

LONG TERM HYPERBARIC OXYGENATION (HBO) RETARDS PROGRESSION IN MULTIPLE SCLEROSIS PATIENTS

Abstract: Analysis of 703 MS patients showed that 300 HBO treatments (about one treatment a fortnight over 10 - 13 years) appreciably arrested progression of MS. More than 500 treatments, (approximately once per week) are most effective. Patients who begin HBO treatment in the early stages or with low initial Kurtzke values did best.

This Report follows the progress of many patients since they started treatment over 10 years previously at the Multiple Sclerosis National Therapy Centres in the UK. Hyperbaric Oxygen Therapy (HBOT) was administered for treatment of Multiple Sclerosis.

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Multiple Sclerosis is a disease of the nervous system that results in localised patches of inflammation in the brain and spinal cord which may eventually scar (sclerosis).

In 1983 the *New England Journal of Medicine* reported a controlled, double-blind study on the effect of hyperbaric oxygenation on the symptoms of multiple sclerosis. It reported scientifically demonstrated benefits but recognised the need for long-term studies.

After a pilot study had confirmed this report, patients and their relatives installed pressure chambers in 56 Centres throughout the UK. Since 1982 over 12,000 UK patients have received HBOT. In most, an initial intensive course has been followed by intermittent maintenance treatment. Well over a million individual sessions have been completed without untoward incident.

It is difficult to assess the effect of any treatment on MS patients because of the unpredictable fluctuation of signs and symptoms. One authority considers that the best experimental design is to observe a large number of patients treated over a period of time. MS National therefore followed the progress of 703 patients who had first received treatment soon after the centres opened.

They were recruited from those attending 28 of the Centres. Details are given in Table 1.

Patients had been told that they had multiple sclerosis by neurologists who had said that there is no effective treatment for their condition. The co-operation of the patient's family doctor had been obtained before they were accepted for treatment.

During HBO treatments, patients breathed 100% oxygen under pressure in HBO chambers. The initial course of treatment consisted of twenty sessions in 4 weeks. Thereafter, the patients returned for a 'follow-on' treatment on a weekly basis, or failing that, as often as they felt the need or found it possible.

Table 1. Patients recruited to the Survey

Patients	Females 464 = 66%	Males 239 = 34%	Total 703
Mean Age (range)	47 (20 - 70) 47 (19 - 73)		
Average duration of MS (range)	14 years (0 - 54)	15 years (0 - 50)	
Diagnosis confirmed by a Neurologist			96%
MS TYPE			
Relapsing Remitting	126 = 10%	41 = 6%	167
Chronic Progressive	262 = 37%	155 = 22%	417
Chronic Static	76 = 11%	43 = 6%	119

Patient Assessment

They were interviewed and assessed immediately before, during and immediately after the initial 20-treatment course. Patients were classified as Relapsing/Remitting, Chronic Progressive or Chronic Static and assigned a Kurtzke Disability value from a scale (KDS) that enables patients from different Centres to be compared. Between two and four years, and again between six and eight years after the initial course, another assessment was made. A further review was conducted after 10 or more years.

Twenty-five percent of Relapsing/Remitting patients improved on their value, while 64 - 77% of symptoms improved (Table II).

Table II. Patients assessment of their response to initial course.

		Improved	No Change	Worse
	n	%	%	%
Fatigue	567	70	22	8
Speech	187	64	34	1
Balance	562	59	37	4
Bladder	523	68	30	0
Walking	638	77	19	4

Other improvements that significantly affect the quality of life were gained during therapy, many of which were retained with regular maintenance treatment in 73% of patients after 4 years. Subjective relief of bladder symptoms were confirmed by recording urinary frequency (Table III).

Table III. Urinary frequency of 703 patients - before and after the initial course.

