done well, can provide accurate knowledge of therapies
- Can be done improperly → misleading results
  - **IT IS POSSIBLE TO PERFORM A RANDOMIZED CONTROLLED TRIAL THAT GIVES ERRONEOUS RESULTS**
- Must base conclusions on **best** scientific evidence, not *any* scientific evidence
  - **CANNOT PICK AND CHOOSE FROM AVAILABLE EVIDENCE**
- Difficult, expensive to conduct a study that provides accurate information
- A “necessary evil” because we cannot simply “decide” to be unbiased

# The study of nature

The scientific method is **not** a cultural tradition, it is a method of examining traditions/beliefs to distinguish between those that are true and those that are false

- Fundamentally **simple** (compare two things → difference?)
- **Democratic**: no-one is “revered”; anyone can make observations to verify or discredit claims
- **Observations** of **nature** drive theory, not the other way around
- **Humble**: continually strives to find & correct errors; acknowledges that not everything is known
- **Universal**: is the study of nature; strives to eliminate cultural biases (e.g. showed that essentially all “Western” medicine based on theory of humours – cupping, purging, bleeding, firing, etc. – was ineffective)

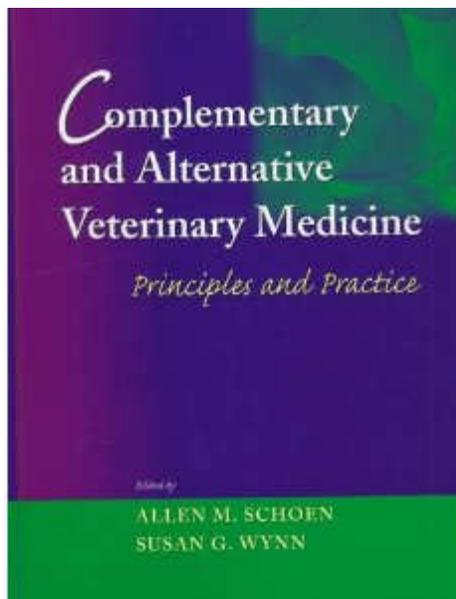
# Evidence-based medicine

Evidence-based medicine:

“The judicious use of the *best* available evidence in making decisions about the care of individual patients”

Finding the best information to answer practical questions

-Trisha Greenhalgh,  
How to Read A Paper: The basics of evidence-based medicine, BMJ 2006



*“Evidence-based medicine will provide the most appropriate, substantive, and truly scientific approach to medical decision making.”*

-Brenda Bonnett,  
Chapter 2: Evidence-Based Medicine – Critical Evaluation  
of New and Existing Therapies

# Evidence-based medicine



## CONSORT 2010 checklist of information to include when reporting a randomised trial\*

Section/Topic	Item No	Checklist item	Reported on page No
<b>Title and abstract</b>			
	1a	Identification as a randomised trial in the title	_____
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	_____
<b>Introduction</b>			
Background and objectives			
	2a	Scientific background and explanation of rationale	_____
	2b	Specific objectives or hypotheses	_____
<b>Methods</b>			
Trial design			
	3a	Description of trial design (such as parallel, factorial) including allocation ratio	_____
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	_____
Participants			
	4a	Eligibility criteria for participants	_____
	4b	Settings and locations where the data were collected	_____
Interventions			
	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	_____
Outcomes			
	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	_____
	6b	Any changes to trial outcomes after the trial commenced, with reasons	_____
Sample size			
	7a	How sample size was determined	_____
	7b	When applicable, explanation of any interim analyses and stopping guidelines	_____
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	_____
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	_____
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	_____
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	_____
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those	_____

# Evidence-based medicine

Evidence-based medicine is often **misrepresented** and then ignored

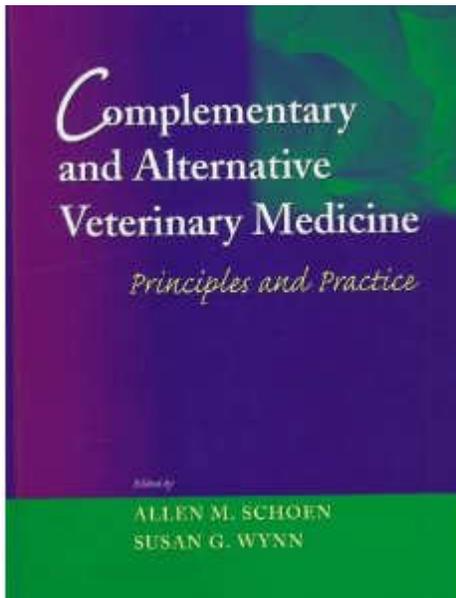
*“There seems to be a prevailing notion that a doctor can be either evidence-based or compassionate – but not both.”*

*“**EBM is not about ignoring patients and focusing on numbers.** I can't imagine how one could be more compassionate than to recommend a therapy that has been shown to be effective, or to be able to give some sort of reasonable likelihood that a therapy will be effective. That seems much more caring than sticking with an opinion that might be wrong.”*

- comments from members of EBVMA

# If integrative medicine is to be taken seriously...

We need a serious scientific assessment of traditional claims/beliefs



*“We must move beyond a dependence on anecdote, personal experience, and expert opinion.*

***We must have adequate evidence that our interventions do more good than harm... preferably from randomized controlled trials.***

*An appropriate **comparison** group must be in place.”*

-Brenda Bonnett,  
Chapter 2: Evidence-Based Medicine – Critical  
Evaluation of New and Existing Therapies

