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IS SURVIVAL TIME AFTER HEMORRHAGE A HERITABLE, QUANTITATIVE TRAIT?: AN INITIAL ASSESSMENT.

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Enhancing survival to hemorrhage of both civilian and military patients is a major emphasis for trauma research. Previous observations in humans and outbred rats show differential survival to similar levels of hemorrhage. In an initial attempt to determine potential genetic components of such differential outcomes, survival time after a controlled hemorrhage was measured in 15 inbred strains of rats. Anesthetized rats were catheterized, and approximately 24 h later, 55% of the calculated blood volume was removed during a 26-min period from conscious unrestrained animals. Rats were observed for a maximum of 6 h. Survival time was 7.7-fold longer in the longest-lived strain (Brown Norway/Medical College of Wisconsin; 306 +/- 36 min; mean +/- SEM) than in the shortest-lived strain (DA; 40 +/- 5 min; $P \leq 0.01$). Mean survival times for the remaining inbred strains ranged from 273 +/- 44 to 49 +/- 4 min (Dahl-Salt Sensitive > Brown Norway > Munich Wistar Fromter > Dahl-Salt Resistant > Copenhagen > Noble > Spontaneous-hypertensive > Lewis > BDIX > Fawn Hooded Hypertensive > FISCHER 344 > Black agouti > PVG). The variance in the hazard of death attributable to different strains was estimated to be 1.22 log-hazard units, corresponding to a heritability of approximately 48%. Graded and divergent survival times to hemorrhage in inbred rat strains are remarkable and suggest multiple genetic components for this characteristic. However, this interpretation of differential responses to hemorrhage may be confounded by potential strain-associated differences related to the surgical preparation. Identification of inbred strains divergent in survival time to hemorrhage provides the opportunity for future use of these strains to identify genes associated with this complex response.

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