# Research on Tuberculosis in Nazi Germany and the Cruelest Medical Experiments on Jewish Children: An Observational Review

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**ABSTRACT** Germany was a scientifically advanced country in the 19th and early 20th centuries, particularly in medicine, with a major interest in research and the treatment of tuberculosis. From 1933 until 1945, Nazi Germany perverted scientific research through criminal experimentations on captured prisoners of war and on "subhumans" by scientifically untrained, but politically driven, staff. This article exposes a series of failed experiments on tuberculosis in adults, experiments without scientific validity. Nonetheless, Dr. Kurt Heißmeyer repeated the experiment on Jewish children who were murdered for the sake of personal academic ambition. It is now 75 years since liberation and the murdered children must be remembered. This observational review raises questions of medical and ethical values.

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**KEY WORDS:** crimes against children, immunotherapy, medical ethics, medical experiments, tuberculosis

## HISTORICAL BACKGROUND

"*I saw no difference between guinea pigs and Jewish children,*" Dr. Kurt Heißmeyer, 1964

Germany, considered to be one of the major scientific powers of the 19th and 20th centuries, was extensively involved in tuberculosis research. Robert Koch, one of the main founders of modern bacteriology investigated various infectious diseases including anthrax, cholera, malaria, and above all tuberculosis during the late 19th century. His initial findings, rejected by mainstream medical journals, were published with the help of the editors of botanical (Cohn in Breslau) and minor medical journals (Cohnheim in Berlin). His discovery of *Mycobacterium tuberculosis* was universally accepted in 1893 and he was awarded the Nobel Prize in Physiology or Medicine in 1905.

In 1895, Wilhelm Conrad Röntgen produced and detected electromagnetic radiation in a wavelength range known as X-rays, and perfected it for the diagnosis of lung tuberculosis. He was awarded the inaugural Nobel Prize in Physics in 1901.

Numerous scientific papers and discoveries were published during the interwar Weimar period, between Germany's defeat in World War I in 1918 and Hitler's rise to power in 1933. The available treatments were conservative ones such as enhanced nutrition and improved air quality in high altitude sanatoriums. More aggressive treatment modalities were induced pneumothorax, aiming to compress the pulmonary caverna and tracheostomy for clearing the airways once the larynx was affected.

The first instance of standstill in the process of tuberculous lung disease, an *Endstand*, was described by Koch, a case in which tracheostomy secretion infected a skin excoriation [1]. This research was followed by the publication of a second case by Wichman in 1917 [1], *The healing impact of skin tuberculosis on the lung/larynx disease* describing a 22-year-old female treated with tracheostomy for extensive lung disease. The patient developed a skin lesion from a scratch, which was infected with tracheal secretion. It was followed by complete cessation of the lung disease. This remission lasted for years, with bacillus-free sputum, cessation of cough, and a general improvement in her well-being. Wichman postulated that it was the skin tuberculosis infection that caused the remission of lung tuberculosis and survival for at least 15 more years [1].

Kutschera-Aichbergen observed in 1917 (but published later) [2] his own case of spontaneous healing of pulmonary tuberculosis, S*pontanheilungen*, following the infection of his patient's finger from a tracheal fistula. Once again, there was cessation of lung symptoms, clearing of bacilli in the sputum, and weight gain of 18 kg, all supported by radiological improvement. The authors hypothesized that the formation of autoantibodies, Anti-Körper in German, originated from the skin granuloma and promoted the healing of lung disease. This finding was similar to a reported case of spontaneous cancer recovery in 1916 [3].

Kutschera-Aichbergen described the histology of the skin lesion, calling it lupus. He postulated that the tracheal secretion, containing tuberculosis bacteria and mucine, once implanted into the skin, triggered a hemolysin process. Acting as an antigen, it would elicit antibody production, leading to cessation of the lung disease. In case of highly virulent bacteria, hochvirulente, it would serve as an autovaccine, just as an attenuated tuber-

culosis Bacillus, developed by doctors Calmette and Guérin (Bacillus Calmette–Guérin [BCG]), was introduced in 1921 as a prophylactic immunization. The authors also described that once the dermal lupus spontaneously resolved after one year, the lung and larynx tuberculosis disease re-activated.

The three published cases in 1893, 1917, and 1943 reported a "standstill in the disease after skin inoculation." This standstill may have indicated autovaccine immunization. The idea was not universally accepted at that time [4,5].

Later in the history of tuberculosis, during the interwar Weimar period, a tragic immunization attempt in 1930 led to the death of 92 children in Lübeck, Germany. Consequently, a Code of Experimentation was introduced into the German parliament in 1931 by the physician and parliamentarian Dr. Julius Moses. With the ascent of the New Regime, it was shelved 18 months later. The tuberculosis mortality rate in Germany in 1933 was one of the lowest in Europe. A record 240% increase in its incidence was recorded in 1945 [6].

