

What the Lebendige Kraft and Kellogg's sanatorium have in common is that they both were places where patients were trained to conduct a strict regime, constantly practicing self-control and focusing on the health of their body and mind. This phenomenon is still seen in today's wellness practices, where it is commonly described as 'healthism'. As today, Bircher-Benner's numerous patients were practicing healthism without any compulsion from outside but nevertheless influenced by the presence of a higher authority, personified in Dr. Senior, as Bircher-Benner was called inside the Lebendige Kraft. The French sociologist and philosopher Michel Foucault described this phenomenon as 'governmentality', and saw it as a crucial factor in making modern societies work.

Medicine in the Media Age

To conclude: in which way did the Swiss physician Maximilian Bircher-Benner have an influence on medicine? It was not his somehow weird theory of nutritional energy from solar light, which had never been broadly accepted. Even if he promoted an ideal dietary plan that has some similarities to the ones of today, there is no direct line between the two, since he promoted raw food for partly different reasons. His nutritional eponym in the German-speaking world – Birchermuesli – is less and less known, while muesli's recipe and image have substantially moved away from the original form. However, Bircher-Benner, like John Harvey Kellogg and others, had a remarkable influence on medicine in a broader sense. His ideas of *Ordnungstherapie*, with its strict health regime, his internationally renowned sanatorium to practice this regime and a multifaceted set of mass media to promote it established an early and well-known platform of modern popular health practices, for better or for worse. Remember this the next time you bite into an apple instead of a steak.

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Further Reading

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The

Up to the 1870s operative surgery hardly existed and was, in most places, a dirty and brutal business. Infections were rife and septic bleeding common. But in Bern a Swiss surgeon was developing a careful, precise technique that would revolutionize operations forever.

U. TRÖHLER

In 1909, the eminent Swiss surgeon Theodor Kocher delivered his lecture as that year's Nobel laureate in Medicine or Physiology. In his oration, he discussed the rapid progress made in previous years, saying: 'In the great majority of so-called internal diseases a surgical treatment crowned with the most splendid curative successes has been made possible. Within less than half a century, it has become possible to expose all organs of the body – brain and heart not excluded – without danger, and to carry out the necessary surgical interventions on them.'

Indeed, when Kocher had made his career choice in the middle of the 19th century, surgery was undergoing a radical and exciting period of change. In 1846 and 1847 inhalation anesthesia with ether and chloroform, respectively, had started their triumphal march around the world. A decade later, Rudolf Virchow proposed the doctrine of the cellular origin of diseases, providing the theoretical basis for interventions in all bodily cavities, and in 1867 Joseph Lister first published on his antiseptic tech-

niques. Surgery was developing from a craft into a science and would, in the following decades, become one of the most active and successful fields of medicine (lacking such tools as hormones, antibiotics and vitamins, internal medical treatments of the time were restricted to diet, bed rest and herbal remedies).

Early Years

Theodor Kocher, the second of six children of an engineer father and a deeply religious mother, was born in Bern on August 25, 1841. He studied medicine in Bern and Zürich, where he was also taught by the surgeon Theodor Billroth. After his university studies, Kocher broadened his horizons by visiting leading surgical clinics throughout Europe. He visited Berlin and London, and – being fluent in German, French and English – was able to meet with such important figures as Rudolph Virchow, the pathologist, and Thomas Spencer Wells. The latter he had witnessed performing Switzerland's first ovariectomy (oophorectomy) in Zürich. Kocher ended his tour in Paris where he was not impressed by the dirty surgery he saw.

Upon his return to his hometown, he became resident in the department of surgery at the University of Bern. In 1872, at just 31 years of age, he was appointed Chair of Surgery. Deeply rooted in his native Bern, in later life he would turn down opportunities of chairmanships in major cities of German-speaking Europe, including Prague, Vienna and Berlin.

Kocher's meticulous nature and zeal for perfectionism were perfectly suited to the challenge of improving surgery. For one,

despite the basic advances mentioned, hospital infections and septic bleeding were still commonplace. Unlike most surgeons of the time, who saw speed as a sign of operative finesse, Kocher developed a slow, methodical technique where precision was key. He saw painstaking hemostasis as of critical importance. Kocher rejected the then common technique of mass ligation

of the arteries and developed 'Kocher clamps' for use as hemostats. From the mid-1880s, based on animal experiments by the Bern physiologist Hugo Kronecker, Kocher combated 'shock' during surgery by administering warm 'physiological' saline intravenously. These are just two points of Kocher's system of 'safe' surgery, described in five increasingly voluminous German editions of a textbook on surgical operations (1892–1907), which was eventually translated into six languages.

