



Testing Hughlings Jackson's proposed dietary treatment of epilepsy:

John Merson's cross-over trial of 1875

(History of Neurology)

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Abstract

The results of randomised controlled clinical trials form the basis for the modern treatment of epileptic seizures. Elements of clinical trial design may sometimes be discerned in the therapeutic experiments of earlier generations. We review an investigation published in 1875 in which some features typical of a cross-over clinical trial were adopted. This trial of farinaceous versus nitrogenous diet in the control of epileptic seizures was explicitly based on the pathophysiological speculations of John Hughlings Jackson and was conducted by John Merson at the West Riding Asylum in Wakefield, West Yorkshire, England. This article examines the context, the setting, the investigator, the trial, and its aftermath.

Keywords: clinical trials; cross-over; diet; history of neuroscience; John Hughlings Jackson; John Merson.

Introduction

Randomised controlled clinical trials and the meta-analysis of such trials have underpinned many of the therapeutic advances in the management of epilepsy in recent decades, and trial data are central to the licencing and acceptance into clinical practice of new anti-seizure medications. However, any impression that clinical trials are a recent innovation, foreign to the clinicians of the past, is controverted by extensive evidence (Tröhler 2000; Chalmers 2001; Bhatt 2010). The trial of treatments for scurvy undertaken by James Lind (1716-1794) in 1747, possibly prompted by the proposal of Francis Haukesbee (1688-1763) in 1743 for an “experimentum crucis” to compare the safety and efficacy of new medicines (Cooper and Cooper 2025), is often regarded as the first controlled clinical trial. However, these older studies lacked the rigorous methodology of current trials. Hence, their outcomes were not free from many potential confounds, for which reason these investigations may perhaps be better conceptualised as therapeutic experiments rather than as clinical trials, at least as the latter term is now understood.

The aim of this paper is to present one such therapeutic experiment in patients with epilepsy, undertaken in the 1870s and based on the ideas of John Hughlings Jackson (1835-1911), the leading clinician studying epilepsy at the time (Greenblatt 2022). The study in question manifests some features typical of a cross-over clinical trial.

The context

No effective treatment for epilepsy existed before the 1850s when the first description of the use of bromides was published (Eadie 2012). Despite the efficacy of bromides, few people with epilepsy could access such medication. Seizures were thus essentially unmanaged, and hence refractory, with the result that many people with epilepsy could not be employed and were at risk of becoming destitute. In England and Wales, such individuals often fell into the Poor Law system of the workhouse and the lunatic asylum, as documented on more than one occasion by Charles Dickens (Larner 2012).

People with epilepsy formed a significant proportion of the lunatic asylum population in the nineteenth century, both those with psychiatric disorder or learning disability complicated by seizures (hence “insane epileptics” in the terminology of the time) and those not so afflicted (i.e. “sane epileptics”). There was a continuous expansion of asylum capacity throughout the nineteenth century necessitated by the increasing population of individuals deemed insane, with some asylums constructing wards dedicated specifically to the care of those “inmates” with epilepsy.

The setting

The late nineteenth century shift from moral to medical treatment of insanity was nowhere more apparent than at the West Riding Asylum (WRA) located at Wakefield in West Yorkshire, England. Under the medical superintendency of James Crichton-Browne (1840-1938) between 1866 and 1876, WRA was at the forefront of the investigation of brain disease. This was a consequence of the development of a dedicated pathological laboratory and the employment (without salary) of Clinical Clerks and Clinical Assistants who, along with the resident Assistant Medical Officers, could undertake research projects, generally at the suggestion and under the supervision of Crichton-Browne (Larner, forthcoming).

Many of these projects were subsequently published in the asylum’s house journal, the *West Riding Lunatic Asylum Medical Reports (WRLAMR)*. In addition, Crichton-Browne was able to persuade clinicians working outside WRA to contribute to the journal he edited, most notably Hughlings Jackson, who published no less than four papers on epilepsy therein (all were subsequently included in the publication of Jackson’s *Selected Writings*; Taylor et al. 1931, 77-

89, 90-111, 119-134, 135-161). One judgment of posterity has opined that “By far the most important writings in the *WRLAMR* are those by J Hughlings Jackson” (George and Trimble 1992, 248).

