Medical Hypotheses

Medical Hypotheses (1995) 44, 254–256

Is Karl Landsteiner the Einstein of the Biomedical Sciences?

S. SRI KANTHA

5-16-305 Tsukimicho, Fukuroi City, Shizuoka 437-01, Japan

Abstract — If Albert Einstein is the acclaimed peerless genius among the physical scientists of this century, who can claim the equivalent title among the biomedical scientists? The research contributions of 24 Nobelists in medicine (contemporaries of Einstein) who received the Nobel prize between 1912 and 1966 were analyzed. When assessed on three criteria, (a) influence in multiple disciplines, (b) revolutionary in opening new vistas of knowledge, and (c) significant impact to human life, Karl Landsteiner's discoveries of the human blood groups stand out prominently. Thus, Landsteiner seems an appropriate choice to use as a 'control' to analyze Einstein's productivity.

Introduction

If Albert Einstein (1879–1955) is the acclaimed peerless genius among the physical scientists of this century, who can claim the equivalent title among the biomedical scientists? While continuing my studies on Einstein (1,2), I posed this question, to find an 'appropriate control' for analyzing Einstein's productivity. In this paper, I attempt to show that Karl Landsteiner (1868–1943) seems an appropriate choice.

Einstein's contemporaries

From standard reference sources (3,4), I compiled a list of 24 Nobelists in medicine who were born 15 years before or after Einstein and thus could be considered as contemporaries of Einstein. The names of these biomedical scientists and the significant discoveries with which they are identified are shown in Table 1.

Among the 24 Nobelists, contributions of Fibiger and Egas Moniz have not stood the test of time (5,6). The Nobel awards of Banting (for discovery of insulin) and Waksman (for discover of streptomycin) raised controversy because their junior collaborators, namely Charles Best and J.B.Collip (7) and Albert Schatz (8) were not given equal recognition. Similarly, Szent-Gyorgyi's claim for fame in elucidating the biological activity of ascorbic acid has also been questioned (9). The remaining 19 Nobelists in medicine, listed in Table 1, can be grouped, according to their research speciality, as follows:

Neurology: Adrian, Dale, Loewi, Erlanger, Gasser, Hess
Physiology: Barany, Hill, Krogh, Spemann
Pathology: Landsteiner, Minot, Whipple
Biochemistry: Warburg, Doisy, Kendall
Microbiology: Fleming, Rous
Surgery: Carrel.

There is little doubt that all made pioneering contributions to their disciplines. However, when assessed on three criteria, namely (a) influence in multiple disciplines, (b) revolutionary in opening new vistas of

Date received 7 June 1994
Date accepted 24 August 1994

Table 1 Nobelists in medicine, born between 1864 and 1894

Scientist*	Year of birth–death	Significant discovery
Edgar Adrian (1932)	1889–1977	Function of the neurons
Frederick Banting (1923)	1891–1941	Insulin
Robert Barany (1914)	1876–1936	Physiology of vestibular apparatus
Alexis Carrel (1912)	1873–1944	Suturing of blood vessels
Henry Dale (1936)	1875–1968	Chemical transmission of nerve impulse
Edward Doisy (1943)	1893–1986	Chemical nature of vitamin K
Antonio Egas Moniz (1949)	1874–1965	Therapeutic value of leukotomy
Joseph Erlanger (1944)	1874–1965	Highly differentiated function of single nerve fibres
Johannes Fibiger (1926)	1867–1928	*Spiroptera* carcinoma
Alexander Flemming (1945)	1881–1955	Penicillin
Herbert Gasser (1944)	1888–1963	Highly differentiated functions of single nerve fibres
Walter R. Hess (1949)	1881–1973	Functional organization of interbrain
Archibald V. Hill (1922)	1886–1977	Production of heat in muscles
Edward Kendall (1950)	1886–1972	Hormones of adrenal cortex
August Krogh (1920)	1874–1949	Regulation of motor mechanism of capillaries
Karl Landsteiner (1930)	1868–1943	Human blood groups
Otto Loewi (1936)	1873–1961	Chemical transmission of nerve impulses
George Minot (1934)	1885–1950	Liver therapy against anemia
Francis Payeton Rous (1966)	1879–1970	Tumor-inducing virus
Hans Spemann (1935)	1869–1941	Organizer effect in embryonic development
Albert Szent-Gyorgyi (1937)	1893–1941	Ascorbic acid and the catalysis of fumaric acid
Selman Waksman (1952)	1888–1973	Streptomycin
Otto Warburg (1931)	1883–1970	Action of cytochrome oxidase
George Whipple (1934)	1878–1976	Liver therapy against anemia

*Year of Nobel award is given in parentheses.

knowledge, and (c) significant impact to human life, the work of Landsteiner stands out prominently. His trendsetting discoveries between 1900 and 1940 (10–17), as shown in Table 2, permitted successful blood transfusions in humans and gave life and hope to millions.