Kocher's surgery, like that of most of his contemporaries, was initially based on pathological anatomy and aimed to simply remove diseased tissue. However, in his later period, he began to foster 'physiological' surgery, aiming not just to remove the diseased parts but, when doing so, attempting to preserve or to restore bodily functions.

In these buoying decades Kocher was able to contribute significantly to domains which have long since become specialties (see table). In addition to his work in general surgery, he also made advances in asepsis, anesthesia, endocrinology, neurology and neurosurgery. He invented instruments, a high-pressure sterilization device, a mask for inhalation anesthesia, and, above all, many specific operative procedures that are still called by today's surgeons by his name.

Kocher's innovations and masterly technique turned his clinic in Bern into a world-renowned center of excellence. In themselves his advances in surgical methods would have been enough to earn him name recognition from every student of surgery the world over, but Kocher will forever primarily be linked with his insights into a critical gland that, during his time, was so enigmatic that physiologists generally thought it had no function at all – the thyroid.

The Thyroid

From the 1830s onwards, surgeons and physiologists in many countries removed the thyroid gland from various species of animal to see what happened. The results were ambiguous: since neither antiseptics nor the existence of the parathyroid glands were known, it was not possible to know

‘Kocher aimed not just to remove diseased parts, but to preserve and restore function’



THEODOR KOCHER
(1841–1917)

Subtle Knife

whether the post-operative observations reflected infection or an organic failure.

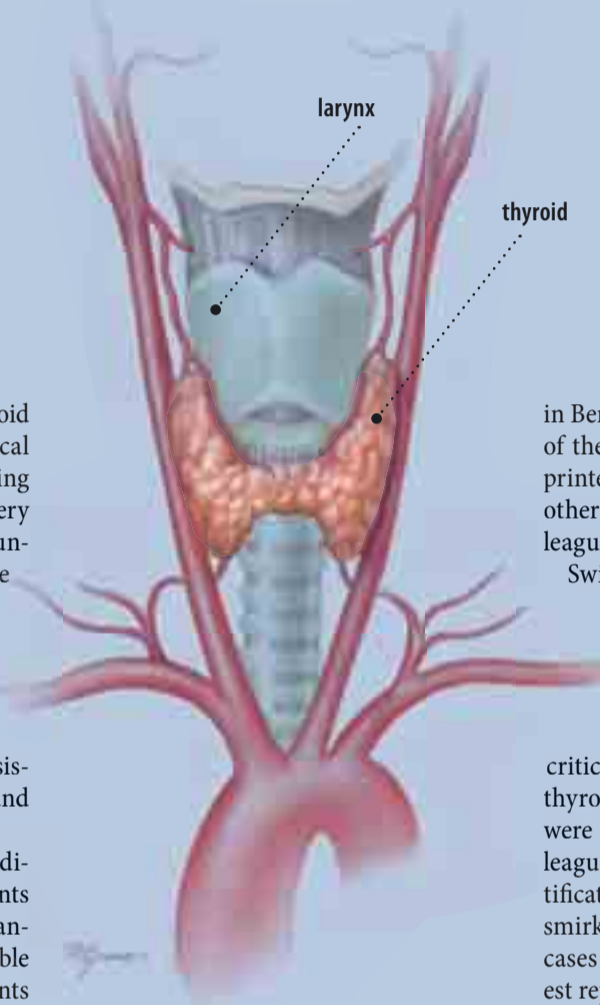
As physiologists had been unable to determine a function for the thyroid, surgeons of the time assumed it had none, and so some removed the gland in its entirety.

Thyroidectomy was an important intervention for Kocher working in Bern, for there was a particularly high incidence of endemic goiter (a swelling of the thyroid gland caused by iodine deficiency). After performing his first thyroidectomy in 1872, Kocher would perform the surgery over 7,000 times in his career. Increasingly he followed the prevailing wisdom of the time and completely ablated the gland, until he made an unexpected and personally terrifying discovery which would change this opinion forever.