Despite his characterisation of epileptic seizures as a consequence of “discharging lesions”, Hughlings Jackson’s conception of epilepsy was not explicitly electrical, indeed his ideas were fundamentally chemical in nature (York and Steinberg 2006, 13). In 1873, Jackson’s speculations on the cause of epileptic seizures were aired in the pages of the third volume of *WRLAMR*:

There are, I submit, two ways in which nutrition may be imperfect - in quantity and in quality. I believe that nerve tissue in discharging lesions is over-nourished in the former sense and worse-nourished in the latter (Jackson 1873, 326).

I believe, then, that the highly unstable nervous matter of disease (in a ‘discharging lesion’) differs in composition, but not in constitution, from the comparatively stable grey matter of health. The alteration in composition is of course such that the nervous substance formed is more explosive. (Jackson 1873, 326).

The following is a speculation as to the kind of alteration of composition. One striking constituent of nervous matter is phosphorus. [...] My speculation is that in the abnormal nutritive process producing unstable nervous matter the phosphorus ingredient is replaced by its chemical congener, nitrogen. [...] If nitrogen be substituted as supposed, we can easily understand that the substance produced would be more explosive. [...] The nutrition is, therefore, assumed to be defective not in quantity but in quality, in those functional alterations I call ‘discharging lesions.’ (Jackson 1873, 327).

This formulation had clear therapeutic implications, as Hughlings Jackson realised:

I think these speculations have a practical bearing on the dietetic treatment of epileptics. I advise epileptics not to eat much meat (not much nitrogenised food), nor, indeed, much of anything. (Jackson 1873, 327).

This recommendation was to influence one of the junior doctors at WRA who was undertaking clinical research.

The investigator

John Merson (1846-?1936) was a graduate of the University of Aberdeen (MA 1866 MB CM 1870; Johnston 1906, 365) who came to Wakefield as Assistant Medical Officer and Pathologist in 1873, having already spent three years as Assistant Medical Officer in the Northumberland County Asylum. During his time at WRA, in addition to his clinical duties Merson attended the annual medical meetings, termed *conversazione*, held at the Asylum. At the events of both 1873 and 1875, he supervised a table displaying photographs of current and former patients taken in the asylum’s dedicated photographic studio. He was promoted to the degree of MD at the University of Aberdeen in 1874.

Merson undertook various research studies whilst at WRA, resulting in three publications in *WRLAMR*: “The urinology of general paralysis” in 1874; “On the influence of diet in epilepsy” in 1875; and “The climacteric period in relation to insanity” in 1876. It is the middle of these papers which is of particular interest here.

The trial

Rationale

Merson's opened his paper with a very clear explanation of his objectives and their rationale:

The primary object of this Essay is to record the results of a series of observations on a number of patients suffering from epilepsy, undertaken with the view of determining the relative value of a nitrogenous and a farinaceous diet in the treatment of that disease. These observations were suggested by a paper in the third volume of the West Riding Asylum Medical Reports on the 'Investigation of Epilepsies,' by Dr. Hughlings Jackson, in which the author brings forward certain speculations regarding the nature of the morbid alteration in the nutrition of brain tissue, underlying the epileptic condition. [...] they lead Dr. Hughlings Jackson to the conclusion that a farinaceous diet is more suitable in the epileptic condition than a nitrogenous. It was for the purpose of testing the value of this opinion that I undertook the series of investigations which it is the object of this paper to record. (Merson 1875, 1).

After a lengthy digression on the law of the conservation of energy, Merson then addressed the relevance of diet to brain function:

compounds containing nitrogen in one form or other make up a large proportion of the entire brain substance, a fact that leads us naturally to expect that the nutrition of this organ may be most readily affected through the increase or diminution in the nitrogenous principles of the food. The phosphorised [*sic*] matters of the brain are also marked out by their multiform chemical relations as likely to play an important part in the production of nervous activity, and in this relation the amount of phosphorus in the food becomes an important consideration. (Merson 1875, 10).

Thus, a consideration of the possible interaction of diet and epilepsy treatment was reached:

In considering the question of diet in its bearing on the treatment of epilepsy, we have first to enquire into the probable nature of the abnormal condition of brain matter existing in that disease, and then to determine whether this condition is likely to be influenced by the quantity and quality of the food. (Merson 1875, 11).