Landsteiner's work

What made Landsteiner such a trend-setter? In the opinion of a 1985 Nobelist in Medicine, Joseph Goldstein, 'He (Landsteiner) applied his chemical knowledge to the clinical problem of transfusion reactions

Table 2 A summary of Landsteiner's significant discoveries

Year	Discovery	Ref.
1900	Demonstration of the existence of different types of human blood (A, B and O groups).	10, 11
1903	Feasibility of grouping dried human blood stains and the usefulness of such tests in forensic medicine.	12
1908	First to isolate the polio virus and demonstrate the use of monkeys as an experimental model in polio research.	13
1927–1928	Discovery of additional blood groups (M, N and MN) - equally useful as the A, B and O group, in anthropological research (with P. Levine)	14–16
1940	Discovery of Rh-blood groups (with A. S. Wiener)	17

and the result was the discovery of A, B and O blood groups and the theory of chemical immunity' (18). According to Silverstein, a historian of immunology, Landsteiner's 1900 observation on the specificity of isoantibodies in the human blood 'opened up the field of blood groups, of such great future importance in blood transfusion, immunogenetics and anthropology' (19).

The 1922 discovery of insulin and the 1929 discovery of penicillin also significantly influenced the human life in comparable terms to that of the discovery of human blood groups in 1900. However, in impact on multiple disciplines and opening new vistas of knowledge, Landsteiner's contributions seem extraordinary in comparison to the groups which worked on insulin and penicillin. The 'insulin group' in Canada consisted of Banting, Best, McLeod and Collip. The 'penicillin group' in Britain was made up of Fleming, and Oxford professors Florey and Chain. Contrastingly, Landsteiner's landmark discoveries made at the turn of this century were solitary contributions. In this respect, his effort resembles that of Einstein's. Furthermore, Einstein's research career began in Switzerland (1902–1913), flourished in Germany (1914–1932) and was concluded in the USA (1933–1955). Landsteiner's career also spanned three countries; his native Austria (1891–1919), Netherlands (1919–1922) and the USA (1922–1943).

Conclusion

Landsteiner's pioneering discoveries made between 1900 and 1940 make him a peerless genius among the biomedical scientists of the 20th century. Einstein's significant contributions to physics and cosmology were also made within this time span. Thus, Landsteiner seems an appropriate choice to use as a 'control' to analyze Einstein's productivity. The parallels between the careers of Landsteiner and Einstein as well as their scientific productivity are being examined now and will be presented in a subsequent communication.

References

1. Kantha S S. Albert Einstein's dyslexia and the significance of Brodmann Area 39 of his left cerebral cortex. Med Hypotheses 1992; 37: 119–122.
2. Kantha S S. An appraisal of Albert Einstein's chronic illness. Med Hypotheses 1994; 42: 340–346.
3. Schlessinger B S, Schlessinger J H. The Who's Who of Nobel Prize Winners. Oryx Press, Phoenix, Arizona, 1986.
4. Bendiner J, Bendiner E. Biographical Dictionary of Medicine. Facts on File, New York, 1990.
5. Stolley P D, Lasky T. Johannes Fibiger and his Nobel prize for the hypothesis that a worm causes stomach cancer. Ann Intern Med 1992; 116: 765–769.
6. Valenstein E S. Great and desperate cures. Basic Books, New York, 1986.
7. Bliss M. Who discovered insulin? News Physiol Sci 1986; 1: 31–36.
8. Wainwright M. Streptomycin: discovery and resultant controversy. Pubbl Stn Zool Napoli (II) 1991; 13: 97–124.
9. Jukes T H. Szent-Gyorgyi and vitamin C. Nature 1988; 332: 390.
10. Landsteiner K. Zur kenntnis der antifermentativen lytischen und agglutinierenden wirkung des blutserums und der lymph. Zentralbl Bakteriol Parasit Infekt 1900; 27: 357–362.
11. Landsteiner K. Ueber agglutinationserscheinungen normalen menschlichen blutes. Wien Klin Wochenschr 1901; 14: 1132–1134 (for an English translation, see Kappus A L. Transfusion, 1961; 1: 5–8).
12. Landsteiner K, Richter M. Ueber die verwertbarkeit individueller blutdifferenzen für die forensische praxis. Zeitschr Medizin 1903; 16: 85–89.
13. Landsteiner K, Raubitschek H. Demonstriert mikroskopische präparate von einem menschlichen und zwei affenrückenmarken (poliomyelitis). Wien Klin Wochenschr 1908; 21: 1830.
14. Landsteiner K, Levine P. A new agglutinable factor differentiating individual human bloods. Proc Soc Exp Biol Med 1926–1927: 24: 600–602.
15. Landsteiner K, Levine P. Further observations on individual differences of human blood. Proc Soc Exp Biol Med 1926–1927: 24: 941–942.
16. Landsteiner K, Levine P. On individual differences in human blood. J Exp Med 1928; 47: 757–775.
17. Landsteiner K, Wiener A S. An agglutinable factor in human blood recognized by immune sera for Rhesus blood. Proc Exp Biol Med 1940; 43: 223–224.
18. Goldstein J L. On the origin and prevention of PAIDS (Paralyzed Academic Investigator's Disease Syndrome). J Clin Invest 1986; 78: 848–854.
19. Silverstein A M. History of immunology: the dynamics of conceptual change in twentieth century immunology. Cell Immunol 1991; 132: 515–531.