In 1874 Kocher had performed a complete thyroidectomy on a young girl. When he saw her again, early in 1883, he realized that she had undergone a ‘complete and

substantial change’ and become cretinoid (a condition of severe stunting of physical and mental development). In 1883, during a lecture to the German Society of Surgery in Berlin, Kocher explained – using the un-sentimental language of the time – the difference between this girl and her younger sister, with whom she had previously often been confused: ‘Whilst the younger sister has now grown up to a blossoming young woman of very pretty looks, the sister operated on has remained small and exhibits the ugly looks of a semi-idiot.’

After this discovery, Kocher immediately wrote to 77 of the 102 goiter patients he had operated on since 1872. Not all answered or came to see him, but he was able to notice a difference between 28 patients in whom he had carried out a partial removal of the gland, and the 24 in whom the gland had been completely ablated. While the partial removal group were in good



in Berlin). A list summarizing the features of these 102 patients was included in the printed version of his lecture, as were another 134 cases collected from 15 colleagues in German and French-speaking Switzerland and southern Germany. It was an early example of a complete surgical audit, which included frank reporting of mishaps.

Although Kocher had initiated this masterly lecture with a long, critical review of operative techniques in thyroid surgery, the reactions to his talk were mixed. While one or two of his colleagues realized its main point – the identification of a new disease entity – others smirked that the large number of thyroid cases he reported (his was by then the largest reported series operated on by any single surgeon) reflected solely his lust for operating, and so dismissed his ideas. Most participants at the congress were un-receptive to the new information, thinking that Kocher’s cachexia strumipriva was nothing really new. For them, the early stages of cretinism were characterized by an increase of thyroid volume. So-called cachexia strumipriva, they believed, was simply a late stage of cretinism which had developed despite the removal of the thyroid. Such a view meant that there was no

health ‘very happy with and grateful for the success of the operation,’ only two of the complete removal group showed an improvement.

In the girl who first caused Kocher alarm, he noted slow physical and mental decay following the total removal of the gland, puffiness of the face, hands and body, decreased growth in height and noticeable pallor caused by anemia. He designated the concurrence of these and other physical signs as a new disease specific to the removal of the gland. He concluded that its relation to ‘idiotism and cretinism’ was unmistakable, and so named the condition ‘cachexia strumipriva’ (decay resulting from the lack of goiter).

In his lecture to the German Society of Surgery, Kocher speculated at length about the possible functions of the thyroid (his discussion ran to 15 pages in the printed version of his speech). In conclusion he said that the thyroid’s task was ‘to paralyse the influences which produce stupidity.’ In support of his hypothesis he used examples from the complete list of all 102 cases on whom he had operated between May 1872 (when he had taken over as head of the Bern surgical clinic) and March 29, 1883 (five days before his lecture

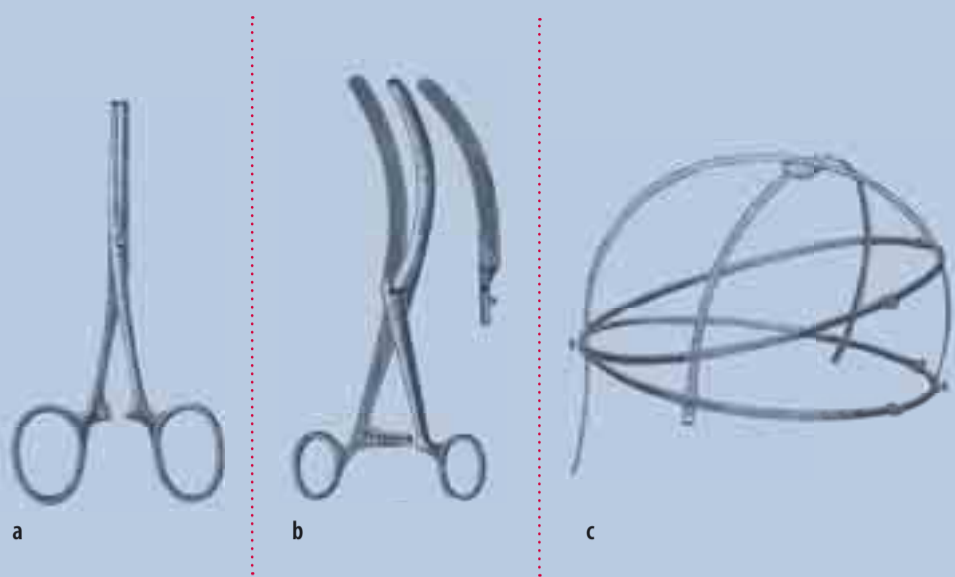


Terrifying discovery: In 1883 Kocher realized that complete thyroidectomy could cause cretinism. In lectures he used this photo of two sisters, previously alike, to illustrate the ‘complete and substantial change’ after surgery on the older sister (on the right in **a** and left in **b**).

