

ANTI-TETANIC SERUM AND TOXOID

A CRITICAL STUDY OF THEIR VALUE

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In the previous article* reasons for opposing the use of tetanus toxoid and its recent incorporation in a triple vaccine—a combined diphtheria-pertussis-tetanus vaccine—were put forward in some detail. Many of the ill-effects which have been reported in connection with the injection of these three vaccines both when given singly and in combination were described. But the actual value and effectiveness of tetanus toxoid was not dealt with.

Since the use of this prophylactic was developed largely on account of the doubtful efficacy of the anti-toxic serum, and since it is now recognised with some misgivings that the serum has come to be regarded as routine treatment in all road-accidents as a supposed preventive, one cannot escape the necessity for a brief study of the history of the earlier serum.

Not a few practitioners have complained that the antitoxic serum is injected by harrassed casualty officers with no regard to the fact that the injured person may already have had previous injections of the tetanus toxoid. As the Hon. Secretary, Medical Officers of Schools, Dr. Thomas L. Scott, pointed out recently,† “it is unnecessary and indeed undesirable to run the risk of sensitizing them to horse serum by administering A.T.S.”

The reason for this state of things was made clear in the *British Medical Journal* (April 6, 1957, p. 819) when it was explained that a doctor who did not inject the serum would be open to a charge of negligence. As a result of this it is possible that more injections of antitoxin are given to protect the doctor than are given to protect the patient.” This—in spite

* *Animals Defender*, September, 1958.

† *Lancet*, May 17, 1958, p. 1069; *Brit. Med. Jour.*, May 17, 1958, p. 1176.

of the well-known fact that the serum may be followed by grave consequences.

It is desirable, at the outset, to know something of the source of the serum and of the incidence of tetanus before its introduction.

Devised by Behring in 1890, it is obtained by bleeding horses that have been inoculated with repeated and increasing doses of toxin or toxoid, which is derived in the first place from a culture of the tetanus bacilli. The serum from the horses' blood is separated from the red-corpuscles, and is then known as Tetanus Anti-toxin (T.A.T., or A.T.S.). Both toxin and anti-toxin serum are tested and standardised by inoculation into animals.‡

The serum first came into use in 1904, when it began to be employed in the treatment of wounds from burns sustained during the 4th July celebrations (fireworks) in America. In this country it was introduced into the Army during the 1914-1918 war, but even at this time (1916) Dr. Bosaanquet and Eyre pointed out in their well-known textbook that tetanus was "too uncommon a disease for statistics of it to be of value."

Incidence of Tetanus In Previous Wars

1. In the Crimean War the incidence was 1.5 per 1,000 wounded.
2. In the American Civil War the incidence was 2.0 1,000 wounded.
3. In the Russo-Turkish War the incidence was 1.2 per 1,000 wounded.
4. German statistics for 1870-71 showed that the incidence in the army was 3.5 per 1,000 wounded.
5. In the South African Campaign, the Nile Expedition, and the Russo-Japanese War, "Tetanus seemed to have vanished completely from the catalogue of military diseases."
6. In the New Zealand War (1863-67), "Not a single case among British troops."

‡See *Vaccines and Vivisection*, p. 6. Obtainable from N.A.V.S. 92 Victoria Street, London, S.W.1. Price 3d.

Incidence In First World War

The *Official History of the War* gives the incidence of tetanus as 1.47 per 1,000 wounded.

According to other official figures (British), the incidence was 2.6 per 1,000 wounded. Dr. A. T. MacConkey, of the Lister Institute, recorded that among 1,881 cases of tetanus who had received prophylactic injections of serum the incidence per 1,000 wounded was 2.6.

In the 15th German Army Corps (1914) the incidence was 6.6 per 1,000 wounded, although there can be little doubt that prophylactic injection of serum was the routine practice.

Incidence In The Second World War

In the Second World War (1939-1945) the incidence of tetanus per 1,000 wounded was authoritatively stated to have been as follows:

British Expeditionary Force (1939-40)	0.43
Middle East Africa (including Malta) (in 1940-45)	0.22
British North African Force	0.04
Central Mediterranean Force	0.09
British Liberation Army	0.06

The fact that in some previous wars tetanus was practically unknown is borne out by the above figures, but in a comparison of the incidence in various wars, published in the *Lancet* (January 26, 1946, p. 114), the figures relative to the South African Campaign, the Nile Expedition, and the Russo-Japanese War are conveniently ignored, as is the low incidence in the Russo-Turkish War.

