A FATHER'S WORKOUT CAN BOOST HIS OFFSPRING'S ENDURANCE

Heredity and exercise. My genetics teachers used to repeat a simple idea: you can train hard to become a champion runner, but only your DNA will help your children become one — your exercise will not.

Now, a new paper challenges that classical view. A study in Cell Metabolism (1) shows that paternal endurance training in mice improves the aerobic capacity and metabolic health of their offspring — even when the offspring never exercised. Mechanistically, exercise remodels sperm microRNAs, which are delivered to the embryo and suppress NCoR1, a repressor of mitochondrial biogenesis pathways coordinated by PGC-1α. This early embryonic shift promotes enhanced mitochondrial function and oxidative muscle phenotype in the next generation. Importantly, injecting only sperm small RNAs from exercised males reproduces the effect, and restoring NCoR1 in embryos cancels it.

In short, this work provides strong experimental evidence that paternal exercise can transmit endurance advantages via sperm-borne microRNAs, illustrating a non-genetic, epigenetic pathway of intergenerational inheritance of fitness traits.

1. https://www.sciencedirect.com/science/article/pii/S1550413125003882?via%3Dihub