## THE EXPERIMENTS

The totalitarian Nazi regime encouraged medical experimentation and research, particularly with regard to tuberculosis, which was a serious public health issue at the time. The Waffen-SS (state security) "scientist", Dr. Kurt Heißmeyer was one of several experimenters. Dr. Mengele was the most prominent and best known.

Heißmeyer's biography reveals two phases in his life. During the second phase, beginning after the end of World War II, he avoided public prominence for 4 years. In 1949 he settled in the East German city of Magdeburg and took on the role of a lung specialist. During the next 10 years, Heißmeyer established a large private practice and accumulated considerable wealth, a rather surprising situation in a communist country.

The exact type of treatment of tuberculosis in his clinic is not known, but it is assumed to have been conservative at that time. Heißmeyer's past was discovered in 1960, following a claim made by a survivor from 100 Russian prisoners of war in Neuengamme camp who endured his experiment. Heißmeyer was exposed and brought to trial that lasted from 1963 until 1966.

The first phase of Heißmeyer's life began in 1905 in Lamspringe, in the central German state of Thuringia. He was born into a strongly nationalistic medical family. He graduated from medical school in Freiburg and spent a year in Davos studying lung rehabilitation. He introduced racist ideology into the description of diseases in weak and inferior people and advocated *Arbeit therapy* (work therapy) [7].

Family connections in high circles of the SS enabled Heißmeyer in 1942 to obtain a position in the elite Hohenlychen Sanatorium, near Berlin, where his patients included some of the most prominent officials. He soon joined the SS, but to become a university academic, he needed a research project. His suggested thesis for a doctoral project was, "The weakened Jewish resistance to tuberculosis due to their racial inferiority".

Heißmeyer intended to prove that a second peripheral skin infection with tuberculosis bacteria would heal the primary central lung infection [8].

The human experiments began in mid 1944 in the Neuengamme Damm concentration camp, in the outskirt of Hamburg, the second largest in the German Reich with over 20 subcamps and holding more than 100,000 prisoners.

The experimental "material" consisted of 100 Slavic (Polish, Ukrainian, and Russian) prisoners of war (POW), all aged in their 20s. The victims had live tuberculosis bacteria instilled through an intra-tracheal tube [Figure 1]. The culture had been obtained from Meinicke's Central Laboratory in Berlin. The progress of their disease was followed with frequent chest X-rays, and they all developed active tuberculosis [9,10]. A number of the POWs were hanged and 32 were subjected to autopsy. The remaining POWs (their precise number varying between sources), still alive despite the experiments at the end of April 1945, were marched toward Lübeck, a North Sea port, and forcibly loaded onto the prison ship *Cap Arcona*. The ship was subsequently mistakenly bombed by the Royal Air Force (RAF). One surviving Russian managed to swim to shore and much later brought the story to the Hamburg City Council and to the world, demanding reparation for incarceration and his tuberculosis [8].

Despite the experiments resulting in aggravated, rather than healed lung tuberculosis, Heißmeyer obtained permission to repeat the experiments in children. To finalize the scientific study, Mengele personally chose children to be transferred from Auschwitz and exposed to the same experimental atrocities, a term appropriately coined by Weidling, *a* renowned Oxford academic [9].

Ten Jewish girls and ten boys, aged 5 to 12 years, better fed and hygienically lodged, were inoculated with virulent tuberculosis bacteria through bronchial tubes into one or both lungs. Within one week all children were febrile, anergic, and very ill. In early December 1944, the second phase of the experiment was initiated. A small cut was made on the skin of the forearm and smeared with live bacteria obtained from the Berlin Laboratory. This batch contained additional, material from the experimented subject, to form the hypothetical autovaccine of combined antigen-mucin. After another month, lymph nodes from each armpit were surgically removed under local anesthesia. The experiments were concluded by the end of March 1945. The numerous X-rays and 40 biopsies were sent to the Hohenlychen Sanatorium by Heißmeyer for diagnosis and histological evaluation. [10,11].

## RESULTS

The outcome on the adult prisoners has been assessed in detail in a review by von Villiez [10]. The review presents data on age, country of origin, occupation, extent of tuberculosis infection (lung or other organs), and date of death [Figure 1, Figure 2].