This aspect of the subject is so important and illuminating that full quotations from the *Official History of the War* (Pathology), 1923, appear justified:

"In some of the great wars that came in the last century there seemed to be a decided drop (in the incidence of tetanus). The official medical history of the British Forces in the Crimean War records only two cases of tetanus in 1,000 wounded. The surgical history of the American Civil War shows an incidence of 2 per 1,000 also, and the German statistics of 1870-71 record 3.5 cases of this disease per

1,000. Finally, came a series of wars, the South African Campaign, the Nile Expedition, the Russo-Japanese War, in which tetanus seemed to have vanished completely from the catalogue of military diseases . . . Longmore has noted that 'not a single case of tetanus occurred among the British Troops during the New Zealand War between the years 1863 and 1867.' (p. 164).

"There do not appear to have been any cases of tetanus among the large number of gunshot wounds which were treated in the hospitals of Paris on the occasion of the insurrectionary outbreak of 1848; at any rate, there was not sufficient to attract notice.

"In the Russo-Japanese War, battles were fought in zones of intensive cultivation on ground manured with both human and horse manure, yet there was practically no tetanus." (p. 165).

According to the *Report of the Royal Commission on Vivisection* (1912, "Dr. Martin admitted in evidence that large quantities of the serum were shipped to South Africa during the late war, but as only three cases of tetanus occurred throughout the war, it was not required, and had to be thrown away." (p. 127).

*Fallacy That Tetanus Was Practically Abolished
In the War (1914-18)*

The following is a table of cases which reached the United Kingdom, excluding, therefore, deaths which occurred abroad:

Year	Cases	Deaths	Mortality per cent.
1914 (Aug.-Dec.)	... 192	104	54
1915	... 134	75	56
1916	... 501	182	36
1917	... 353	68	19
1918	... 266	68	25
Total	1,446	497	34

The *Official History of the War* (p. 184) records 520 cases of tetanus among the wounded who had received prophylactic inoculation with serum, with a mortality of 66.5 per cent. Yet, strange to relate, the Medical Correspondent of *The Times* wrote on August 2nd, 1917 that, in regard to the conquest of disease on the Western Front, tetanus "had practically disappeared since inoculation immediately after wounding was adopted." This statement is a typical instance of the falsification of facts which is, unfortunately, a marked feature of the arguments put forward in the Press and elsewhere to impress the value of serum on the public mind. There has never been a lack of evidence to show that other factors than the use of serum have been successful in checking the disease.

Even in the South African War, Dr. Martin told the Royal Commission (*Report*, 1912, p. 127): "Clean surgery prevented the occurrence of tetanus, notwithstanding the enormous number of wounded." He contended "that the prompt cleansing or washing of all wounds is the only natural prophylactic."

Importance of Accurate Diagnosis

A complicating factor in the compilation of valid statistics is introduced by errors of diagnosis. Although one would have thought this was a fairly simple matter, yet it may surprise some to learn that clinical diagnosis has confused it with cases of hysteria, meningitis, cerebral malaria, influenza, and diphtheria.

Serum Fails When Protection Should Be Greatest

The War Office Memorandum on tetanus stated: "There is strong experimental evidence . . . that in about ten days the immunity conferred by the primary injection is to a great extent lost."

The following figures, taken from the *Official History of the War* (1923), do not seem to bear this out.

Period elapsed since wounding	10 days	11-21 days	21-540 days	
No. of cases occurring	85	61	29	1918
Percentage mortality	71.1	49.1	31.0	

It will be noted that the highest mortality and the greatest number of cases occurred in the first TEN DAYS, when protection should have been at its maximum. In the *Official History of the War*, we read the laconic remark: "The explanation of these facts is obscure."

The Fallacy of Early Treatment

Sir David Bruce gave the following figures from the first World War.

On 1st day of wounding	...	47.1
On 2nd day after wounding	...	26.0
On 3rd to 12th day	...	26.9

He remarked: "From these figures it would appear that it is better to defer treatment until the symptoms have been manifest for one or more days. *Quod est absurdum.*" As we shall see from authoritative pronouncements, the inoculation of the serum *after* the symptoms have appeared is regarded as useless, although to this day it is practised as a matter of routine.

The More Doses Given—The Higher The Mortality

Sir David Bruce gave the following extraordinary results of multiple injections:

Injections No. of	Cases No. of	Recovered	Died	Per cent. Mortality
1	... 37	33	4	10.8
2	... 18	14	4	22.2
3	... 5	3	2	40.0
4	... 1	1	4	0.0

Needless to say the one case with four injections proves nothing; it is a common error of those unaware of statistical laws to express small groups of figures as percentages; one might with equal logic multiply still further and call the mortality-rate 0 per million.

