ATTRIBUTIBLE CASES OF CANCER AND NEUROCOGNITIVE DISORDERS IN CHILDREN IN THE UNITED STATES BASED ON PATERNAL AGE

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ABSTRACT

Mean paternal age has increased from 1972 to 2015 from 27.4 to 30.9 years within the US. Recent studies have suggested that older fathers may have a higher risk of producing children with cancer, psychiatric disease, chromosomal abnormalities, and neurocognitive deficits. While the etiology of this trend remains largely unknown, an increased rate of de novo mutations over time as men age is likely contributory. Spermatogenesis is continuous, and aging increases the number of chromosome replication events by primary spermatocytes. Thus, while paternal age may not be a significant barrier to conception, the effects of older fathers on offspring health are certainly worth considering.

BACKGROUND

All births born in the US in 1972 and 2015 were compiled using a weighted dataset provided by the Centers for Disease Control called the National Vital Statistics System. A comprehensive literature review of cohort studies was subsequently conducted to determine specific prevalence rates for each paternal age group after adjustment for maternal characteristics. Missing rates were estimated using a linear regression model. The estimated number of births affected by each disease was calculated for each year and normalized to 4 million births to determine the association of paternal age with the number of affected births for each disease over time.

METHODS

RESULTS

- In 1972, 3,266,235 weighted births were recorded compared to 3,988,733 in 2015.
- Using published prevalence rates adjusted for maternal age:
  - 54,030 additional cases of prostate cancer
  - 107,885 additional cases of breast cancer
  - 3,774 additional cases of autism
  - 68,174 additional cases of bipolar disease
  - 35,913 additional cases of substance abuse are expected to have occurred by 2015 due to the rise in older fathers

CONCLUSIONS

- Paternal age is on the rise
- The prevalence rates of certain cancers, congenital disorders, and psychiatric illnesses have been shown to directly correlate with advancing paternal age.
- The increasing number of births affected by aging fathers is non-trivial and is likely associated with a significant economic burden that should be further evaluated.