Kocher’s innovations impacted on many fields of surgery

Trauma	Introduced ‘reduction technique’ for shoulder dislocation, based on an exact anatomical and functional study of the shoulder joint.
Surgical instruments	Developed numerous surgical instruments. In addition to his clamp for stopping minor bleeding, he also devised a craniometer, artery and bowel clamps, probes, kidney-holding forceps, scissors, chisels and files. Yet many contemporary surgeons attached their names to their own similar ‘inventions’.
Anesthesia	As did other surgeons, Kocher devised sequential chloroform-ether narcosis and designed better masks for delivery of the gases. He introduced pre-operative preparation of patients who were to receive anesthesia to avoid aspiration of gastric content.
Goiter	Described effects of total and partial thyroidectomy. Was able to ‘measure’ and explain increased, decreased and normal functioning of the thyroid.
Methodology	Prioritized hygiene, counseled against washing hands in stagnant water. Investigated effects of various techniques for sterilization. Kept meticulous surgical records that quantified success and failure.

Further discussion of many of the above innovations can be found in Ake André-Sandberg and Gaby Mai’s 2001 article for *Digestive Surgery*, ‘Theodor Kocher (1841–1917) – A Surgical Maestro’ (vol. 18, pp 311–316). It is available at www.karger.com/dsu.



Instruments of a maestro: Surgical tools designed by Kocher.

a The Kocher clamp, an arterial forceps with serrated blades and interlocking teeth at the tips for controlling bleeding or holding tissues. **b** Bowel clamp. **c** Craniometer. Illustrations reproduced from a catalog from M. Schaerer AG in Bern (1907), which produced the instruments according to Kocher's drawings

specific function of the gland that would have been abolished once the gland had been removed.

Kocher insisted that the thyroid had specific functions, and tried – in vain – to isolate the ‘active principle’ using chemical techniques. However, he did not at this time conceptualize the gland as having a remote function, instead explaining it mechanistically by its local action.

So convinced was Kocher that the thyroid had important functions, that from 1883 onwards he began implanting human thyroid tissue in thyroidectomy patients in an attempt to replace the loss of the postulated functions. In so doing, he became the pioneer of organ transplantation.

Kocher continued to refine his operating technique on the thyroid (and on thyroid transplantation) throughout his life and eventually achieved a complication and mortality rate for thyroidectomy of just 0.5%, which was astonishingly low at the time – and still is today.

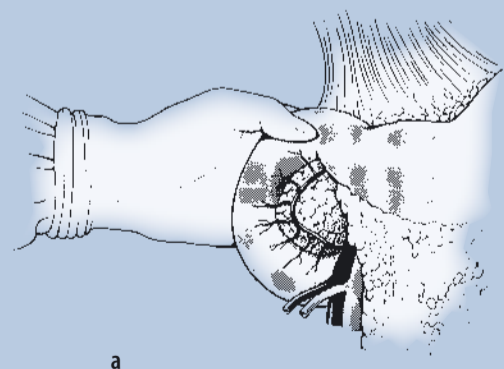
Kocher went too far with one of his claims during his Berlin lecture, however. He claimed that ‘for the first time – as far as is known to us – a relation of dependence between the thyroid gland and cre-

tinism has been demonstrated with certainty’. This was an overstatement. Well known clinical and anatomical observations – not least in cretins – had led to such thoughts during previous decades, particularly in Great Britain, yet proof had been lacking.

Kocher also failed to acknowledge his contemporary and colleague in Geneva, Jacques-Louis Reverdin. Aware of the British literature, Reverdin had coined the term ‘myxoedeme opératoire’ in one of a series of articles in the *Revue Médicale de la Suisse Romande*, beginning 11 days after Kocher's lecture in Berlin. The context of the publication of Kocher's and Reverdin's findings led to a priority contest between the two Swiss surgeons.

Both Reverdin and Kocher contributed to the discovery that lack of thyroid gland causes severe physical and mental damage, and in so doing laid the basis for what we now call endocrinology. That said, Kocher's prompt and detailed description of his investigation of a possible adverse effect of his therapeutic intervention is a real milestone. The paper is a classic example both of surgical audit and of the investigation of unanticipated effects of a treatment which had been deemed to be safe.