**Figure 1.** Adult chest X-ray with intrabronchial tube in the left lung (positive film image)

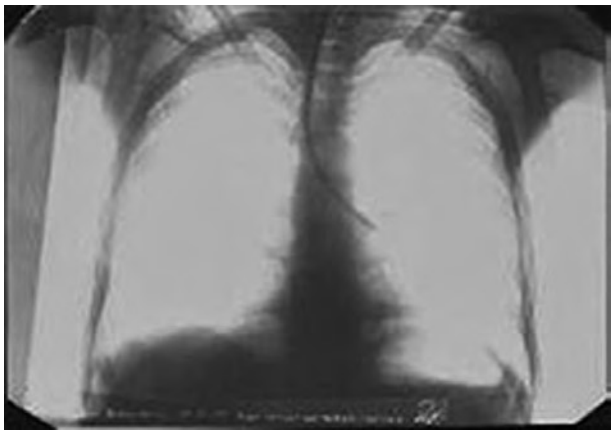
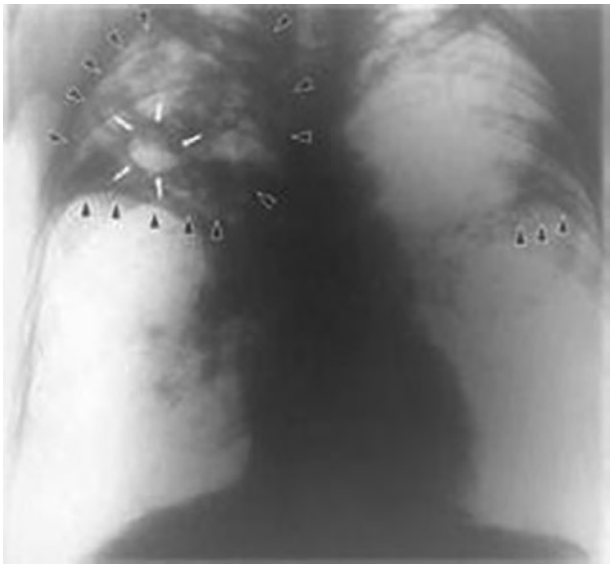


**Figure 2.** Chest X-ray with caverna in right lung, sclerosis in left lung (positive film image)



### END OF THE EXPERIMENT ON THE CHILDREN

The approaching Allied Armies made it essential for all evidence of the experiments to be destroyed. The pathology specimens were buried in a metal box in the garden of the Hohenlychen Sanatorium. They were retrieved by a Magdeburg Court order in 1966, after initially denying that they ever existed. The box was found and was signed by Dr H. Klein. The results of the auxiliary lymph node biopsies were found and reported as: "Condition with very strong swelling of the central endothelium. No cells in the free sinus, above all no lympho- and leukocytes. No necrosis. No indication of TBC".

As part of the experiment, three of the children's X-rays were reported in 1945 by Schubert, a senior physician at Berlin's Charite Hospital and retrieved from Heißmeyer's hidden box [8,10]:

- On the lungs of Jacqueline Morgenstein, aged 12: he reported: "on the left, the diaphragm is obscured by density in the lateral lung fields. This density extends from diaphragm to the anterior fourth rib"
- Regarding the case of Lelka Birnbaum, aged 12: he reported "dense shadow in the lower right lobe, as appears in adults when given an inoculation in to the lungs"
- Regarding the case of Sergio de Simone, aged 7, the condition could well have been caused by an injection into the lungs"

The results were all interpreted as typical of tuberculosis infection of the lung [8-11].

The children were ordered by the Berlin office of the SS to be murdered on the Fuehrer's last birthday, 20 April 1945. The 20 Jewish children were given morphine and, once semi-comatose, were hanged by Obersturmfuehrer (First Lieutenant) Arnold Strippel on hooks in the dressing rooms of the neighboring Bullenhusser Damm School. The reason for the injection of a non-lethal low dose of morphine may have been its scarcity at the time.

Trezinski, previously in Auschwitz and Majdanek extermination camps and the chief medical officer in the Neuengamme camp, arranged the nooses around the children's necks. One child, too light in weight, while hanging on the hook, needed an SS man's weight to be pulled down. All of the children's bodies were cremated early the next morning and apparently all evidence erased.

To eliminate any proof of these most inhuman experiments, four adults who cared for the children, two French physicians (Gabriel Florence and Rene Quenouille) and two nurses, were also murdered [8,11,12].

## DISCUSSION

### WHY DID THE HEISSMEYER EXPERIMENT FAIL?

The concepts of autovaccine theory and of modern immunotherapy are important developments in 21st century therapeutics. Some malignant and chronic inflammatory diseases were already similarly treated during the previous century, but are more extensively developed currently [13-15].

Heißmeyer's ignorance in bacteriology and serology was exposed at his court trial in 1966, and his criminal experiments lacked scientific justification. One might speculate that the sought the development of an autovaccine could have been a precursor of immunotherapy, but the ethical consequences of his methods make them absolutely unacceptable.

### FINAL JUDGMENT

This gruesome story ended in 1966 in a Magdeburg court where several SS officers and chief medical officer Trzebinski were tried, found guilty, and executed.

