Selye 70 years later: Steroids, ‘stress ulcers’ & H. pylori

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Hans Selye: Major original discoveries/contributions

- Classification & naming of steroids (*Science*, 1941; *Nature*, 1943; *Endocrinology*, 1942; 1944).
- Steroid anesthesia (*AJP*, 1941; *Endocrinology*, 1942).
The organ-specific contribution of Hans Selye in the development of stress concept

Adrenal gland

Cortex

Medulla

Cannon: Catecholamines

Selye: corticoids

Glucocorticoids & mineralocorticoids
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Steroids & Selye:  The early research – 1940-43


Classification of steroids


Glucocorticoids & mineralocorticoids


Effect of ACTH in acute rheumatic fever. Clinical and laboratory course of an 11-year-old girl in her second attack of acute rheumatic fever.

(After Thorn et al. B39546/49.)
The Selye-1943 & modern classification of steroids

- **Selye-1943**
  - Corticoids = Corticoids ("cortico-steroids")
  - Testoid = Androgens
  - Luteoids = Estrogens
  - Progestins
The “triad of stress” & gastric ulcers

- The “triad of stress”:
  - thymolymphatic atrophy
  - adrenal hyperemia/hypertrophy

- gastric ulcers
The FIRST reference to human ‘stress ulcers’ in 1943

  – Stress does cause gastroduodenal ulcers in healthy humans…

• Subsequent clinical studies: Patients treated with large doses of glucocorticoids often develop gastroduodenal ulcers (e.g., during rheumatoid arthritis)
Nobel Laureate Dr. Barry Marshall in Long Beach in 2006
The role of Helicobacter pylori in gastritis & ulcer pathogenesis

• H. pylori causes inflammation & cancer, NOT ulcers...
• The “Koch postulate” was satisfied only with Hp causing gastritis (inflammation), NOT ulcers...
• Hp delays the healing of gastroduodenal ulcers caused by aspirin-like drugs, other chemicals or stress...
• Most likely because it decreases the bioavailability of angiogenic growth factors (e.g., bFGF, VEGF, PDGF) that accelerate ulcer healing.
Summary

- Selye developed the first physiologically sound, structure-activity classification of steroids that was also based on the chemical structure of steroids.
- He not only introduced the names of glucocorticoids & mineralocorticoids but discovered the anti- & pro-inflammatory properties, respectively, of these steroids in animal models.
- He described the first stress-induced gastric ulcers in rats (1936) & published the first human ‘stress ulcers’ during the air-raids in London (1943).
Conclusion

Selye not only recognized, morphologically & pathophysiologically described biologic stress, but also discovered the first molecular mediators & regulators of this & other endocrine responses that involve steroids.