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Bingel read medicine in Tübingen, Leipzig, Munich and Berlin, where he graduated in 1902, qualifying MD with a pathological-anatomical dissertation. After some further travel, he continued in this field in Leipzig and became assistant to the professor of internal medicine Ernst von Romberg (1865-1933) in Marburg and Tübingen. Romberg was interested in circulation research and neurology (see *Romberg's symptom*).

In 1910 Bingel accepted the position of chief of internal medicine at the City Hospital in Braunschweig (Brunswick), Germany, a post that he held until 1948. Throughout this period, his clinical practice and research covered all of internal medicine as it was defined when he began. This included neurology, dermatology, endocrinology, radiology and even some gynaecology and paediatrics (he performed over 150 tracheotomies in children with diphtheria).

In addition to the therapeutic trial he reported in 1918, Bingel developed innovative diagnostic tests and technologies, some of which were instrumental in the development of subspecialities. For example, he carried out more than a hundred liver biopsies (with decreasing fatality rates); and he used the sphygmomanometer he developed for more accurate measurement of diastolic blood pressure (1906). Taken together with his clinical and experimental work on proteinuria and the role of renin (discovered in 1898), the latter led to better understanding of hypertension associated with renal disease.

Bingel deserves particular recognition for co-inventing and introducing pneumo-encephalography into clinical practice. He discovered it by accident after puncturing a brain ventricle (which was then not uncommon) under x-ray. In 1921 he reported on 40 patients and presented his apparatus for injecting air into the lumbar canal. By 1928 he had performed 200 pneumo-encephalograms (with a fatality rate of 1%). Pneumo-encephalography had actually first been performed in 1913 by two Americans; but it had been forgotten in the United States until it was tried again around 1918 by the American neurosurgeon Walter Dandy (1886-1946). Dandy introduced pneumo-encephalography in the United States during the 1920s. His approach involved introducing air into a brain ventricle. He reported that three patients had died among the 100 on whom he had used the technique.

Bingel also used pneumo-encephalography 'therapeutically' in all forms of meningitis. Indeed, he considered it "life-saving" in acute toxic brain disease and *status epilepticus*. I am not aware of any evidence that he tested these ideas in controlled trials comparable to the one he reported on serum treatment for diphtheria. Although pneumo-encephalography was extremely disagreeable and risky for patients, and is now obsolete, it remained in use until the introduction of computerized tomography in the 1970s.

In summary, Adolf Bingel was a member of the last generation of general internal physicians who practised and did significant research in fields that have since become highly specialised. This may have reflected the fact that he was not working in an university clinic (where sub-specialities often originated), but rather in a general city hospital where he had to cover a broad range of responsibilities. Further research is required into Bingel's motivation for the prospective clinical trial presented in the *James Lind Library*, the epistemology of his other therapeutic studies, as well as other aspects of his biography.

References

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