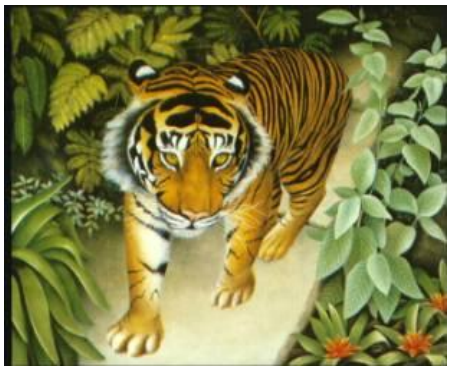

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The Nightingale Research Foundation

Byron M. Hyde, M.D.
121 Iona St.
Ottawa, Ontario
Canada
K1Y 3M1

www.nightingale.ca

Tel. private # (613) 729-8995 / fax (613) 729-0148

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001Mosso

La Fatica, Milano, Treves, 1891.
Fatigue: English Translation 1904
By Professor of Physiology, U. Of Torino, Angelo Mosso (1846-1910)

Note: *This 12 page extract of the 334 page book has not yet been spell and grammar corrected. A corrected version will be supplied when we can find an editor who did better in primary school than I.*

The English Translation of Mosso's book Fatigue was made by: Margaret Drummond M.A. and W.B. Drummond M.B. C.M. F.R.C.P.E. (Royal Hospital for Sick Children, Edinburgh. Published by Swan Sonnenchein & Co. Ltd and published in 1904. Translated from the original 1894 text of Angelo Mosso of Turin Italy.

I have reduced professor Mosso's 334 pages to 12 pages and obviously more than a little has been left out. I wanted to select the skeleton of Mosso's book that applies to patient with M.E. or any of the fatigue illnesses. As if this were not sufficient, I have **further** reduced the 34 pages to only a small handful of 4 sentences. The 12 pages are for M.E. patients who may have difficulty in reading. The further reduction to a nuclear four sentences is for the benefit of physicians.

It must also be remembered Mosso's book is an exploration of fatigue and energy in healthy individuals in which he reviews the great diversity to be found in normal healthy persons. However he does mention fatigue in those patients who have chronic illness and how the ability of these people to recover cannot be taken as comparable to healthy persons who develop and recover from fatigue in the course of their every day lives. No physician should ever speak or write on disabling illnesses which have fatigue as one of the many symptoms unless they have read Angelo Mosso's book: La Fatica or in English: Fatigue.

I have also annotated many of Professor Mosso's statements to compare to what is found in patients from my own personal experience in investigating patients with M.E. or M.E.-like disease. Mosso's exploration is a remarkable and perambulatory work, important to all physicians studying M.E. but also for M.E. patients as well. As many physicians today, both men and women, Mosso is not without his faults. He appears in three statements to be a sexist when discussing the hysterical nature of the

"weaker sex". I have no doubt he would not have the same views today, but this work was set down over 120 years ago when he first took his pen to paper to begin this remarkable document.

Mosso's recurring theme is that "Fatigue" is a symptom of brain dysfunction, and in more than one place he notes Fatigue is a circulatory dysfunction of the brain. Physicians today should be aware when they produce a reputedly scientific publication, stating the diagnostic cause of M.E. can be found in some chemical or hormone they have found in the blood. M.E. is caused by only one thing, an acquired viral injury of the Central Nervous System by enteroviruses either sporadically or in epidemics. Except to the patient, M.E. is a chronic and invisible encephalopathy. To the patient, M.E. can be a life changing catastrophy.

Note: In the following vignettes taken from Mosso's attached work of over 110 years ago, I have at times shortened or simplified the sentences or changed words to better reflect modern usage, but hopefully in all cases retaining Mosso's intended meaning. In places I have also annotated certain statements in an attempt to relate Mosso's statements to the difficulties of Myalgic Encephalomyelitis patients.