In addressing this issue, Merson directly quoted those passages from Hughlings Jackson's 1873 *WRLAMR* paper given above.

Participants and interventions

The study participants and the interventions were then explained:

Twenty-four chronic epileptic patients were selected and subjected to observation under two different kinds of diet, the one consisting largely of nitrogenous matter, and the other containing no animal food, but consisting of milk, arrowroot, potatoes, butter, oatmeal, and bread. Though the terms are not strictly accurate, I shall distinguish the former as *nitrogenous* and the latter as *farinaceous*. (Merson 1875, 13 [*italics in original*]).



Although not explicitly stated, it seems that all 24 participants were men since, speaking of the diet, Merson noted the “quantity allotted to each man per day” (Merson 1875, 14).

As for the conduct of the trial:

The patients under observation were engaged in light occupation in the wards, and walking exercise in the airing grounds when they were inclined. The amount of actual mechanical energy expended was therefore very small.

Previous to commencing the above dietary each patient was accurately weighed, and his physical and mental condition noted. Twelve of the patients under observation were then put on nitrogenous diet, the other twelve on farinaceous, and this arrangement was continued for four weeks, during which time their physical and mental conditions were closely observed from day to day, and the number of epileptic seizures accurately noted. At the end of four weeks the weights were again taken and the diet changed, those previously on nitrogenous diet being transferred to farinaceous, and those on farinaceous to nitrogenous. After another period of four weeks, during which the condition of the patients was from time to time noted and compared with that which had been observed in the previous period, the weights were again ascertained, and the patients allowed to resume their ordinary dietary. (Merson 1875, 15).

Hence, all patients experienced both the nitrogenous diet and the farinaceous diet, one month on each (hence one group AB, the other group BA), in other words a cross-over arrangement.

Outcomes

Merson considered not only the frequency of seizures as an outcome measure but also the effect on “mental condition” and “general physical condition”. In terms of the patients’ mental condition, the results of the dietary interventions were noted:

In a considerable number of those who took nitrogenous food during the first month, it was observed that soon after commencing that diet they became much more dull and stupid than they had previously been, would sit in a dreamy, listless manner for a great part of the day, were very slow and languid in their movements, and took little notice of what was going on around them.

As soon as the diet was changed to the farinaceous, it was remarked that the condition of mental hebetude began to pass off, and in some of the cases the change was very remarkable.

A similar condition was observed in some of those who began with farinaceous food. Several patients who, during the period of farinaceous diet, had been observed as more lively and intelligent, became languid and stupid when the food was changed to the nitrogenous. (Merson 1875, 16).

However:

no connection could be traced between this condition of mind and the number of fits (Merson 1875, 16).

As regards the patients' general condition:

The general physical condition does not appear to have been appreciably affected by one diet more than the other. Under both diets there was a slight tendency to lose weight during the first month, and this is in accordance with what has often been observed, that under a regulated diet of any kind there is a tendency to lose weight. During the second month most of the cases remained stationary in weight or gained slightly. (Merson 1875, 18).

Concerning seizure frequency, the key outcome variable:

as regards the number of fits in individual cases, there is a slight balance in favour of the farinaceous regimen. (Merson 1875, 15).

This was the outcome that Hughlings Jackson's considerations had predicted. But matters were not clear cut:

out of twenty-four cases observed there was in fourteen a decided decrease in the number of fits during the period of farinaceous diet; the average number of seizures for the farinaceous period in these fifteen [*sic*] was 20.7, as compared with 28.3 for the nitrogenous period. Of the remaining ten cases, four had the same number of fits under each diet. There are, therefore, only six left in which the advantage is on the side of the nitrogenous regimen [...] I think then that, after making due allowance for the short period of observation and the limited number of cases observed, there is still a certain indication that the actual number of fits is less under a farinaceous dietary than under a nitrogenous. (Merson 1875, 21-22).

Merson's conclusions regarding the outcome of the trial

Merson's conclusions as to the effects of nitrogenous versus farinaceous diet on epilepsy were as follows:

The results obtained during those two months of observation are not such as to justify the conclusion that either of the two diets used possessed any decided advantage over the other in the treatment of epilepsy. (Merson 1875, 15).