Surgery was developing from craft to science, and would soon be the most successful branch of medicine



a



b

Kocher's maneuver: The term ‘Kocher's maneuver’ is used in surgery today to describe how the head of the pancreas may be mobilized and assessed during an operation. Kocher discovered that there is a layer between the back of the duodenum and pancreatic head and the retroperitoneum which contains no important blood vessels. After separating the peritoneum along the duodenum's lateral edges, it is possible to dissect forward to the aorta and feel and inspect the pancreas head.

a Palpation of the pancreas head back side during dissection using the maneuver.

b The head of the pancreas fully mobilized after the maneuver, uncovering the vena cava inferior and the left kidney vein, and freeing the aorta's right side.

Reproduced from Aké Andrén-Sandberg and Gaby Mai's 2001 article for *Digestive Surgery*, ‘Theodor Kocher (1841–1917) – A Surgical Maestro’ (vol. 18, pp 311–316). Available at www.karger.com/dsu

Theodor Kocher
Institute

A Noble Prizewinner

Kocher's greatest legacy will always be the countless lives that would have been lost or blighted on the operating table were it not for his methods. But he did not just leave the world novel surgical techniques and tools, he also enshrined in bricks and mortar his pioneering spirit. Using the money he received from his Nobel Prize, Kocher provided an endowment to finance and build a research institute at the University of Bern that still bears his name.

Today, the Theodor Kocher Institute focuses on immunity and inflammation, as well as vascular biology and the blood-brain barrier. It boasts advanced live cell imaging equipment, including in vitro time lapse videomicroscopy and two-photon microscopy, and forms part of the university's Microscopy Imaging Center. The institute is also a significant teaching facility for students of medicine and the life sciences.

For more information on the Theodor Kocher Institute go to www.tki.unibe.ch

Recognition and Influence

Kocher's painstaking surgical technique impressed his peers and, during his lifetime, he was regarded as one of the world's foremost surgeons. In 1909 he received the imprimatur of professional excellence when he was given the Nobel Prize in Physiology or Medicine, the first surgeon to ever receive the award. The Nobel committee bestowed the award on him for his work on the ‘physiology, pathology and surgery of the thyroid gland’.

By the dawn of the 20th century, Kocher was known also in the United States and the UK as an innovative surgeon. His clinic's reputation attracted visits from such personalities as William Halsted, young Harvey Cushing, George Crile and Lord Berkeley Moynihan.

Today, Kocher's memory endures through some surgical innovations that still bear his name, such as the Kocher clamp and the Kocher maneuver. In addition, he is more publicly recognized in his hometown of Bern, where he survives visibly in two busts, and a street as well as park are named after him.

In 1967, fifty years after his death, the Swiss post office issued a commemorative stamp from which Kocher gazes out with the stern but intelligent eyes of a great surgical innovator.

The Man

Kocher was a great surgeon, entirely and exclusively devoted to his work and his patients. He was a serious man of great composure and an exacting, unemotional nature. He held that, ‘life has taught me that if one man dies from overexertion, 999 perish from doing nothing.’ This was – in a good sense, not a tyrannical one – a feature of his relations with his collaborators.

He was probably more admired and respected than loved, but this was anyhow no question. He asserted priority for his advances and the superiority of his methods up to the end of his life.

The *British Medical Journal* wrote in 1911: ‘While not slow to recognize the many surgical workers in all lands [Kocher] does not hesitate to claim for himself, in the sure knowledge of his own experience and attainments, the right to express his own opinions with no uncertain voice.’ [BMJ 1911, ii, 1477]. This is understandable in a man whose sole interest was surgery.

Though professionally pretentious, he was personally unassuming – his fees were considered modest by a patient from the highest ranks of the aristocracy. This had to do, perhaps, with his religious beliefs. He and his wife belonged to the pietist association of the Moravian Brothers. His religion helped him to relativize his successes and to overcome the inevitable misadventures, which affected him very deeply. It was also the motivation for him to donate the Nobel Prize money for a research institute, the future Theodor Kocher Institute of Bern University, which carries forward his spirit of research to this day (see box).

Further Reading

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An extended reading list is available online at www.karger.com/gazette

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Prof Tröhler was founding president of the European Association for the History of Medicine and Health. He has written extensively on the history of regulation of animal and human experimentation, surgery and obstetrics. He is co-editor of the James Lind Library (www.jameslindlibrary.org).