I have not included Professor Mosso's many pages on social justice and the poverty of the workers and young children working in sulphur mines, nor the destroyed health, stature and mind of these ordinary men and women and children in Sicily where I have completed this work. Mosso's words remain to be read in the attached original translation for those who are interested. His is possibly one of the most lyrical scientific publications you may ever read. He both lauds and criticizes Karl Marx who failed to mention in his book Das Capital, the exhaustion which machines produce in the operative nor to demonstrate the injurious effect of work on women and children. (See pages Chapter 7 & specifically pg. 172—174). He comments 30 years before the event of the Russian communist revolution: *Even if a law were to place all men in the same conditions, it would be immediately broken. The disappearance of social differences is unfortunately a dream still more beyond our reach than the universal brotherhood of nations.* (Pg. 175) Mosso was so correct. As mentioned above, Mosso is not without his faults and once falls back upon the theory of the hysteric. Pg. 188: *In weak and nervous persons, especially in woman, a very prolonged strain on the attention may give rise to serious ailments.*

Angelo Mosso's entire 1894 book Fatica (Fatigue) can be reduced to a few immutable facts he observed through scientific investigation:

1: Fatigue is caused by a physiological central (CNS) dysfunction associated with circulatory changes.
2: Muscle dysfunction is caused by the accumulation of toxic chemicals within those muscles.
3: An individual with pre-existing (central) fatigue, has significantly reduced muscular strength.
4: A healthy person recovers from fatigue, an ill person does not.

This is a charming, scientifically based, 334-page physiological textbook. The following is not a praecis. It is more a collection of vignettes underlying some of Dr. Mosso's basic observations.

Chapter 1:

The Migration of Birds

In one of the most captivating opening chapters of any scientific book you will ever read, Angelo Mosso describes the exhaustive migration of quail across the Mediterranean from Africa and then discusses his scientific observations and scientific analysis in quail, pigeons and water fowl.

i. Quail returning from Africa, arriving on the coast of Italy had such poor vision they often smashed into walls and killed them selves, which Mosso believes is associated with decreased blood circulation of the brain.

ii. Mosso examines the pectoral muscles and brains of fatigued homing pigeons, which have returned to their hutch, immediately following an exhausting 200-mile flight from Bologna to Turin and compares their muscle and brain anatomy with pigeons which have been resting at home. (pages 19-20) The fatigued birds have muscles which are dark and rigid in spasm (interpreted as pain).

iii. The muscles of the rested birds were normal, not rigid with no suggestion of spasm.

iv. Also, the brains of the rested pigeons had a normal perfusion of blood whereas the fatigued pigeon's brains were pale, almost bloodless. This fact probably explains why the quails on their arrival from Africa do not see so well as usual and why we ourselves are incapable of doing brain-work after great fatigue.

Discussion:

When I examine the significantly fatigued brains of patients with Myalgic Encephalitis (M.E.) employing SEGAMI Oasis software, the cognitive and often, the motor areas are lacking in blood circulation.

In the first months of a patient's acute illness, their vision is often significantly abnormal. I describe this in the textbook, the Clinical and Scientific Basis of Myalgic Encephalomyelitis.

With the expertise of Dr. Jean Léveillé at Hotel Dieu de Montreal, we have also performed SPECT circulating blood volume in over 100 M.E. patients. Once again, these patients have brains significantly deficient in circulating blood.

Chapter 2

Upon the History of the Study of the Movements of Animals

This short chapter discusses the work of Galileo, who was obliged under the pain of death or blinding, to submit to the church that the earth moved around the sun.

He writes about Giovanni Borelli (1608 – 1679) who continued on Galileo's work, the fight of whether the nerves or circulation control muscle function and the circulation of the heart, also attacked by the church.

He writes about Malpighi (1628-1694) possibly the first microscopic anatomist, who made so many revolutionary discoveries and who was the first to discuss the physiology of red blood cells and blood clotting. (A*s an aside, Malpighi discovered the link between arteries and veins that had eluded the remarkable studies of William Harvey (1578-1657). Malphghi was the first to describe the pulmonary and capillary network connecting small arteries with small veins, a major discovery in the history of science, which in turn evoked increasing controversy from his colleagues and authorities).*

William Harvey, the English but, Italian trained (University of Padua) also notes the criticisms his discoveries caused. When asked to return as a physician he writes:

> "You know full well what a storm my former lucubrations (intensive studies) raised. Much better is it oftentimes to grow wise at home and in private, than by publishing what you have amassed with infinite labour, to stir up tempests that may rob you of peace and quiet for the rest of your days.

