

Research Paper Review

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Functional Neurology: Review of Theories & Evidence Chiropractic & Manual Therapies 2017; 25: 19.

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ABSTRACT

INTRODUCTION: Functional Neurology (FN), a seemingly attractive treatment approach used by some chiropractors, proposes to have an effect on a multitude of conditions but some of its concepts are controversial. A scoping review was performed to describe, in the context of chiropractic manual therapy, 1) the FN theories, and 2) its clinical applications (i.e. its indications, examination procedures, treatment modalities, treatment plans, and clinical outcomes) using four sources: i) one key textbook, ii) the scientific peer-reviewed literature, iii) websites from chiropractors using FN, and iv) semi-structured interviews of chiropractors using FN.

METHODS: The scientific literature was searched in PubMed, PsycINFO, and SPORTDiscus, completed by a hand search in the journal Functional Neurology, Rehabilitation and Ergonomics (November 2016 and March 2017, respectively). The only textbook on the topic we found was included and articles were chosen if they had an element of manual therapy. There was no restriction for study design but discussion papers were excluded. Websites were found in Google using the search term 'Functional Neurology''. Chiropractors, known to use FN, were invited based on their geographical location. Theories were mainly uncovered in the textbook as were all aspects of the clinical applications except treatment plans. The other three sources were used for the five aspects of clinical applications. Results were summarized and reported extensively in tables.

RESULTS: Eleven articles were included, five websites scrutinized, and four semi-structured interviews performed. FN is based on the belief that reversible lesions in the nervous system are the cause of a multitude of conditions and that specific clusters of neurons can be positively affected by manipulative therapy, but also by many other stimuli. Diagnostic procedures include both conventional and unusual tests, with an interpretation specific to FN. Initial treatment is intense and clinical outcomes reported as positive.

CONCLUSION: FN gives the impression to be a complex alternative to the old variant of the chiropractic subluxation model, in which the vertebral subluxation is replaced by "physiological lesions" of the brain, and the treatment, spinal adjustments, are complemented by various neurological stimuli. Both models purport to treat not the symptoms but the cause. We conclude there is a need for more scientific documentation on the validity of FN.

ANALYSIS

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Background Information

Treatment of non-musculoskeletal (non-MSK) conditions has been a controversial hallmark of the chiropractic profession since its inception. Beyond the treatment of more traditional non-MSK conditions such as colic or otitis media, a relatively new approach to treatment is that of Functional Neurology (FN), which has as its roots the concept that disturbances of nervous system physiology can have detrimental effects on the body. First described by Carrick (1) in 1997, the FN approach sprung from his observation that spinal manipulation can alter the size of the physiological blind spot of the eye, which he claimed as proof of the ability of spinal manipulation to affect brain function. FN has been the target of criticism, but has also gained in popularity among chiropractors and other allied health care professionals. Indeed, in a recent survey, 13.3% of Australian chiropractors identified themselves as FN practitioners (2).

In this broad scoping review, the authors sought to provide a comprehensive explanation of FN as a treatment concept, including presentation of the scientific evidence underlying the basic concepts of FN. Their study had 6 research objectives, which included descriptions of:

- 1. the theories that constitute the basis of FN;
- 2. the conditions that functional neurologists treat;
- 3. the diagnostic procedures;
- 4. the therapeutic modalities;

- 5. the course of care; and
- 6. the clinical outcomes obtained or expected with this approach.

Summary:

Data and information pertaining to Functional Neurology (FN) was gathered from a number of sources:

- 1. textbook of FN (3) was available and provided information on 5 of the 6 research questions;
- 2. case reports, 1 randomized, controlled trial and 6 case reports were found relating to FN;
- 3. websites of chiropractors practicing FN were read in full; and
- 4. semi-structured interviews with FN practitioners were conducted.

Neurophysiological Theories

The detection and treatment of "physiological lesions" or "functional lesions" are the basic foundations of FN. Identification of lesions is a combination of examination findings at 1) the cellular level, 2) related neurological pathways and 3) the FN concept of "hemisphericity".

Cellular level: symptoms are caused by a dysfunctional "central integrative state" (CIS) of one or more functional units of neurons within the nervous system. As a result, abnormal outputs are created by the units, which lead to symptom creation.

Neurological pathways: certain pathways, such as the cortico-reticulo-spinal tract are centrally important to FN, where the CIS in a unit of neurons affects ipsilateral muscle tone (facilitation or inhibition) and ipsilateral inhibition of pain sensation and sympathetic nervous system activity.

