

## Diabetes and war



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Today's diabetes world is fast-moving and exciting; knowledge is accumulating at an astonishing rate. To help understand the present, however, it sometimes helps to examine the past.

In this installment of *Tattersall's Tales*, Robert Tattersall takes a look at the historical impact of war on diabetes, highlighting the seemingly odd occurrence of reduced diabetes prevalence and mortality during wartime food rationing.

In 1997 I went to Bosnia for a postgraduate course organised by Chris Burns-Cox for doctors who had been cut off from the outside world for more than 4 years by the siege of Sarajevo (1992–1996). In one session a Bosnian doctor asked me what I thought the solution was to the worldwide epidemic of type 2 diabetes. One answer that came to me because of where we were was “to have a war” but I thought this would be flippant and insensitive so I spouted out the usual stuff about diet and exercise. I then asked the doctor for her solution and she said “we know because we have tried it – to have a war” (Kulenovic et al, 1996).

This is actually an old observation. The French physician Apollinaire Bouchardat (1806–1886) had been an advocate of dietary carbohydrate restriction since the 1840s, his motto being “Mangez le moins possible”. Proof of this concept on the large stage came in the Franco–Prussian War during the siege of Paris (19 September 1870 to 28 January 1871) when he noticed that glycosuria disappeared in some of his patients.

A similar effect was seen during World War I when diabetes mortality fell in countries that were subject to a blockade and rose in unaffected countries such as Japan, Australia and Italy. Countries near the main theatre of war showed a fall whether they were belligerents (Germany and Austria) or neutrals supplying food to the central powers (Holland and Denmark). A strict naval blockade meant that the effect was seen in Germany as early as 1915 whereas in England it did not start until the submarine campaign in 1917. In general, the fall in mortality was most pronounced in towns. This was particularly starkly seen in Prussia where the urban death rate from diabetes fell from a high of 14/100 000 in 1914 to a low of 8/100 000 for the years 1918–1920. In contrast, the rural death rate hovered between 4 and 5.5/100,000 between 1914 and 1920. The reason was that the mechanism of food distribution to towns was greatly affected by the non-cooperation of farmers and market gardeners. The German government estimated that a third of all food was withheld for private consumption or black market sale so that the diet of the rural population changed little during the course of the war (Himsworth, 1935). German clinicians noted that the “severity” of the condition in previously diagnosed diabetes became less – meaning that control was easier – and that the number of new cases fell (Gottstein and Umber, 1916). A similar phenomenon was noted in Japan during World War II (Goto et al, 1958).

It is, of course, not war per se that causes the amelioration of diabetes but the compulsory restriction of food which accompanies it. Thus, as Himsworth showed, the prolongation

of rationing after World War II in Britain caused diabetes mortality (a good surrogate for incidence) to remain well below pre-war levels until 1950 (Figure 1; Himsworth, 1949).

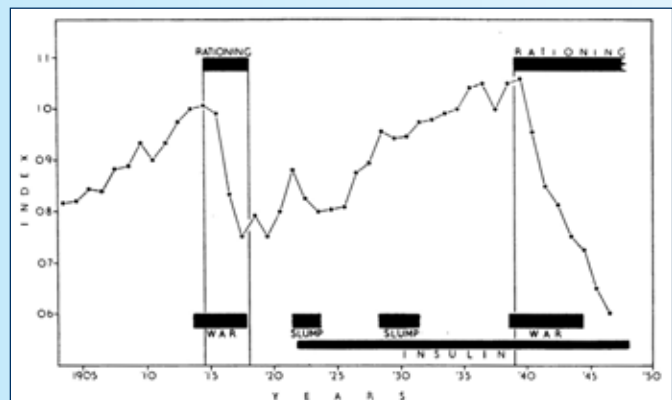


Figure 1. England and Wales. Diabetic mortality: comparative mortality indices (1938 basis). Showing the effect of food restrictions on diabetic mortality. (The figures for 1946 and 1947 have kindly been supplied by Dr. Percy Stocks.) From: Himsworth (1949). Reproduced with kind permission from the Royal Society of Medicine.