Intimidation and burning at the stake are not the only historic causes of scientific reversals. In this chapter, Dr. Mosso talks about the Dane, Stensen from Copenhagen, (1638-1686) who came to Italy where he was known as Steno. He studied arterial circulation and the effects of lack of blood circulation, and from whose name came the term, stenosis. In his earlier years Stensen was the first to describe blood clots as a cause of disease and crystals as the typical pure form of a mineral. He then, under the influence of the Catholic Church entered into a life of extreme penance and poverty for his ill anti catholic ways, gave up his scientific works, which appeared in contravention to the views of the church and apparently died as a result of his severe penitence, possibly starvation, at the age of 48.

Chapter 3

The Origin of the Energy of the Muscles and of the Brain.

Giovanni Borelli, attributed all life to the ultimate heat of the sun. He attributed al the heat of the body to both the friction of the blood against the walls of the arteries and veins and to fermentation. (Presumably of food stuffs in the Gastrointestinal tract.) Antoine Lavoisier (1743-1794) the father of modern chemistry s believed that life is a chemical function. Lavoisier was the first to discover the composition of air in 1777 and to understand the true significance of respiration which had been explained by the ancients either not at all, or erroneously. (pg 103-104) Mosso confirmed Borelli's concept that temperature was related to friction of blood in the arteries by stopping blood flowing to the arm and reducing the temperature of the arm by 3-4 degrees within 15 minutes but after a further 15 minutes pain occurs and circulation was restored. (pg 67)

The cerebral hemispheres are so sensitive to every cause, which diminishes their nutrition, that when even for a few seconds the quantity of blood, which flows to the brain is lessened, consciousness disappears immediately. This experiment was conducted on a male called Bertino who had an opening two centimetres in size in the vault of the frontal skull. Mosso covered the hole with sheet of rubber and measured the effect of circulation on the brain and its functions with a machine measuring the brain pulsations.

Pressure was then placed upon the carotids. After 8 seconds of cerebral anemia Bertin fell back in a fit of convulsions and the pressure on the carotids was stopped. On awakening he had no ill effects. In a little he asked us to repeat the test. We were astonished at such sang-froid, ..but we did not have the courage to repeat .. any experiment in cerebral anemia. (pg 72). …we compressed only two arteries, the carotids. Consequently we had interrupted only half (part) the blood current, which goes to the brain, yet it was sufficient to banish consciousness. (The two vertebral arteries are much smaller in size and blood flow, also there is no proof they were patent in Mr. Bertino.)

Discussion: Mosso's significant but partial decrease of blood flow to the patient's brain, and its effects is understandable. The relatively small but chronic local decrease in blood flow in the brain of M.E. patients, as we have demonstrated in HMPAO SEGAMI Oasis brain SPECT is sufficient to demonstrate the effect of silent brain encephalopathy. We have found marked hypoperfusion to (a) the left anterior temporal lobe, (b) the cingulate gyrus and often (c) the motor cortex is sufficient to cause major weakness in memory, administrative disabilities and often motor difficulties and as we have seen clinically in visual function in early disease onset as mentioned by Mosso.

Chapter 4

Upon the General and Special Characteristics of Fatigue

Much of this chapter is based upon the construction and diagrams of medical engineering instruments by which to measure fatigue.

The physiologist and physician, Herman Helmholtz, (1821-1894) the inventor of the myograph, measured the speed of nerve transmission either to the periphery or from the periphery to the brain at 30 metres per second. (Actually. 24.6 - 38.4 meters per second.)

In 1858, Carl Ludwig (1816- 1895) made use of the myograph to study the modifications, which are produced in the muscle as the effect of fatigue. He and his fellow scientists demonstrated that fatigued muscle contracts and returns to its original state more slowly than rested muscle.

Experiments: Of all the causes, which modify the physical condition, exercise is that which most increases the strength of the muscles. (pg. 94) . On the same page, Professor Mosso mentions Victor Alfieri in his autobiography writes, the faculties of learning after ten years of disuse had been obstructed beyond all belief.

More than anything else, exercise and habit enable men to resist fatigue both of brain and of muscle. Undoubtedly, brain work, to those unaccustomed to it, must cause more fatigue than exercise of the muscles. (pg. 121)

Mosso used the repetitive raising of a weight of 3-4 or more kilograms by the middle finger.

