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EDITORIAL

# What is scientific truth?

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Truth is a seemingly simple concept. From childhood, all of us are admonished to 'tell the truth'. When this follows a dispute and both sides 'tell the truth', we are reliant on the wisdom of an arbitrator (initially a parent) to decide whose version of the truth is true.

To define truth seems simple, yet the study of truth has become a science of its own, epistemology. Truth can be altered by our own belief systems, our culture and our society. If we live in a desert where grass is always brown, why should we believe it true that grass is green? If a blind man believes that tomatoes are brown, who is it to argue against that personal 'truth'. If we believe hormones are good for postmenopausal women, is it harder for us to believe they may cause harm?

Post-modernist theory defines truth as a product of our own beliefs which act as filters to protect us from reality (if reality truly exists). Accordingly, it is impossible for anyone to declare an 'absolute truth' since our individual perception of that truth is affected by our own perceptions and beliefs.

However, we all need some concept of truth to help us in our daily lives, and community agreement provides a solution. When a group of people agree on a 'truth', this agreement (whilst not a definition of truth) provides a means of forming a knowledge community with shared values.

In science, what we refer to as truth is really a distillation of evidence. The quality of scientific truth is therefore dependent on the quality of the evidence, the quality of the research protocol, the quality and integrity of those carrying out the research and the vigilance and diligence of editors and peer reviewers.

The world's first scientific journal, *Philosophical Transactions*, was published in 1662 by the Royal Society of London. The goals of the editor, Henry Oldenburg, were to publish new research, encourage debate and eventually agreement and, in a very post-modernist way, to make money. It remains not just the first but also the longest continuously published scientific journal.

Thus began the shared truth of scientific research. A hypothesis is developed, a trial conducted to test the hypothesis and the result submitted for publication. Others read the paper and conduct their own research to test the original claim. If they agree, they declare the original claim valid or 'significant' if it passes certain mathematical tests.

This does not make the finding 'true'; it may still be later disproved or found to be falsified. It just means that most of the scientific community have studied the theory and agreed it is true, *based on their understanding at that time*. In other words, they agree with the evidence.

Scientific evidence is what guides us in our professional lives. Good scientific evidence takes time, effort, patience and money. The results must be objective and unbiased and, as pointed out in an earlier editorial in *Climacteric*[1], funding sources remain an important source of potential bias which we must consider.

Data validity is also critical. Data must be collected ethically and safely and results reported for the entire study population and not necessarily extrapolated to other populations. When submitted to a journal, due process should be confirmed by the editor including confirmation by all authors that the paper accurately represents the research conducted and the results reported. This is followed by peer review, the last and most critical step before publication. It is the opinions of our peers which will determine if and where our research will be published and to what extent it will be cited by others.

If the paper is of sufficient importance, an editorial may be commissioned. Too often this will be by someone linked to the authors whereas, to further strengthen the evidence, it should be by an independent person of the editor's choosing.

A very important and significant paper was published in July 2002 in *The Journal of The American Medical Association*, *JAMA*[2]. Entitled 'Risks and benefits of estrogen plus progestin in healthy postmenopausal women', it was the first publication from the Women's Health Initiative (WHI) randomized clinical trial. The results of this trial are well known.

In contrast to the positive information gained from earlier observational studies, these data were suggestive of harm. The paper was released, as is commonly the case, at a press conference and in such a way as to make maximum impact[3]. The media told the public that users of postmenopausal hormone replacement therapy were '29% more likely to suffer coronary heart disease, 26% more likely to contract breast cancer and 41% more likely to suffer a stroke'. That the absolute numbers were seven more cases of heart disease, eight more strokes and eight more breast cancers per 10 000 women was lost in translation.

The effect on clinicians and their management of postmenopausal women was massive. Many women ceased hormone therapy at once, many more never started and the adverse consequences of those decisions on their cardiovascular health, bone health and quality of life have been discussed elsewhere.

For more than a decade, debate, discussion and disagreement ensued until the publication in 2016 of a commentary in *The New England Journal of Medicine*[4] in which two of the WHI key investigators noted that 'the WHI results are being used inappropriately in making decisions about treating women in their 40s and 50s who have distressing vasomotor symptoms …'. Many of the original claims were misunderstood. Much of the harm did not apply to younger postmenopausal women. What we thought was the truth was no longer the truth, although it had been the truth at the time. Telling the truth is not easy.

Now a new paper has been published[5] which raises questions about due process surrounding the data evaluation, writing, author approval and publication of the original WHI paper. It seems not all principal investigators were consulted during the data evaluation and writing phases. There may have been protocol violations and the paper was prepared and published prior to review by all authors.

Other WHI investigators may hold different views of this 'truth', but serious questions have been raised. The results may not have been different but interpretations of 'the truth' may well have changed if data had been released after thorough assessment by all key investigators, if the statistical methods stipulated in the original WHI protocol had been applied and if results for age cohorts had been presented.

Much angst may have been avoided, many women may not have suffered unnecessarily and the consensus now reached, that hormone therapy prescribed to healthy postmenopausal women within 10 years of their last menstrual period is an effective safe intervention, might have been arrived at long ago.

Which brings us back to 'the truth'. Our individual acceptance of the original WHI data will have been influenced by prior knowledge and belief. All of us will have interpreted that truth differently as, it seems, have a number of the key WHI investigators themselves.

We all contend with truth daily. It governs our relationships, the way we raise our children, our belief systems, our politics and certainly our health. The truth is that 'The Truth' is, for everyone an unknowingly constructed theory determined by our upbringing, our values and beliefs, our prior knowledge and other external influences that will help each of us to navigate our daily life with greater certainty and consistency.

The late great American philosopher, Richard Rorty once claimed, 'Truth is what my colleagues let me get away with'. We would all do well to remember that whenever we read a scientific paper.

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