# If integrative medicine is to be taken seriously...

## Widespread problem:

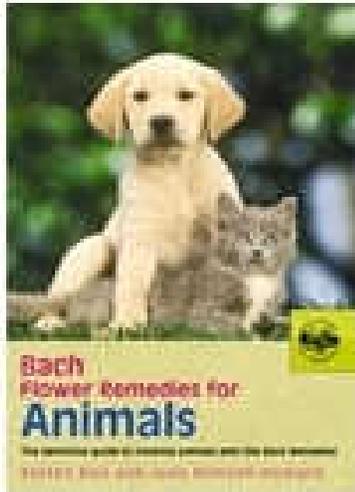
Personal experience is all that really matters, scientific support is not essential / does not apply / science is misleading



It is exciting to note the thoughtfulness and care that permeates these discussions. As a veterinarian now practising homeopathy and chiropractic almost exclusively, I have all the proof I need every day in my practice to justify these modalities. However, this was not always so. As I entered into the formal study of each of these modalities, I carried with me a big dose of skepticism. Through the process of learning more about the philosophy and theory of these modalities, together with sharing clinical experiences with my chiropractic and homeopathic colleagues, this skepticism was steadily replaced by certainty that these are powerful healing sciences.

As we continue to evolve as a profession, let us at least respect the efforts that each of us put into our careers and

# If integrative medicine is to be taken seriously...

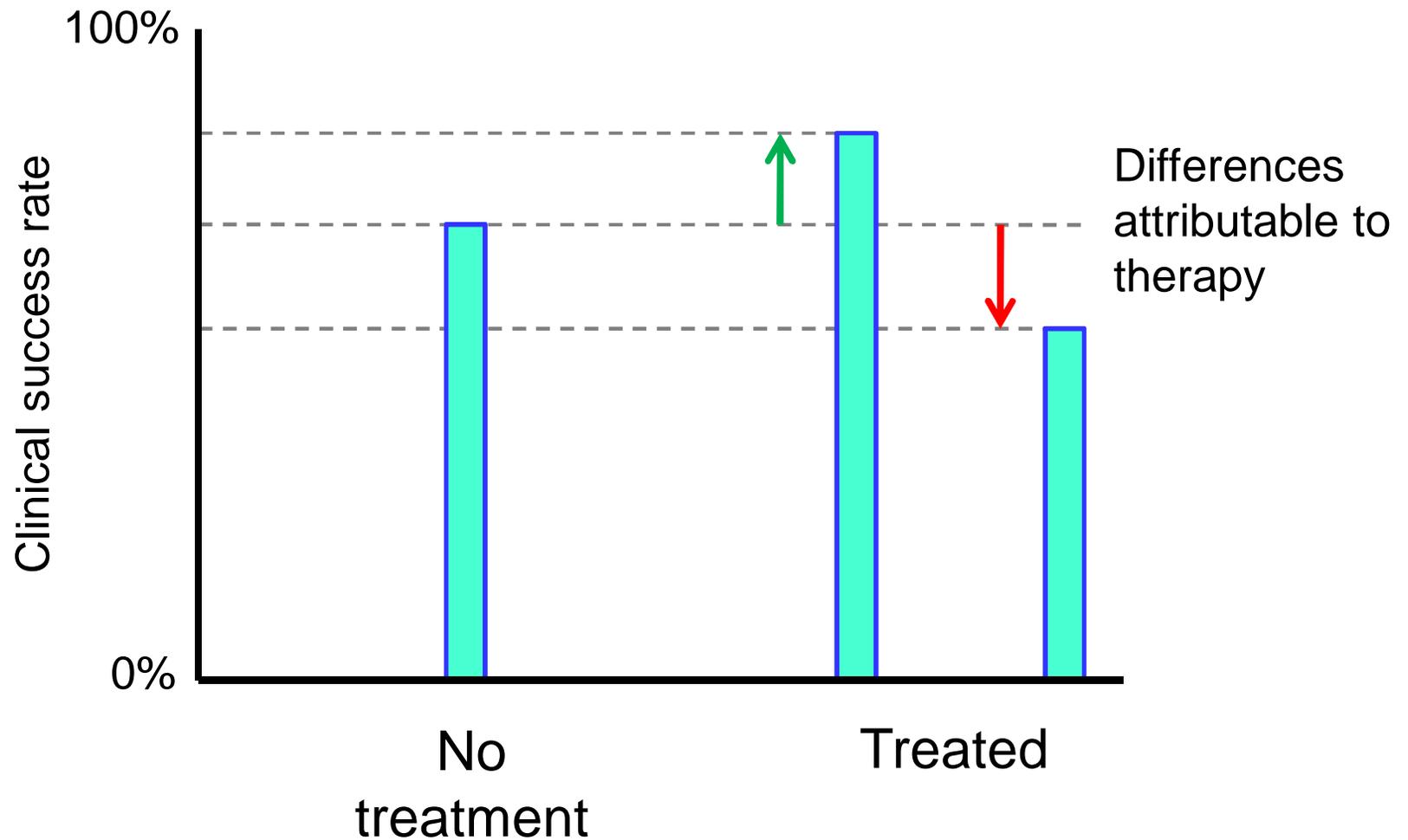


*“No science, **no knowledge is necessary**, and they who obtain the greatest benefit from this God-sent gift will be those who keep it pure as it is; free from science, free from theories, for **everything in Nature is simple.**”*

- S Ball & J Howard, *Bach Flower Remedies for Animals*, Vermillion/Random House UK, 1999; p. 14.

# If integrative medicine is to be taken seriously...

What if we don't even try?



# If integrative medicine is to be taken seriously...

What if we don't even try?



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Brad Hanna, DVM, PhD  
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Lead talk at Equine Guelph's first *Integrative  
Therapies Night*, May 19, 2011



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