Total Times Voided Day and Night

	Before Initial Course	After Initial Course	% Improvement
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Urinary Frequency	Daily Average	Daily Average	
At night	2.4	1.2	47%
During the day	7.4	5.7	24%

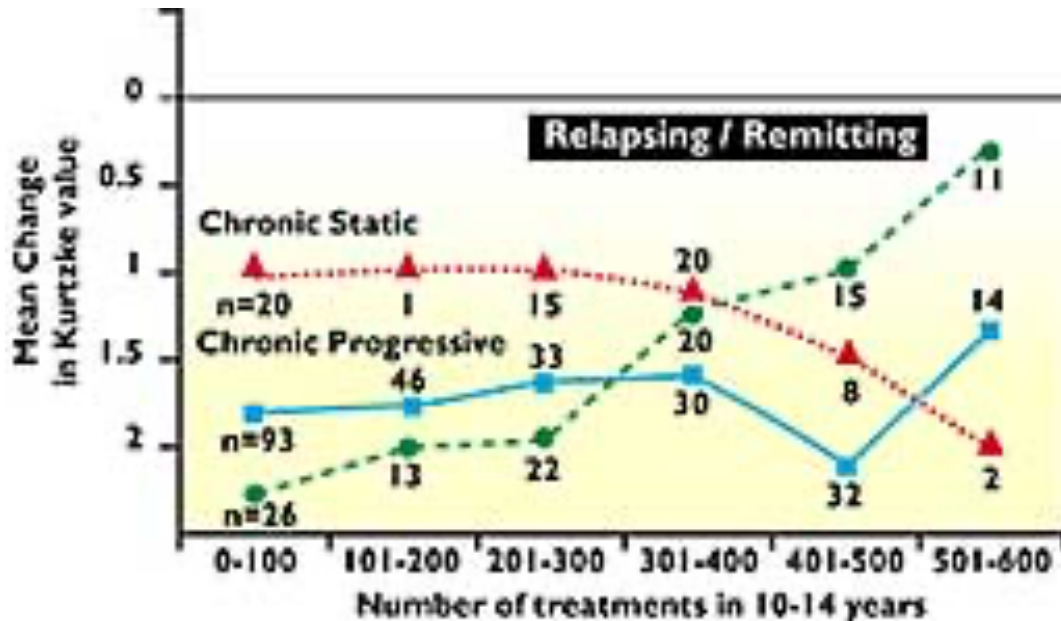
Some patients complained that their symptoms were briefly made worse - fatigue 20%, leg weakness 5%, visual disturbance 3% and limb numbness 1%, but those symptoms were only short lived. Minor problems with pressure on the eardrums occurred in 17%, but did not necessitate stopping treatment.

Some patients lost their improvements within a week or two. Four hundred and sixty-four patients (66%) who completed the initial course continued with treatment for at least three years because they found that their condition had stabilised, or the previous rate of deterioration retarded. On the other hand, 239 patients (34%) abandoned the treatment at intervals. Of these 25 later returned.

Thirty six patients (7 Relapsing/Remitting, 24 Chronic progressive and 5 Chronic static) did not have any further treatment and after 6 years, 24 (67%) had deteriorated by a mean of 1.8 on the Kurtzke scale.

The rate of deterioration was inversely related to the frequency of treatment. As might be expected, patients in the early stages of the disease (Relapsing/Remitting) did best as there is less irreversible damage in the nervous tissue. None of these (mean initial KDS 2.3) who had received at least eight treatments in every quarter over 6 years had deteriorated. Indeed, four had actually improved by a mean of 0.8 on the Kurtzke scale.

Figure 2. The change in Kurtzke value related to the number of treatments in 10 - 13 years
Higher levels indicate improvement



A third survey was conducted after 10 - 13 years. By then 126 patients had died (8% were over 60 years old when first treated), 99 were lost to follow up, 29 had suffered injuries that affected their Kurtzke value and two had their diagnosis revised. Therefore 447 remained for analysis. The extent of deterioration clearly depends on the frequency and duration of treatment (Figure 2).

Thirty eight of these patients had received less than 10 follow-on treatments and had deteriorated by 3.18

on the KDS. It is therefore evident that with an adequate dosage, progressive deterioration can be retarded.