He was aware of (some of) the limitations of his study:

It must be allowed, however, that the time over which these observations extended was too short to warrant any decided conclusion as to the advantage of the one diet over the other. (Merson 1875, 19).

But nevertheless:

On a review of the whole evidence furnished by these observations, I think, after making due allowance for all circumstances likely to tell in the opposite direction, that there are fair grounds for the conclusion that a farinaceous diet is likely to be more useful in the treatment of epilepsy than a nitrogenous; but in order to get satisfactory results, observations would have to be extended over a longer period than was at my disposal in the present instance. I hope, however, to continue these observations, and at some future time may record the results of my further experience. (Merson 1875, 23).

The aftermath

The particular dietary approach to the control of epileptic seizures investigated by Merson, on the basis of Hughlings Jackson's pathophysiological speculations, does not seem to have had any followers or imitators. No "results of my further experience" were published by Merson. We are not aware of any comment on, or citation of, Merson's work by Hughlings Jackson. A later superintendent at WRA, William Bevan-Lewis (1847-1929), commented in his seminal work, *A text-book of mental diseases* (1889), that the study was "based upon too limited a number of instances, to warrant final acceptance" (Bevan Lewis 1889, 220).

Some twenty years after the trial was conducted, James Crichton-Browne recalled that:

whatever the effect of a liberal diet of animal food may be upon the healthy understanding, there can be little doubt that it is prejudicial to the mental power of epileptics. Just twenty years ago one of my colleagues, Dr. John Merson, carried out at the West Riding Asylum in a masterly way a series of observations bearing on this point. He placed two groups of epileptic patients on a nitrogenous and farinaceous diet respectively for a fixed period, and then for a like period he changed the dietary of the two groups, giving those patients who had had a farinaceous diet a nitrogenous one, and those who had had a nitrogenous diet a farinaceous one. The patients on whom he experimented were of a chronic and confirmed class – patients in whom long-continued epilepsy had resulted in mental deterioration; and yet even in them marked results were obtained. In fourteen out of twenty-four cases there was a decided decrease in the number of fits during the farinaceous diet, and in a very considerable number of cases it was observed that soon after the nitrogenous diet was commenced mental dulness [*sic*] and stupidity supervened, the patient passing into a state of hebetude, which only disappeared when a farinaceous diet was again resorted to. (Crichton-Browne 1895, 75).

This favourable recollection, twenty years after the events, along with the positioning of Merson's paper as the first article in the fifth volume of *WRLAMR*, might possibly suggest that Crichton-Browne had faith in and was invested in the study, likewise his further recollection published another 30 years later (Crichton-Browne 1927, 41).

As for John Merson, he had become the designated Deputy Medical Director at WRA by the time of Crichton-Browne's departure in 1876. Elected to membership of the Medico-Psychological Association (forerunner of the Royal College of Psychiatrists) in 1877, Merson was appointed Medical Superintendent of Hull Borough Asylum in 1878. In this role, Merson was adjudged "competent" but he "reduced the provisions supplied to patients [...] and stopped the issue of beer", undoubtedly a cost-cutting measure and one not calculated to endear him to the patients, but perhaps influenced by his findings with respect to farinaceous versus nitrogenous diets in asylum patients. "He came to Hull as a bachelor but soon announced his forthcoming marriage to a widow with children who had been Matron at Wakefield", one Harriet Castledine (Bickford 1983, 31-32).

Merson superintended the move from the Old Asylum in Hull's Argyle Street to the new purpose-built asylum at De La Pole Farm in 1883. A few years later Daniel Hack Tuke, a prominent figure in psychological medicine in these years, judged that it was "Dr. Merson [...] to whom the satisfactory state of the existing asylum is really due" (Hack Tuke 1889, 15). Merson remained in post at Hull Borough Asylum until 1924 but seems not to have undertaken any further research studies or authored any publications throughout his long incumbency. He

did, however, make medical news in 1897 when it was reported that he was “rendered unconscious by a violent blow to the back of the head with a cricket bat, by one of the inmates. His condition for some time caused much anxiety, but he is now making slow but steady progress” (Anon. 1897). A later account, erroneously attributing the incident to 1898, stated that “Dr. Merson was umpiring [...] when a patient he had given out attacked him so violently that he was concussed, and on sick leave for months” (Bickford 1983, 71). The attack was also mentioned, along with other similar incidents befalling asylum personnel, in a subsequent general reference to the “risks of asylum life” (Anon. 1898).