Add picture of Instrument Photograph page 88

He demonstrates the fatigue curve produced by Professor Vittorio Aducco in 1884.

Fatigue curve Photograph page 89

To eliminate mental fatigue as a cause of muscle fatigue Mosso then stimulated the same middle finger muscle electrically and apparently came to the same conclusions, that mental fatigue was not a cause of the muscle fatigue observed. Using electrical stimulation to cause fatigue gave the same result as when the muscle was triggered to do work and produce muscle fatigue as when the action was elicited by the brain.

Discussion: The insurance industry and the physicians who suggest the value of the PACE trials as a manner in returning the disabled to healthy physical and intellectual function are doing so on the concepts introduced in this chapter. The reader has to remember, the studies in this book were conducted on healthy subjects with no CNS or other disability. From observing these patients for over 30 years there is no doubt that total inactivity is detrimental to the patient, so is an attempted return to normal activity

Dr. John Richardson, a most remarkable Yorkshire-man, one of my several important mentors was highly critical of the PACE treatment. He discussed with me **(a)** the death of an acutely ill football player, who was convinced to return to the playing field. He did so but died there on the first attempt. Yet his heart was normal with no suggestion of occlusion. **(b)** A second case, the young 35 year-old head nurse at the U of Ottawa, came to me to organize such a rehabilitation program. It was her intention to return to full time work and was aware of the early PACE trial positive results. I then hospitalized her at the University of Ottawa Disability Hospital on Smythe Road for six weeks. She cautiously walked unsteadily into the hospital where she was slowly introduced to measured but increasing physical activities and pool activity. After the treatment, this woman who walked in, was carried out to her home. Due to this treatment she has been largely house bound for many years and was never able to return to any form of work.

It is essential to realize, as in all diseases, whether it is poliomyelitis measles, chicken pox, typhoid, small pox, malaria or even a common cold, the degree of complexity and disease penetration varies from a disease state of such minor importance it is not seen, to disability and disfiguration, to deafness, blindness, permanent mental disability, paralysis and death. Most minor cases of these same diseases are not even noticed or are termed anxiety syndrome when the patient complains of invisible dysfunction or illness. Patients disabled with M.E. have marked variability of penetration of disease and markedly different abilities of recovery although children and young men often have a better chance. Women recover as well, but they are few when compared to men and children.

In my experience, the most successful treatment of both men and women is when they have disability insurance, which is paid immediately to the patient without further stress and which covers their extended period of recovery. This is never rapid and may last from 1 to 5 years. Few professional individuals wish to spend their life disabled or without working. This is seen constantly in professionals in the teaching and health care industry who have interesting though often exhausting work. Many of those who I have seen over the past 30 years who have recovered, years later break down once again. This is identical to what I have seen in cases of post polio syndrome. Myalgic Encephalomyelitis or M.E. like paralytic polio and other increasing number of enteroviral illnesses which cause various types of polio and non-polio virus flaccid paralysis and other encephalitic, cardiac, diabetic ophthalmic injuries are all caused by the same extended family of enteroviruses.

Chapter 5

The Substances Which are Produced in Fatigue

The lack of energy in a weary man depends upon the fact that the muscles during work produce noxious substance, which little by little interfere with contraction.(pg. 105)

Now among the substances, which are produced by fatigue in the muscles or in the brain, one of the most important is lactic acid, the same substance, which is found in sour milk. Exertion produces both lactic acid and carbonic acid. (pg.) 108

Medical men call neuroasthenics, those who quickly exhaust the energy of their nervous centres, and who are slow in repairing the loss of that energy. In spite of their frailty of their nervous system, have produced immortal works in science and art. For example, I site the name of Charles Darwin. In robust people fatigue produces merely a local disturbance of the organs, which were taxed, such as the brain, the eyes, the muscles etc. In Neurasthenics fatigue very readily induces general disorders. (pg. 124)

Discussion: While I visited George Rada at Oxford University in the UK at the John Radcliff Hospital, during the 1990 period, the physicians did intracellular measurement in both normal and CFS. patients. They were not able to find any differences between any significant differences in patients with CFS from ordinary patients. However their criteria as in most studies are based upon the CFS definitions, which are unable to determine scientifically the cause of the illness of individual patients.

