Evidence based medicine (EBM) is currently considered the gold standard of effective clinical practice. In 1996 David Sackett, one of the major proponents of EBM, wrote "Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients."[1] It is based on the premise that the guidelines for the most effective clinical treatment of any condition should be based on the best scientific research possible instead of relaying *only* on clinical judgment and past experience. The principles of EBM are:

1. Current best evidence from relevant, valid research
2. Individual Clinical expertise
3. Patient values and expectations

The principles of evidence based medicine have evolved from the field of clinical epidemiology where they have been used to bridge the practice of clinical medicine on individual patients to population based recommendations for public health policies. In essence they have introduced the use of the scientific method into clinical decision making and have been responsible for a transformation of clinical practice in medicine over the last 20 years.

The essence of EBM is a hierarchal based protocol for evaluating the efficacy of medical interventions. The 4 steps of EBM involve:

1. Translation of clinical problem into an answerable question that can find the most relevant research. PICO is a useful acronym to remember – Patient Problem, Intervention, Comparison, Outcome
2. Systematic gathering of best evidence available. For most people PubMed/Medline has the most extensive resources available
3. Evaluating the quality of the evidence gathered. The questions to be answered are what are the results, are the results valid and will the results actually help the care of my patient. More specifically this involves the following questions:
    a. Types of studies. The evidence pyramid ranks the hierarchy of design. The lowest level is animal studies moving up through case reports to RCT (random controlled trials). Systemic reviews and meta-analysis, such as those the Cochrane Collaboration put out, are considered the top of the pyramid.
    b. Were patients randomized and was allocation concealed? This balances the group for known prognostic factors such as age, wt and sex as well as unknown factors and insures that treating clinicians did not influence patient selection. How blinded was evaluation of results and how complete was follow-up.
    c. What are the results? This includes how large was the treatment effect and what was the relative and absolute risk reduction. What were the confidence intervals? In practice I am personally most interested in the absolute risk reduction. It is easy to get all excited about a decreased relative risk until you release it means that 1 person out of a 1000 actually had an improved outcome. Narrow confidence intervals and a p value of at least .01 are best. Clinical significance is probably most important – did the highly statistically significant

change actually mean anything clinically? This requires clinical expertise, the second guiding principle in EBM.

4. Application of results in practice. Remember the practice of evidence based medicine actually consists of 3 principles. The first, where most of the emphasis is usually placed, is the evaluation of valid current research. The next principle however is patient values and expectations. What is the PATIENT's desired outcome? Does she want to just avoid hospitalization, or does she want to be able to run a marathon with her despite her decreased ejection fraction. In addition is obtaining the likely treatment benefits worth the potential risks? How many patients need to be treated to produce one positive outcome (NNT)? A NNT of 3 means that 3 patients have to be treated for one to respond.

However I think that before we all eternally prostrate in front of the altar of evidence based medicine it is wise to consider how well the principles have been shown to stand up to "best practice" standards. Interestingly a review of the literature in pub med shows a striking paucity of studies evaluating the effectiveness of EBM practice! More importantly *evidence based medicine is only as good as the research underlying it*. For instance in a newly emerging disease category, such as Chronic Inflammatory Response Syndrome, the paucity of RCT trials in all aspects of the field – diagnosis and treatment – could lead an insurer to say that treatment should not be covered because of a lack of evidenced based guidelines. However one wonders if EBM principles had been applied 100 years ago how many of the new advances in medicine would have ever gotten established, since often clinical treatment will precede research underlying its effectiveness. In psychiatry, the problem is slightly different. While we have reams of studies supporting the *reproducibility* of "symptom clusters" there is much less evidence supporting the *validity* of these clusters? While it is clear that even a group of well-trained children can all standardize their ability to agree with other in marking a symptom checklist of symptoms, the evidence that this symptom cluster is meaningful in elucidating the underlying cause of the observed illness is lacking. In many cases it is not clear that a grouping of symptoms corresponds to one, several or any underlying biological cause (2, 3). In particular, many of the DSM IV criteria for depression are also part of the symptom roster for CIRS. By not asking about the more physical symptoms such as thirst, muscle cramps and "sparking", it is easy to diagnose a patient as depressed, and administer the so called EBM treatment of choice, SSRI's while completely missing the underlying biotoxin illness. I see this every day! My point is simply that while all the principles of EBM can be followed in evaluating and treating the "depressed" patient, the boat is completely missed because the research data for diagnosis and treating CIRS is not yet established.

That does not of course invalidate the clinical recognition and treatment of CIRS, in my mind at least, although it may in the eyes of insurers and courts ☺ It also strengthens my resolve to contribute to the advancement of this field by making sure that I keep adequate data records pertaining to CIRS patient's treatment, and thinking about questions that can be answered with research. Not a day goes by

without another patient telling of a new and novel treatment for CIRS that some alternative practitioner has tried with them, or that they read on the internet. Leeches, applied in a particular pattern "known" to be helpful for mold, is my favorite. Now, a year later on CSM and after remediation, the patient who had that treatment can look back and blame trying it on her "moldy brain". Nasal auto urine therapy is a close second in my favorites list. But that brings up the perennial problem that most people not trained in science easily believe that protocols written by a charismatic authoritative figure with many fans must be true. I try to point out the value of real research, and do stick to my guns that people can add anything they want but need to be trying the Welchol or CSM if they want improvement. In addition interference by well-meaning but ill-informed alternative practitioners, such as the NP who told a patient that lowering her cholesterol would be harmful for her brain health (as if a TGF beta of 20,000 was benign) or the clinical nutritionist who delayed the start of CSM by a month in order to get the patient started on bile producing foods, can make me grumpy. I usually handle it in the same way, by discussing KNOWN research on the normalization of biomarkers versus speculation. So clearly I favor the introduction of EBM into biotoxin illness, and look forward to contributing.

However, in the spirit of written debate , I bring up one broad fear of the application of EBM as we enter this new era of insurance for all. I am concerned at how much the enthusiasm for centralized, policy directing EBM where the numbers are run and the only question is asked was the cost justified, leaves out the two of the three principles of EBM – patient expectations of outcome and practitioner expertise in understanding the clinical significance of the results. Without consideration of clinician and patient input in the evaluation of the numerical research gathered, we risk leaving the individual out of the equation of what is the best treatment. This does not invalidate EBM but only points out that the application of EBM is only as good as those who are supervising its use. I feel that an excellent question to be answered over the future years is how much ideology versus controlled scientific evidence is hidden in the cue words "evidence based medicine" ☺

1. [a] [b] [c] Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS (January 1996). "Evidence based medicine: what it is and what it isn't". *BMJ* **312** (7023): 71–2. PMC 2349778. PMID 8555924
2. [a] [b] Sobo S (May 2009). "Pursuing treatments that are not evidence based: how DSM IV clarifies, how it blinds psychiatrists to issues in need of investigation". *Med. Hypotheses* **72** (5): 491–8. doi:10.1016/j.mehy.2008.12.022. PMID 19181456.
3. ^ "Can Science Make Psychotherapy More Effective?". Science Friday / National Public Radio. http://www.npr.org/templates/transcript/transcript.php?storyId=121092295. Retrieved 2010-02-09.
4. http://www.forbes.com/sites/davidwhelan/2011/02/13/we-probably-dont-spend-enough-on-our-health-unless-youre-peter-orszag/