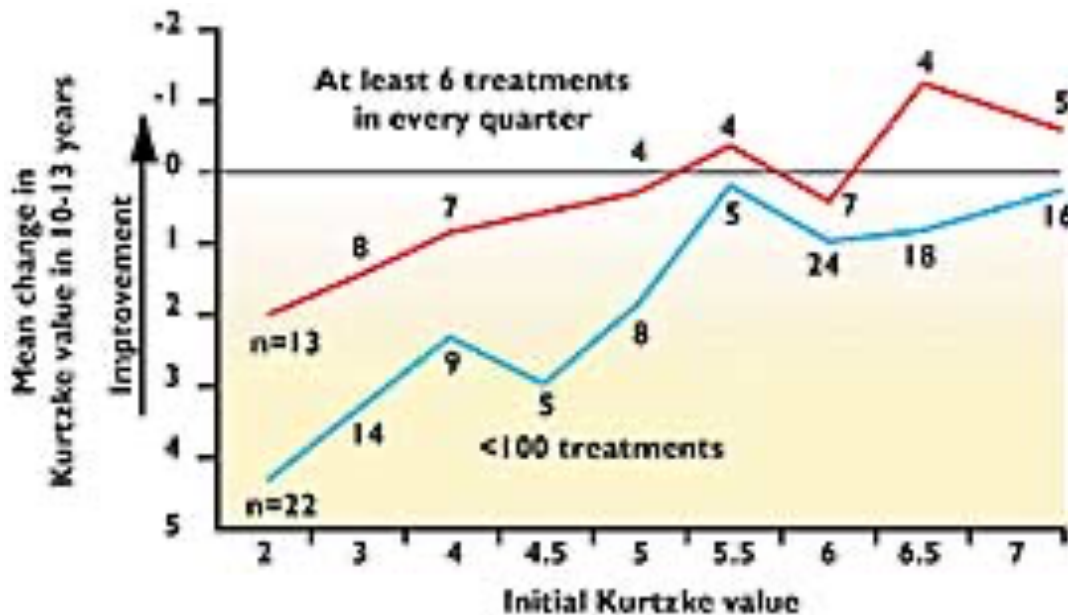
Table IV shows that 23% of the patients remaining eligible for assessment were no worse after repeated treatments over 10 - 13 years. Even more remarkable are the 30 patients (7%) of patients who have actually improved.

Table IV. Patients who were no worse after regular periodic treatments over 10 - 14 years.

STATUS	112 Relapsing/ Remitting	259 Chronic Progressive	76 Chronic Static
Improved 30=7%	14 = 13%	12 = 5%	4 = 5%
Unchanged 73=16%	23 = 21%	31 = 12%	19 = 25%
No worse 103=23%	37 = 33%	43 = 17%	23 = 30%
Mean No of Treatments	338	257	266

An analysis reveals that over 300 treatments (about one treatment a fortnight over 10 - 13 years are required to appreciably arrest progression and that more than 500 (say, once a week) are most effective. Those patients with a low initial Kurtzke value do best (Figure 3).

Figure 3. Patients who received at least 6 treatments in every quarter versus those with less than 100.



The natural history of MS is well established. Although there is a wide variation in the rate and patterns of decline, the majority of patients deteriorate over a two year period of observation. In this series the Relapsing/Remitting patients who had less than two follow-on treatments had deteriorated by 2.0 on the KDS after 10+ years, while the 31 who received more than 400 had only deteriorated by 1.1. This represents a difference of being able to walk without assistance and the need to use two sticks, or the ability

to walk 200 yards and being confined to a wheel chair.

The Centres have attracted sufficient numbers of patients to allow assessment of the effect of different dosage on different stages of the disease. As might be expected, the response is better in patients with less advanced disease. The treatment has been shown to be safe, practicable, cost-effective and without side effects. After 10 or more years 38% of the 447 patients were still attending regularly.

The findings imply that treatment with hyperbaric oxygen should be instigated as soon as the condition is diagnosed and before irreversible lesions have become established. The evidence suggests that treatment should be given every week and may have to be continued indefinitely.