### Managing diabetes in war time

The beneficial effect of war on glycaemic control only applies to type 2 diabetes. The problem for the person with type 1 diabetes and their government is to maintain a supply of insulin.

In England in 1940 RD Lawrence, Chairman of the Diabetic Association (now Diabetes UK), wrote an article in the *British Medical Journal* in which he claimed that stocks of insulin were enough for 2 years and that insulin was still being made by English manufacturers. There might, however, be occasions when the local supply was disrupted and he suggested that all diabetics should keep 1 month's supply at home. Everyone should also carry insulin and a syringe with them if there was any possibility that they might not get home for their next injection because of transport disruption. It was even more important that people carried something identifying them as having diabetes than in peacetime. “Imagine,” wrote Lawrence, “what would happen after an air raid injury to any insulin patient with no such information on his person ... any diabetic who neglects this runs the gravest risk.” If an individual's supplies were running short, Lawrence recommended halving the usual dose and taking the usual amount of carbohydrate but no fat. He also stated that all brands of insulin were the same

so that if the chemist did not have the Boots one, the Burroughs Wellcome equivalent would be perfectly satisfactory (Lawrence, 1940). In spite of these reassurances, Lawrence wrote a few months later to *The Lancet* that patients all over the country were having difficulties with their supplies of insulin and appealed to people not to panic buy. It appears that there were also shortages of glass with which to make vials, and Lawrence suggested that this would be an ideal time to phase out the 20 unit/cc strength of insulin (Lawrence, 1941).

In 1952 the first volume of *Diabetes* included a page headed "The Diabetic and the Atomic Bomb" which included instructions to change from long-acting to short-acting insulins and to use the oldest bottles first. "If you have no food," the advice was to "reduce your dose to 1/2 or 1/3 of these amounts to avoid insulin reactions. Test your urine". It ended with a simple emergency diet which it was claimed would be adequate for a few days – provided that the main ingredients bread and potatoes were available!

### **Solutions to shortages**

During World War II fish insulin was produced in Japan and Germany in response to shortages of imported beef and pork insulins. In Japan it continued to be produced from bonito and tuna until 1954 (Wright, 2002).

For people in occupied territories who were deprived of insulin the only alternatives were death or making one's own. To my knowledge the only people who did this were Victor and Eva Saxl (1921–2002) (Mazur, 1991; Personal communication, Eva Saxl). They were well off and well educated Czech Jews – Eva had attended finishing schools in England and Switzerland. They married in February 1940 but 3 months later had to leave as a result of Nazi persecution and ended up in China, one of the few countries that still accepted Jews. Within months of arriving in Shanghai, Eva developed diabetes and was started on insulin. Her nightmare began in December 1941 when the Japanese marched into Shanghai and closed all pharmacies. The supply of insulin soon ran out and black market supplies were very expensive and of variable quality. Local doctors refused to help Victor make insulin but they did lend him textbooks including one, *Beckman's Internal Medicine*, which explained Banting and Best's original methods. He managed to buy water buffalo pancreata from the local market, and a Chinese chemist, Mr Wong, lent him his lab in which Victor, a textile chemist, eventually produced a brown extract which was tested on rabbits and then cautiously on Eva. Amazingly it worked. Victor managed to scale up production under incredibly difficult circumstances so that he was able to supply 400 other people with diabetes who made donations to Mr Wong. After the war Eva gave lectures on behalf of the American Diabetes Association and the Juvenile Diabetes Foundation.

### **War as a cause of diabetes**

Claude Bernard's famous piqûre experiment in 1849 led to the concept of neurogenic diabetes. Facts that were alleged to support the nervous origin were cases that started soon after a nervous shock such as a woman who attributed her diabetes to alarm at the bombardment of Strasbourg in the Franco-Prussian War. However, the horrors of World War I did not lead to an epidemic of diabetes among the troops. As a consultant for the hospital centre in Merves, France, through which 40 000 troops passed, Joslin found only two cases of diabetes. He and Von Noorden changed their previous opinion and pronounced the last rites for neurogenic diabetes (Daniels, 1939).

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