At a dinner held by the Royal Medico-Psychological Association in honour of Crichton-Browne in 1931, the former WRA Superintendent acknowledged that Merson was still living (Anon. 1931, 658). Six years later Merson’s name appeared in the Association’s obituary column (Royal Medico-Psychological Association Yearbook 1937, xl), but no dedicated obituary has been identified.

Discussion

Merson’s paper gives an interesting glimpse into clinical practice in the mid-1870s. The design of his investigation is in marked contrast to other studies of therapeutic agents for epileptic seizures undertaken at WRA around this time, such as Crichton-Browne’s account of nitrite of amyl (Crichton Browne 1873) and John Wallis’s on chloral hydrate (Wallis 1875), both of which were no more than case series. Merson’s study had greater sophistication, sequentially switching the patients between the two interventions being compared. Whether this approach stemmed from Merson himself or was suggested by Crichton-Browne cannot be ascertained from the available documentary evidence. Crichton-Browne’s work on conium for the treatment of mania at WRA has been considered in the light of a controlled evaluation, albeit flawed, of drug treatment (Adams 2010), but it did not include a cross-over comparison.

From our current perspective, with the benefit of hindsight (but hopefully not the condescension of posterity), it is evident that Merson’s study was subject to many observer and selection biases: small number of participants ($n = 24$, 12 in each group); no power calculations; no matching for age, sex, seizure frequency or type; no randomisation; no blinding; no pre-specification of outcome measures; brief trials (one month on each diet); no wash-out period before cross-over; subgroup analysis to derive averages for those subjects (fourteen? fifteen?) with a “decided decrease in the number of fits during the period of farinaceous diet”; etc. However, even though small in size and methodologically limited according to current standards, the cross-over design of Merson’s trial might nevertheless have helped to reduce intra-subject variability and minimize covariate imbalance, thus improving the robustness of the findings.

In addition to the aforementioned methodological concerns, there was no consideration of whether or not participants, unknown to Merson, might have breached the study protocol: the absence of “animal food” in the farinaceous diet might possibly have prompted some participants to seek out or even pilfer other (non-trial) patients’ meat. Subsequent studies of a dietary intervention for seizure management, specifically the ketogenic diet, are known to have been subject to difficulties with compliance and discontinuance due to dietary intolerance (Ruan et al. 2022).

Hence Merson’s conclusion that “the actual number of fits is less under a farinaceous dietary than under a nitrogenous” cannot be considered robust. Perhaps understandably, then, Merson’s trial does not feature in historical overviews of methods to control selection bias in therapeutic experiments (Tröhler 2000; Chalmers 2001). We do not find Merson’s trial mentioned in the James Lind Library (<https://www.jameslindlibrary.org>; accessed 02/09/2025).



Merson was explicit that the rationale for his study was the current thinking of Hughlings Jackson on the pathophysiology of epilepsy, thus contradicting a later judgment that characterised his work as “based on older thinking” (George and Trimble 1992, 248). Although a cross-over design may be detected in earlier therapeutic experiments, indeed dating back to the seventeenth century (Cooper and Cooper 2024), there is no evidence that Merson was aware of these prior reports.