The Failure of Serum As Cure Admitted

The Report of the Royal Commission on Vivisection (1912) stated: "It (anti-tetanic serum) has not proved of practical value in the treatment of tetanus." (p. 40).

Drs. O'Brien and Glenny wrote in 1929: "The treatment of tetanus with anti-toxin did not result in the favourable outcome which had been anticipated, and has not done so to this day."

Drs. J. K. Calvin and A. H. Goldberg stated in 1930 that: "In their experience the mortality from tetanus at the Cook County Hospital has not decreased in the past fifteen years, in spite of the fact that in the last five years larger amounts of anti-toxin were used and it was given intraspinally to more patients.

The available evidence in these cases as to the therapeutic use of anti-tetanic serum does not justify any assertions that such use appreciably affects the character of the mortality, whether the serum is given intraspinally or intravenously or by both routes, or whether large doses are given, or how early they are given."

According to David Nabarro, M.D., F.R.C.P.:

"C. H. Browning said that Bruce's and Golla's figures would seem to show the utter uselessness of anti-tetanic serum as a therapeutic agent."

*Tetanus In The Civil Population**

According to *A System of Bacteriology in Relation to Medicine* (1929), Vol. III (p. 319):

"The occurrence of tetanus neonatorum from infection of the navel was common, but was peculiar to infants of the filthy poor." Since these early days the annual mortality from tetanus in England and Wales has declined, chiefly among children under three months of age. The explanation given by the above authority is that "This state of affairs was soon sup-

* See Tables given in *Animals' Defender*, September, 1958, p. 95.

pressed by simple hygienic precautions." (i.e., substitution of aseptic dressings for Fuller's earth).

While, as mentioned earlier, it has become customary to administer antitoxin to all cases of road-accident on admission to hospital, this is not the case at the Royal London Homœopathic Hospital. Nothing but the indicated homœopathic remedies are given in such cases, and there is no evidence that the incidence of tetanus is any greater there than in hospitals where the serum is used.

Increase in Prophylactic Dose In 1942

It is to be noted that, presumably in recognition of the failure of the usual dose of antitoxin to prevent the onset of tetanus, instructions were issued by the Ministry of Health in 1942 to raise the minimum prophylactic dose from 1,000 to 3,000 International Units.† In cases which had received no active immunisation with Toxoid two further doses of 3,000 units were to be given at weekly intervals.

Fallacy Underlying Division Into Inoculated and Un-inoculated Groups

During the first World War, all wounded cases were given antitoxin as a matter of routine whenever possible, and reasons for any omission had to be reported by the medical officer. After the temporary shortage of serum in 1914, this held good throughout the war, so that the un-inoculated cases were those which could not be removed from the place where they were wounded, and therefore had to lie in shell-holes or no-man's-land for hours or even days. Such cases were "specially liable to gangrene, and to the more severe forms of sepsis".

It is not to be wondered at that these cases succumbed more readily to tetanus than their more fortunate comrades. This accounts for the high incidence during the first few months of the war (1914-1918), when the insufficiency of ambulances

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†It is to be noted that amounts up to as many as 240,000 units (nearly 30 c.c.'s) have been given to one single case in civilian hospitals.

aspect of all brethren, patiently and sympathetically to eliminate or at least eschew the errors, weaknesses or shortcomings amongst ourselves. This can effectively be done only by an attitude of affection, sympathy, appreciation and understanding amongst the professional brethren. It is high time that we should wake up to the basic and unchangeable fact that we are all members of the same family and offspring of the same Mother Homœopathy. (vide Editorial Article—“*Necessity of Common unofficial Organisation of All Homœopaths in India*”—Hahnemannian Gleanings—December 1962, Vol. XXIX/12).

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and medical equipment led, as Sir David Bruce stated, to “the difficulty of collecting the wounded on account of their numbers and the movement of the troops, and, finally, the difficulty of giving thorough surgical treatment to their wounds, which is so essential in the fight against tetanus.”

These considerations afford a satisfactory explanation of the fall in the incidence of tetanus when conditions of the wounded improved, not only in the war of 1914-18, but even more especially in the recent World War, during which evacuation of the casualties by plane and otherwise reached a very high standard. Other factors, such as the occurrence of diseases in epochs, which apparently accounted for the almost entire absence of tetanus in some earlier wars, cannot be discussed here. Indeed little is known for certain about them.

—*The Layman Speaks, Jan., '59.*