Chapter 6
Upon Muscular Contracture and Rigidity

The chapter begins with the sentences: Being unable to separate the study of the muscles from that of the nervous system, I have thought well to restrict myself to the study of brain fatigue: Since up to the present, so far as I am aware, no one has written a book upon cerebral fatigue. I shall speak of muscular fatigue and of the changes which take place in the muscles only so far as may be necessary for a better understanding of the brain.

This chapter is largely limited to the study of muscle contractures in life and in death rather than muscle or brain fatigue. It is in the next chapter where we learn, not so much about fatigue as about exhaustion.

Chapter 7
The Law of Exhaustion

Fatigue is not related to the amount of work one does. One unit of work does not produce one unit of fatigue any more than three units of work does not produce three units of fatigue. Work done by a muscle already fatigued acts on that muscle in a more harmful manner than a heavier task performed under normal conditions. (pg. 150)

Our body is not constructed like a locomotive, which consumes the same quantity of carbon for every kilogrammetre of work. When the body is fatigued even a small amount of work produces disastrous effects. Our organism is more injured by work when it is already fatigued. When the muscle has consumed all the energy at its disposal it finds itself compelled by additional work to trench (depend) upon other provisions of energy, which it had held in reserve. This causes a greater amount of nervous energy to come into play.

There are two factors susceptible of fatigue: (a) central or neurological and (b) peripheral. The peripheral cause is related to the chemical force which is transformed in the muscular fibres into mechanical work. Hugo Kronecker (1839-1914) has shown it is not the amount of work which causes fatigue but the stimulus. (pg.153) If a muscle is fatigued even a little work raising an extra kilogram

will be too heavy. If a muscle is not fatigued raising and another 100 kilograms is raised, another one or two will not be noticed.

Fatigue in most cases diminishes the sensibility. The fact that fatigue increases more rapidly than the associated amount of work saves us from injury which lesser sensibility would create. The worker who persists in his task when he is already fatigued produces less effective work and greater injury to his organism.

There are those who fear that human fatigue will come to be less and less regarded and that the workers will be gradually eliminated and dismissed without means of subsistence…

Chapter 8

Attention and Its Physical Conditions.

In 1886, in his book, Fear - Mosso circa 34-44 years prior to Landsberger writes: Persons are excited by the mere fact of being subjected to experiment. Modifications in experiments can be dependent on the alteration observed in those who pass from a state of dispersed attention or profound tranquillity to one of active thought. (pg. 181)

> **The Hawthorne Effect:** Henry Landsberger, in experiments conducted circa 1920-1930 at Hawthorne Illinois, noted that individuals involved in scientific experiments, tend to modify their results due to the attention they are receiving from researchers rather than because of independent variables.

It is possible to work amidst noise, but it certainly entails more fatigue not to allow ourselves to be disturbed in the work of reflection. (Pg.193)

(By definition, an M.E. patient has had a brain injury and this is well documented by persistent and consistent hypoperfusion of the effected brain utilizing HMPAO SPECT employing SEGAMI Oasis software in these patients. Injuries, whether machine or the human organism, entail both noise and interference. It is understood that recovering old information or adapting new information normally attempts to activate the left temporal lobe. If the left temporal lobe is injured, the brain attempts to process information elsewhere while the left temporal lobe is still attempting to interpret or retrieve information. The activation of competing sites create noise, which in turn diminishes the M.E. brain. This phenomena of CNS noise is well understood by neuropsychologists in - left brain communicating with right brain. BH)

Professor Mosso, discusses the decreased or partial failure of memory when climbing mountains and attributes this to the effect of prolonged muscle exhaustion in arriving at the summit. (pg. 200) There are at least two reasons for this phenomena of decreased memory on mountain summits.

1. With any great expenditure of physical energy, such as climbing a mountain, the proprioceptive activities of the brain and various pressoreceptors redirect a significant flow of blood and serum away from the brain and the gut, directing it to the muscles of the arms, legs, intercostal and myocardial muscles. With less blood flow even the normal brain has a reduced memory ability.

