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This Week's Citation Classic

Friedman N B & Moore R A. Tumors of the testis: a report on 922 cases. *Milit. Surgeon* **99**:573-93, 1946.
[Army Inst. Pathology, Washington, DC and Dept. Pathology, Washington Univ. School of Medicine, St. Louis, MO]

This study brought a simple and clarifying biologic concept to the understanding of testicular germ cell and teratoid tumors. As a general theory it has survived, with modifications, and has been extended to extragenital growths with further ramifications including possibilities of therapeutic differentiation and germ cell programming of immunologic systems. [The *SCI*® indicates that this paper has been cited in over 140 publications since 1961.]

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"This study was carried out during World War II while I was stationed at the old Army Medical Museum in Washington, DC, now the Armed Forces Institute of Pathology. It was prepared as part of a tribute (*festschrift*) to our well-loved commander, Colonel J.E. Ash. It was suggested by my friend, the late Ruell Sloan, then Colonel Ash's executive officer, and written from my notes by my first wife, the late Helen Mc Francis Friedman. The collection of medical materials from our military and civilian sources had been going on since the Civil War. The combination of the enlarged 1942 Army and Colonel Ash's vision led not only to the accumulation of large case groups but to intensive study of diseases of young men.

"Much as a mass of dots in a puzzle can become a figure, so the nearly 1,000 cases of testicular cancer told their own story by the evolution of patterns in primary tumors and their metastases. The basic idea was that most testicular tumors were growths of germ cells expressing the totipotentiality of elements which could give rise to all components of the conceptus, trophoblast, somatoplasm, and germ plasm, and that these tissues could differentiate in various directions at differing times and places. It was this concept which was the basis for the subsequent important work of Pierce[1] which confirmed in animals what had been observed in man, despite the obstinacy of the Willis followers.[2] A parallel development was the identification of germinoma in the pineal by Russell[3] as well as in the thymus by me,[4] the inclusion of extragonadal tumors in the basic concept, and the significance of germ plasm in these loci.[5] Finally, the possibility of induced differentiation as a therapeutic modality in neoplastic disease was given strong impetus.

"The concepts were not entirely brand new. Some of the nineteenth-century German pathologists had anticipated them and Gunnar Teilum published similar interpretations in the 1940s in Scandinavian journals.[6] Peyron[7] had already described embryoid bodies in germ cell tumors in the 1930s.

"The frequency of citation is attributed to this being the first modern paper presenting a simple histogenetic classification of this model cancer. The terms 'teratocarcinoma' and 'germinoma' were first used here and have become standard. The entire subject was brought up to date in a presentation in January 1983, at the opening of the University of Southern California Cancer Center, the proceedings to be published by Grune and Stratton."

1. **Pierce G B, Jr., Dixon F J, Jr. & Verney E L.** Teratocarcinogenic and tissue-forming potentials of the cell types comprising neoplastic embryoid bodies. *Lab. Invest.* **9**:583-602, 1960.
2. **Pugh R C B,** ed. *Pathology of the testis.* Oxford: Blackwell Scientific, 1976. 487 p.
3. **Russell D S.** The pinealoma: its relationship to the teratoma. *J. Pathol. Bact.* **56**:145-50, 1944.
4. **Friedman N B.** The comparative morphogenesis of extragenital and gonadal teratoid tumors. *Cancer* **4**:265-76, 1951.
5. **Friedman N B & Van de Velde R L.** Germ cell tumors in man, pleiotropic mice, and continuity of germplasm and somatoplasm. *Hum. Pathol.* **12**:772-6, 1981.
6. **Teilum G.** Gonocytoma, homologous ovarian and testicular tumors. I. *Acta Pathol. Microbiol. Scand.* **27**:249-61, 1946.
7. **Peyron A.** Faits nouveaux relatifs à l'origine et à l'histogénèse des embryomes. *Bull. Assoc. Fr. Étud. Cancer* **28**:658-81, 1939.