The hangman, Arnold Strippel, was charged with crimes perpetrated in Majdanek, Buchenwald and Ravensbrück extermination camps and for the hanging of the Jewish children and 42

**Figure 3.** Name of children engraved on memorial plaque at Bullenhusser Damm School

| Name | Age at time of death in years | Country of birth |
|---|---|---|
| Mania Altman | 5 | Poland |
| Alexander Hornemann | 8 | Netherlands |
| Marek Steinbaum | 10 | Poland |
| Roman Zeller | 12 | Poland |
| Georges Andre Kohn | 12 | France |
| Jacqueline Morgenstern | 12 | France |
| Eleonora Witonska | 5 | Poland |
| Ruchla Zylberberg | 10 | Poland |
| H. Wasserman | 8 | Poland |
| Rywka Herszberg | 7 | Poland |
| W. Junglieb | 12 | Yugoslavia |
| Eduard Hornemann, 12 | 12 | Netherlands |
| Marek James | 6 | Poland |
| Sergio de Simone | 7 | Italy |
| Eduard Reichenbuam | 10 | Poland |
| Surcis Goldinger | 11 | Poland |
| Roman Witonski | 7 | Poland |
| Lelka Birnbaum | 12 | Poland |
| Lola Kligerman | 8 | Poland |
| Blumel Mekler | 11 | Poland |

**"HERE YOU STAY SILENT, BUT WHEN YOU LEAVE, BE SILENT NO MORE"**

Soviet adults in Neuengamme. He was convicted in Dusseldorf Court in 1981 and received a 3.5-year sentence. He was released a short time later and received a large sum of money as reimbursement for loss of earnings, and as social security contributions. He died a free man in Frankfurt in 1991.

During his 1966 trial in Magdeburg, Heißmeyer was asked by the judge why he did not experiment first on guinea-pigs? His reply was that all the adult inmates had already been condemned to be murdered. Concerning the children, his replied, “I saw no difference between guinea pigs and Jewish children.”

During his verdict the judge stated, "Of all the atrocities I have seen perpetrated in Nazi regime, the story of these children must be the cruelest of all".

Heißmeyer’s sentence was life imprisonment, which lasted one year, as he died from myocardial infarction in prison.

In 1943 Selman Abraham Waxman developed streptomycin for use in the treatment of tuberculosis. He was awarded the Nobel Prize in 1952. By May 1945 streptomycin was in daily use in American clinics. It could have saved the children, but for their last minute murder, just days before the end of WWII.

The Bullenhuser Damm School, near Hamburg and the murder site of the children, was rebuilt after the war. It exists today as the Janusz Korczak School, the alter name of Dr. H. Goldschmit, director of an orphanage in Poland, who opted to comfort his orphans and follow them to the gas chamber in Treblinka extermination camp [Figure 3]. A memorial plaque lists the names, birth places, and age of the children with an illustrative bas-relief.

It is now 75 years since these most hideous of pseudo-scientific experiments were performed on children, to justify discredited theories of racial inferiority and concluded with the mass murder of the children. Those actions contravened all ethical medical laws but the perpetrators felt confident of immunity from any legal liability, guaranteed by the leader of the Third German Empire (Reich). Unfortunately many of the medical criminals escaped accountability for their deeds.

Even today, there are numerous abused children kept in slavery, at work, in intimate attacks and in drug transport, some in countries not that far from our shores. For the sake of present and future generations, we must remember these past victims.

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**Everybody knows if you are too careful you are so occupied in being careful that you are sure to stumble over something.**

Gertrude Stein (1874–1946), novelist, poet, and playwright

Capsule

## Toward a universal influenza vaccine

The development of a universal influenza vaccine is of paramount importance because seasonal vaccines vary in terms of protection. **Darricarrère** and colleagues moved a universal influenza vaccine one step closer to the clinic. The authors vaccinated non-human primates with headless hemagglutinin-stabilized stem antigens presented on ferritin nanoparticles. The vaccines elicited antibodies that neutralized a diverse array of influenza strains, suggesting that they would provide broad protection against influenza infection in vivo. These vaccines, which are now in clinical trials, are promising candidates as broadly protective influenza vaccines.

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Eitan Israeli

Capsule

## An ATLAS to find tumor neoantigens

Tumor neoantigens are cancer-specific antigens that are not found in healthy cells and play a major role in anticancer immune responses. Immunotherapies such as cancer vaccines can be based on known neoantigens, but it is often difficult to identify suitable targets. By using a bioassay called ATLAS, **Lam** et al. identified potential neoantigens in patients with lung cancer, and then characterized the immune responses to these antigens in a murine tumor model. A similar approach was applied to patients with multiple cancer types who were participating in a cancer vaccine trial. ATLAS-identified neoantigens include promising immunogenic candidates for vaccination that offer safe targets and potential for good clinical responses.

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