2. There is a significantly reduced oxygen level at the summit. Mosso may not have been aware of the following oxygen levels and the fact that it is the oxygen (and nutrient) bearing abilities of blood circulation which activates memory and physiological health.

Location	Elevation in Metres	Oxygen available
Sea Level	0	20.9 %
Summit Mt. Blanc	4877	11.4%
Summit Everest	8839	6.9%

For about an hour after, taking stimulants such as coffee, alcohol and cocaine greatly shortens reaction time. (pg 205) Mosso also notes his brother took cocaine and experienced a sensation of excitement and well-being.

Note from B.H. Mosso does not appear to be aware with cocaine this may also lead to dependence, long term or even permanent brain alterations. Also, in my experience with those patients taking stimulants such as cocaine, which I have studied with HMPAO SPECT there appears to be a marked increase in circulation, which can continue for months and years. Unfortunately, I have found this increased circulation is not in the area of the left temporal lobe responsible for a large amount of the mind's information and memory retrieval and transmission but in the frontal and upper parietal areas. In developing brain SPECT analysis, Dr. Ismael Mena found that he was never obtain a normal brain in individuals taking narcotics and other street drugs.

Chapter 9

Intellectual Fatigue

There are many organs of whose function we are ignorant, such as the spleen, the thymus, the thyroid, the supra-renal capsule but memory certainly has a bacterial basis in the cells of the brain. (pg. 209-10)

Note: we may smirk at the world's lack of knowledge of significant organs and glands in the 1890s, but when I started practice in 1968, there were still few adequate tests for thyroid disease. In much of the 1960s, Protein Bound Iodine (PBI) was the main recommended test. It was discarded due to its many failings. Then came the next "gold standard" referred to as T4, which was also inadequate but has persisted up to the present. It too is finally being dismissed. In the late 1960s TSH came into service. The evaluation of thyroid dysfunction still remains, in part, a mystery. Most patients in whom I have diagnosed thyroid cancer, have normal TSH, T4 and T3. Many people **without thyroid disease** are being treated with thyroid and **many people with thyroid dysfunction** are not being recognized and treated. BH: 2017: See Rethinking the TSH test: An Interview with David Derry MD, PhD.

Pain is all but absent within the organs such as the liver, kidneys, brain, spleen or muscles. They can be touched without elicitating pain, except when they are inflamed. Most pain resides in the skin covering the body, (bones and organs). (Pg 218-219)

As long as we are in good health, we are little aware of intellectual fatigue; but as soon as ill health comes upon us, we find how exhausting brain work is. …in illness, even conversation fatigues us, …we find great difficulty in recalling a name or date which is perfectly familiar to us.

Chapter 10

Lectures and Examinations

The nervous system is the soul source of energy: There exists only one kind of fatigue, nervous (neurological) fatigue. ... Muscular fatigue is, at bottom, an exhaustion of the nervous system. (pg. 243-244)

Cerebral fatigue diminishes the force of the muscles…when the centres are exhausted the muscles are weakened. (pg. 280)…after brain fatigue one feels one's energy exhausted by the slightest movement

It is unfortunate that much of this chapter, as in the book itself, investigates the patho-physiology of fatigue and recovery in the normal healthy person. Mosso does mention on occasions that patients who are ill do not correspond to same norms in physical or mental fatigue and recovery as do normal healthy persons.

Chapter 11

The Methods of Intellectual Work

Instances abound of those who have made themselves immortal in spite of uncertain health; who by their own perseverance alone have attained un-hoped for results. (pg 291)

Mosso then writes, (pg. 292-294) of Darwin, the famous scientist explorer, who fell ill at the end of his remarkable voyage around the world, with what appears to have been a myalgic Encephalitis-like illness. For forty years Darwin never knew one day of the health of ordinary men. (pg. 296)

Darwin was in many ways typical of an M.E. patient. Darwin was never to recover his health again yet his books and ideas changed the world. Darwin was so much of an invalid that he could scarcely ever receive friends in his quite country home, because every time he made the effort the excitement and fatigue he experienced brought on chills and nausea. He appears also to have suffered from Raynaud's disease, a finding commonly seen in M.E. patients, with very cold extremities for which he wore fur lined boots to keep his feet warm even in the summer. His working schedule seems to have never continued beyond some two hours a day.

