



In certain subsets of individuals, including women and moderate smokers, the trace mineral selenium may help prevent bladder cancer, determined a recent Dartmouth study.

## Addition to knowledge about egg division

Every pregnant woman dreams of holding a healthy newborn in her arms. But a woman's age has a "very scary" effect on her chance of having a healthy baby, says Dartmouth biologist Sharon Bickel, Ph.D. A woman's risk of conceiving a baby with the wrong number of chromosomes increases from about 2% at age 25 to 35% at age 42. Aneuploidy—having an abnormal number of chromosomes—is the leading cause of miscarriage, as well as of mental retardation in babies who live. Bickel and former graduate student Vijayalakshmi Subramanian, Ph.D., found evidence that supports a long-standing hypothesis about the link between maternal age and fetal aneuploidy.

**Cell:** Eggs develop through meiosis, a special kind of cell division in which the number of chromosomes is halved; a human cell with 46 chromosomes divides into daughter cells with 23 each. Prior to cell division, the maternal and paternal versions of each chromosome, known as homologues, "are held together by a molecular glue," says Subramanian. One hypothesis suggests that as egg-precursor cells age, loss of this glue may cause chromosomes to mis-segregate more often.

During meiosis, microtubules from either end of the cell attach to paired homologues and pull them toward opposite

poles of the dividing cell. "Think about a situation where they aren't held together," says Bickel. Microtubules would then tug the chromosomes randomly toward either pole. Occasionally, both homologues of one chromosome end up in the same daughter cell, giving it more than 23 chromosomes. Such an aneuploid egg can lead to an aneuploid pregnancy. Bickel and Subramanian demonstrated in fruit flies that the cohesion proteins (the "glue") that hold homologues together do deteriorate over time.

**They demonstrated that the "glue" does deteriorate over time.**

In humans, the first steps of meiosis occur in the eggs of a female's ovaries before she is born. Homologues recombine and attach to each other with cohesion proteins. Then, says Bickel, cells "are hanging out" until ovulation. An egg cell doesn't divide until it's released from the ovary, usually decades later. During this period of meiotic arrest, homologues rely on cohesion to keep them together.

**Eggs:** Since studying human eggs over such a time span is impractical, Bickel and Subramanian used flies. They aged some fly eggs by suppressing egg-laying for four days, then determined that chromosomes mis-segregated more often in aged than non-aged eggs. And the segregation errors occurred more often in eggs aged during a stage of development corresponding to the one that human eggs "hang out" in before dividing during ovulation.

The study, published in *PLoS Genetics*, is "the first time that someone's looked at the normal proteins that are operating during meiosis and been able to show [increased segregation errors] over time," notes Bickel. The reason this occurs more often in older eggs won't "boil down to one thing," she suspects, but she believes the loss of cohesion is "a major determinant." Now she wants to explore why that happens.

KATHERINE VONDERHAAR



Biologist Bickel studies chromosome segregation.

### When more is less

For chronically ill patients, spending more time in the hospital is associated with lower quality-of-care and patient satisfaction scores, reported DMS researchers. The group compared quality and satisfaction in regions with a high intensity of hospital care to regions with a low intensity of hospital care. "The common thread linking greater care intensity with lower quality and less favorable patient experiences may be poorly coordinated care," wrote John Wennberg, M.D., et al. in *Health Affairs*. Patients from high-intensity regions cited "dirty rooms, noisy nighttime, poor pain control, and shortfalls in communication with doctors and nurses" as reasons for low ratings.



### Wait lifted

Veterans in need of mental health care at the DMS-affiliated VA Medical Center in White River Junction, Vt., used to have to wait an average of 33 days to see a specialist. Now the average wait time is 19 minutes. So reported a team that implemented a new model of care, making mental health specialists immediately available in a primary-care clinic. "The primary mental health clinic dramatically enhanced access to mental health care . . . while doubling clinician productivity," Andrew Pomerantz, M.D., et al. wrote in *General Hospital Psychiatry*.