References

- Adams CE. James Crichton Browne and controlled evaluation of drug treatment for mental illness. *J R Soc Med* 2010;103(4):160-161. doi: 10.1258/jrsm.2009.09k073.
- Anon. Medical News. *BMJ* 1897;2(1909):320. doi:10.1136/bmj.2.1909.318.
- Anon. The risks of asylum life. *J Ment Sci* 1898;44(185):450-451. doi:10.1192/bjp.44.185.450-c.
- Anon. Complimentary dinner to Sir James Crichton-Browne. *J Ment Sci* 1931;77(318):651-661. doi:10.1192/bjp.77.318.651.
- Bevan Lewis W. *A text-book of mental diseases: with special reference to the pathological aspects of insanity*. Charles Griffin, London; 1889.
- Bhatt A. Evolution of clinical research: a history before and beyond James Lind. *Perspect Clin Res* 2010;1(1):6-10.
- Bickford JAR. *De la Pole Hospital (1883-1983)*. Self-published; 1983.
- Chalmers I. Comparing like with like: some historical milestones in the evolution of methods to create unbiased comparison groups in therapeutic experiments. *Int J Epidemiol*. 2001;30(5):1156-1164. doi: 10.1093/ije/30.5.1156.
- Cooper M, Cooper S. Sir Nicholas Gilbourne’s (magical) cross-over trial of 1631. *J Med Biogr* 2024 Dec 15;9677720241304738. doi:10.1177/09677720241304738. Online ahead of print.
- Cooper M, Cooper S. ‘Experimentum crucis’: Hauksbee the Younger’s ‘decisive experiment’ for comparing the ‘safety and efficacy’ of new medicines (1743). *Notes Rec* 2025 doi:10.1098/rsnr.2024.0033 Published online 8 January 2025.
- Crichton Browne, J. Nitrite of amyl in epilepsy. *West Riding Lunatic Asylum Medical Reports* 1873; 3:153-174.
- Crichton-Browne J. The Cavendish Lecture on dreamy mental states. Delivered before the West London Medico-Chirurgical Society on June 20th, 1895. *Lancet* 1895;2(3750):73-75. doi:10.1016/S0140-6736(01)13385-4
- Crichton-Browne J. *Stray leaves from a physician’s portfolio*. Hodder and Stoughton; 1927.
- Eadie M. Sir Charles Locock and potassium bromide. *J R Coll Physicians Edinb* 2012;42(3): 274-279. doi:10.4997/JRCPE.2012.317.
- George MS, Trimble MR. The changing 19th-century view of epilepsy as reflected in the West Riding Lunatic Asylum Medical Reports, 1871-1876, vols 1-6. *Neurology* 1992;42(1):246-249. doi:10.1212/wnl.42.1.246.
- Greenblatt SH. *John Hughlings Jackson. Clinical neurology, evolution, and Victorian brain science*. Oxford University Press; 2022.



Hack Tuke D. *The past and present provision for the insane poor in Yorkshire, with suggestions for the future provision for this class. (Read at the Leeds Meeting of the British Medical Association)*. J. & A. Churchill; 1889.

Jackson JH. On the anatomical, physiological, and pathological investigation of epilepsies. *West Riding Lunatic Asylum Medical Reports* 1873; 3: 315-349.

Johnston W. *Roll of the Graduates of the University of Aberdeen 1860-1900*. Aberdeen University Press; 1906.

Larner AJ. Charles Dickens (1812-1870) and epilepsy. *Epilepsy Behav* 2012;24(4):422-425.

Larner AJ. *The West Riding Asylum and the origins of British neurology 1866-1876. When neurology became a science*. Springer; forthcoming.

Merson J. On the influence of diet in epilepsy. *West Riding Lunatic Asylum Medical Reports* 1875; 5: 1-23.

Royal Medico-Psychological Association Yearbook. Adlard & Son; 1937.

Ruan Y, Chen L, She D, Chung Y, Ge L, Han L. Ketogenic diet for epilepsy: an overview of systematic review and meta-analysis. *Eur J Clin Nutr* 2022;76(9):1234-1244. doi:10.1038/s41430-021-01060-8.

Taylor J, Holmes G, Walshe FMR (eds.). *John Hughlings Jackson. Selected Writings. Volume 1. On epilepsy and epileptiform convulsions*. Hodder and Stoughton; 1931.

Tröhler U. “To improve the evidence of medicine”. *The 18th century British origins of a critical approach*. Royal College of Physicians of Edinburgh; 2000.

Wallis JAM. On the therapeutic value of chloral hydrate in epileptic convulsions. *West Riding Lunatic Asylum Medical Reports* 1875; 5: 257-270.

York GK, Steinberg DA. *An introduction to the life and work of John Hughlings Jackson with a Catalogue Raisonné of his writings*. (Medical History, Supplement No. 26). The Wellcome Trust for the History of Medicine at UCL, London; 2006.

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