

Bioethics in Anatomy Education Resources:

Evidence-Based Dermatome Maps: History and Ethics

Description:

These PowerPoint slides provide an introduction to the history of dermatome mapping and the resulting variations in these maps. Ethical questions surrounding the increase in anatomical knowledge, or anatomical epistemology, are outlined in relation to evidence-based dermatome maps.

The topics covered by this resource include:

Dermatome maps

Ethics – consent

Epistemology in anatomy

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Further reading:

Lee MW, McPhee RW, Stringer MD. 2008. An evidence-based approach to human dermatomes. *Clin Anat.* 21(5):363-373. doi: 10.1002/ca.20636.

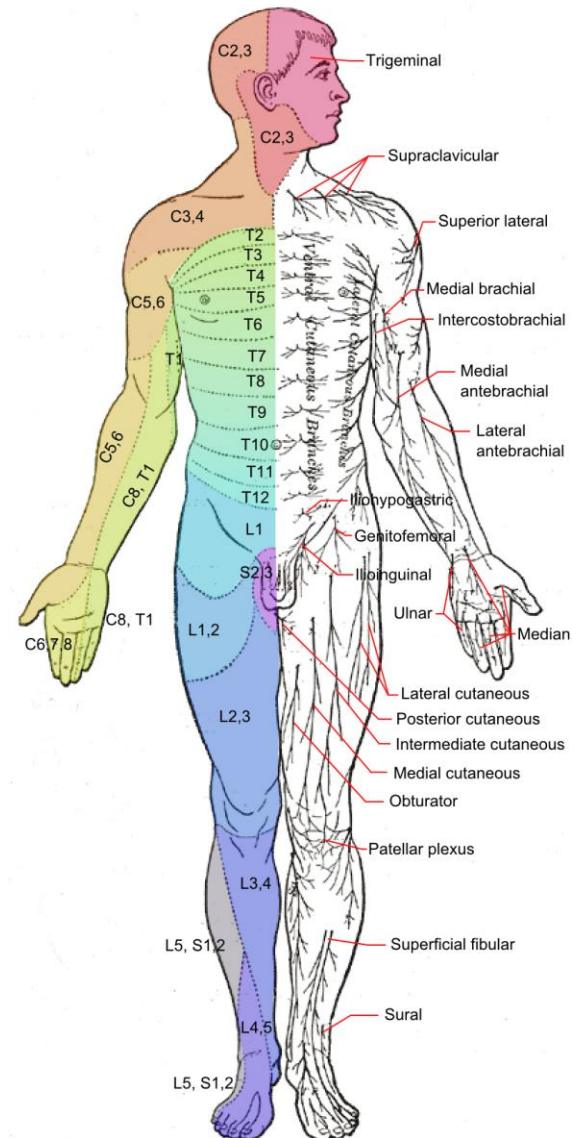
Freeman B, Carmody J, Grace D. 2022. Ethical questions arising from Otfrid Foerster's use of the Sherrington method to map human dermatomes. *J Hist Neurosci.* 4:1-22. doi: 10.1080/0964704X.2022.2029226.

Evidence-Based Dermatome Maps: History and Ethics

Dermatomes are the segmental skin areas supplied by one spinal nerve and its anterior (ventral) and posterior (dorsal) primary rami. Maps of dermatomes are used in all medical education curricula, as knowledge of spinal nerve distribution is clinically important.

Little attention has been paid to the variations exhibited in dermatome maps produced by different authors, with few publications examining why such variations may exist.

Exploring the history of dermatome map generation reveals methods of human research that would be considered highly unethical today, including both neurophysiological and surgical approaches.

