The Effects of Ovarian Somatic Cells on Post-Menopausal Health

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Background

Young women possess a significant health advantage over similarly-aged men.
Menopause: the natural cessation of menstruation and senescence of cyclic ovarian function.
Importance

- Modern medicine has extended our time of dying while our health continues to worsen
- Over 164 million women in the United States
- Over 3.5 billion women in the world

(World Bank Group, 2017)
Previous Studies

Aged Female Mouse

Aged Mouse with Young Ovaries

Average Lifespan is 650 days of age (~ 21 months)

(Peterson, et al., 2016) │ (Mason, et al. 2015) │ (Mason, et al., 2011)
Previous Studies

Ovarian germ cell depletion increased longevity

(Peterson, et al., 2017)
Hypothesis

• absence of germ cell signaling prompts the ovarian somatic cells to support organismal health

• preserving the perceived potential for germline transmission by improving health
Methods for Ovarian Somatic Cell Transplants

Donor Ovaries
- Collected from 65 day old female mice

Ovarian Somatic Cells
- Digest ovaries and separate out the somatic cells from the germ cells

Transplants
- Transplant OSCs into ovaries of old mice

Health Span Assays
- Assess health of the mice after recovery
Control Group

- 2.5 months, n=19
- 6.5 months, n=6
- 19.5 months, n=6
- 27.5 months, n=5

Treatment Group

- 19.5 months, n=10
  - GC, n=9
  - GD, n=1
- 19.5 months, OSC, n=5
Health Span Assays

Musculoskeletal  Cognition  Tremors  Cardiovascular

Arthritis  Hormones  Metabolism  Olfactory  Immunity
Health Span Assays

Musculoskeletal  Cognition  Tremors  Cardiovascular

Arthritis  Hormones  Metabolism  Olfactory  Immunity
Buried Pellet

Average Time Found (seconds)

Trial 1-5

Treatment Groups

- 72 day CNT
- 224 day CNT
- 587 day CNT
- 727 day CNT
- 552 day GC
- 552 day GD
- 588 day OSC
Average Time Spent with the Different Types of Blocks

- 183d CNT
- 251d CNT
- 671d CNT
- 811d CNT
- 663d GC
- 663d GD
- 664d OSC
Conclusion

Young ovarian germ cell depleted transplants improve aspects of health

Young ovarian somatic cell transplants improve aspects of health

Potential germ cell independent influence on health span
Future Directions

Gene Therapy with Fibroblast Cells

- Identify the genes responsible for the increase in health
- Transfect the desired genes into easily attainable cells
- Assess the treatment on health
Acknowledgments

Mason Laboratory
• Authors
• Kate C. Parkinson
• Crystal Collier

Poisonous Plant Research Laboratory
• Kevin Welsh
• Shelly Wilson

USTAR/LARC
• Dr. Aaron Olsen
• Lisa DeSoi

Committee
• Dr. Irina Polejaeva
• Dr. Clay Isom
• Dr. Heloisa Rutigliano
• Dr. Anthony Donato

Funding
• Departmental Start-Up Grant, Utah State University
• UTA01159 Utah Agricultural Experiment Station (UAES)
• Nathan Shock Center Pilot Funding Program
Potential therapeutic treatment for post-menopausal decline in health with further understanding of ovarian somatic cells.