Darwin wrote:

> "I have no great quickness of apprehension or wit, which is so remarkable in some clever men. My power to follow a long and purely abstract train of thought is very limited; my memory is extensive but hazy. So poor in one sense is my memory, that I have never been able to remember for more than a few days a single date or a line of poetry. I have a fair sense of invention, and of common sense or judgment, but not I believe in any higher degree."

Mosso quotes Seneca: One must force one's mind before it will begin to work:

Cogenda mens, ut incipiat

> Action does not depress and exhaust its energy, but renders It more fit for work. (pg. 300) Mosso mentions this point frequently in his book, but earlier he also states this is not necessarily true of ill patients.

The M.E. Patient and the Insurance Industry

In the period 1984-1990 when I first began to study M.E. I was shocked by the number of practicing physicians, who had fallen ill during this period with post enteroviral M.E. and, who came to seek my advice. There must have been close to 50 physicians from Quebec, Ontario, the Maritimes, and Manitoba. They were all well and working when they first fell ill with what was initially mis-diagnosed as a severe "summer flu," an acute gastroenteritis, or angina. It was very interesting to document their recovery or failure to do so. Curiously they broke down into two groups, those with disability insurance and those without. This may seem to be a curious medical subdivision but it was not.

The practice of medicine is not easy, it depends upon long exhausting hours of work and it depends upon strength. The work is never finished. Expenses tend to be very high, particularly during the first years. If you stop you fall behind, both in terms of careful patient care and the necessary expenses of work, of living, of running a family and a home. You may say the same for teachers and secondary school students. Demands are high.

In 35 years examining M.E. patients, I do not recall any physician recovering totally.

M.E. Disabled Physicians without Disability Insurance: It was primarily the relatively young physicians who had never acquired disability insurance, possibly believing they could wait until they were older and had used their incomes to pay off their medical school and setting up practice debts. Approximately half the physicians had no long-term disability insurance. Without funds, these non-insurance physicians, tried to continue to work. In general those who were obliged to work became increasingly ill, often house bound and bed bound. Marriages sometimes broke down, some returned to live temporarily with their parents.

To the best of my knowledge, none of these no-insurance physicians ever returned to work as a practicing physician. Much later, a few, on the power of their medical certification, took government administrative employment, where they tended to became lost in the bureaucracy. I don't recall any of the female physicians who ever returned to any compensational work.

M.E. Disabled Physicians with Disability Insurance: In Canada, most disability insurance packages are administrated by the Provincial medical associations. They tend to pay physicians disabled with M.E. immediately without the extreme hassle encountered by teachers and other professionals, government and institutional workers. What happened to those with disability insurance was quite interesting. Regular funds came in. They all tended to have sufficient funds for all day to day living expenses. They immediately broke down to two further groups: The men and the women physicians:

a. In general, the men rested more. None of them became totally better but they tended to improve and sometimes significantly. After an extended period of 2-5 years many were able to return to part time work. None of them returned to their previous occupations of primary care medicine, to surgery or obstetrics and gynaecology. Some began practicing part time in psychiatry where they could sit and listen and make occasional advice, some became administrative physicians for governments, charitable institutions, insurance companies.

b. In general the women did not rest, particularly if they had children. There were too many chores if they were married. I do not recall a single female physician returning to full time or part time medical employment. Several eventually returned to work in administrative jobs in the government. There was one woman who went to work as an executive for an

insurance company. She had a bedroom beside her office where she spent a part of the day recumbent.

This divergence in ability to recover is also seen among women and men in non-medical employment. Men recover faster and more completely than women, but certainly not all men. Also it is my impression the insurance industry tends to honour men's policies, compensating them without the same degree of difficulty. This may because men tend to fight harder, to be more aggressive. It may also be related to the fact that most patients, up to 80% or more tend to be women and so men represent a lower financial load to the insurer. I have certainly come to the conclusion that women with M.E. have a much more difficult time in all aspects of this illness.

All substances and all causes, which depress and tend to destroy the functions of the nervous system begin by acting as excitants. (pg. 302)

Chapter 12

Over Pressure

We ought to exercise the brain constantly, but never to exhaust it. To regulate our intellectual fatigue we must not look to what others can do, but the to what we can do ourselves.