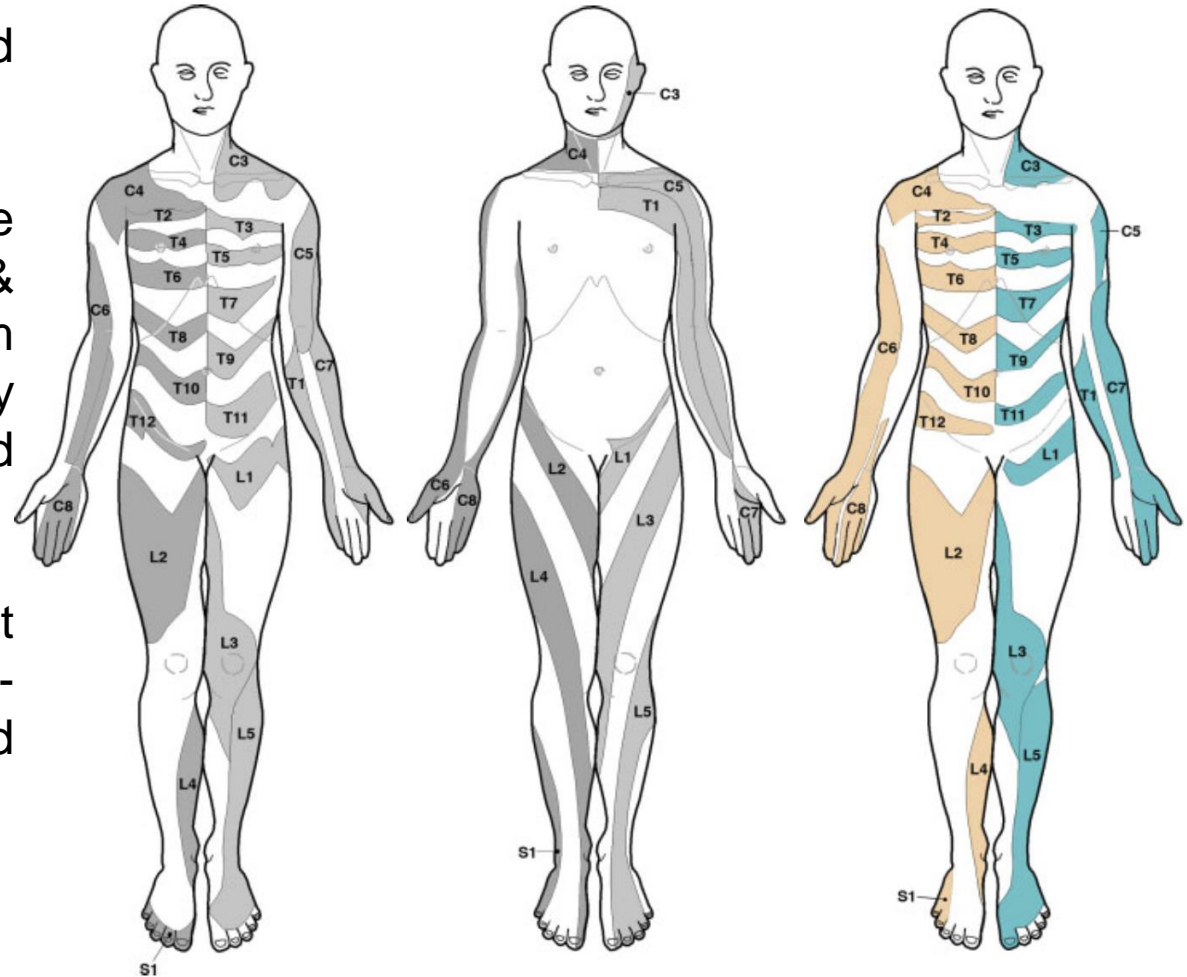


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Lee, McPhee and Stringer (2008) compared 14 dermatome maps and identified areas of variation.

For example, compare the distribution of the C3, C4 & C5 dermatomes on the arm and shoulder in the maps by Head & Campbell and Keegan & Garrett.

The authors concluded that an evidence-based dermatome map was needed and they developed their own.



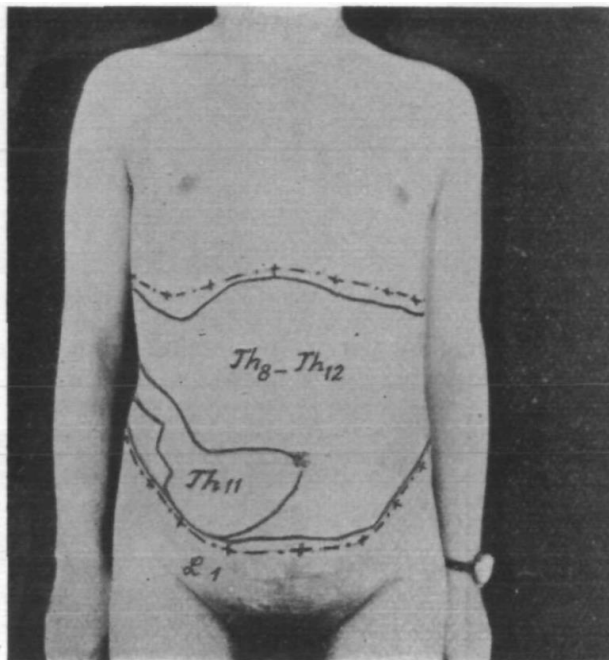
Head & Campbell
1900

Keegan & Garrett
1948

Evidence-based Map
(From: Lee, et al., 2008)

Evidence-Based Dermatome Maps: History and Ethics

Among the commonly used dermatome maps is one created by Otfried Foerster (1873-1941), a renowned neurologist. To generate information on dermatome distribution, he employed dorsal rhizotomy – the surgical disruption of dorsal (posterior) roots – which at the time was used in the treatment of patients with pain syndromes or spasticity. He performed sequential rhizotomies on patients and would leave one nerve root intact to map the resulting dermatomal pattern.



I have had the opportunity of defining a great number of dermatomes in man by exactly the same method as that used by Sherrington, that is by outlining the borders of the sensibility which remains after a large number of contiguous roots have been divided, and a single root in the middle of them has been left intact. I need not discuss here the circumstances under which such a selected procedure may be undertaken.

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Freeman and co-authors (2022) reviewed Foerster's publications and contemporary descriptions of his work and concluded that there was no medical (or ethical) justification for the rhizotomies performed in the manner described. The patients were most likely from the psychiatric unit of the public hospital in Breslau. It is highly unlikely that they were asked for their consent.

Questions:

Is the knowledge of variations in the maps of dermatomes relevant today?

Is the method used to gain the anatomical knowledge about dermatome maps relevant? Is this history relevant for current medical education?

Should there be an agreement on the use of evidence-based dermatome maps?

Is it justifiable to use Foerster's dermatome map knowing that it was produced in an unethical manner? Are there conditions under which it might be acceptable to use data that were obtained unethically in the past for beneficial clinical care in the present?

Would there be a way to collect dermatome data in an ethical manner?