Hemisphericity: the concept that the brain's hemispheres 1) control different body functions and 2) can function at two different levels of activation without there being an obvious pathology (3). As a result, the physiological lesion in FN does not represent a traditional pathological lesion such as would be expected following a stroke. In FN, the dysfunctional CIS exists in one hemisphere and effects are felt ipsilaterally. Widespread cognitive, psychiatric, immune and autonomic manifestations of symptoms are thought to be a consequence of this hemisphericity.

Treatment Theories

FN treatment seeks to restore optimal metabolism within the targeted neurons (those constituting the physiological lesion) in order to promote positive neuroplastic changes. Treatment is often multifaceted, including manual therapies, but also application of sensory, motor or cognitive stimuli.

Basic rules of FN treatment include: a progressive and adapted nature of stimuli, such that fatigue of the targeted neurons occurs; type and size of stimulus will depend on the pathways to be stimulated; stimuli must be repeated and a single lesion can be affected by multiple stimuli; and, treatment effects must be assessed regularly by testing for positive indicators.

Clinical Application

Indications:

Due to its emphasis on brain-related dysfunctions, FN is purported to be indicated for a myriad of conditions ranging from neuromusculoskeletal disorders to traumatic brain injuries to psychiatric conditions.

Examination:

A detailed history, observation, physical exam and diagnostic imaging/testing are utilized by FN practitioners, as in other health care disciplines. The main focus of the FN examination; however, is the functional neurology examination. Specific tests are used to evaluate the following: autonomic nervous system, sensory/motor components of spinal nerves, cranial nerves, reflexes, vestibular system, cortical lobes/hemispheres and cognition. The testing of eye movements, vital signs and blind spot mapping are examples of some tests unique to FN which provide the practitioner with important diagnostic information to augment the traditional tests.

Treatment Modalities:

Treatment modalities are selected primarily based on their abilities to stimulate brain areas, not how they will address patients' symptoms. Eye movement exercises, manual therapy, vibration therapy and many other treatments that stimulate the nervous system, including home exercises and nutritional supplementation, all comprise FN treatment modalities. Modalities tend to be chosen for their ability to simulate multiple areas, and many areas are thought to respond to multiple stimuli.

Treatment Plans:

Treatment plans are highly individualized but often begin with near-daily treatments over the first 2-3 weeks. Prescription of home exercises is also a staple of FN treatment.

Clinical Outcomes:

Clinical outcomes were difficult to assess, given the small number of published studies and the anecdotal nature of findings. Case reports detailing successful treatment of complex regional pain syndrome (4), migraines, ADHD, OCD and Tourette's syndrome (5), Parkinson's disease (6) hemi-paresthesia (7) and post-traumatic brain injury (8, 9) were identified, among available studies. However, no study design other than case reports was found during the authors' searches.

CLINICAL APPLICATION & CONCLUSIONS

The foundational tenants of FN – that reversible lesions in well-defined areas of the central nervous system, specifically the brain, are causative of a variety of disorders – is fundamentally difficult for clinicians untrained in FN concepts to verify (not to mention the broader scientific and health care communities!). The available research is of a low level of evidence, and as such, more research into FN with a mind towards evidence-based practice is required to help increase the acceptance of FN and decrease the skepticism the currently exists. The authors suggest that "the potential ability to change the quality of life for people suffering from poorly understood and/or chronic disorders makes this concept attractive for both clinicians and patients" and thus is worthy of more research.

STUDY METHODS

The authors chose to complete a scoping review, encompassing all available evidence and information pertaining to FN. This included literature searches, direct contact with known FN authors, textbook sourcing, practitioner websites and semi-structured interviews with practitioners. While this approach does not allow for meta-analysis of data and lacks the strict search criteria associated with traditional systematic reviews, it provides the best available evidence to generate an early summary of the concept of FN.

STUDY STRENGTHS/WEAKNESSES

Strengths:

- The search strategy was maximized despite the lack of evidence available in the literature
- The choice to pursue a scoping review allowed for the presentation of all available information.
- The topic is not well represented in the literature and this paper provides an important summary for practicing clinicians.

Weaknesses:

• The lack of strong scientific evidence results in a more subjective and qualitative approach to the topic, rather than the more robust quantitative approach normally used in systematic review.

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