Research Update

Is cloning the fountain of youth?

Scientists from the British Columbia Cancer Agency have discovered that cloned calves are younger, on the cellular level, than normal calves the same age (*Science* 2000;288:665-9). The finding contradicts a previous discovery that Dolly, the sheep cloned in Scotland 3 years ago, was biologically older than a normal lamb.

The startling discovery centres around telomeres, DNA threads that "tie up" the ends of chromosomes to protect the genetic coding information of the DNA. Telomeres generally become shorter with each cell division: the older the cell, the shorter the telomeres. When scientists examined the telomeres of Dolly, they discovered that the clone's cells were the same age as those of the 6-year-old sheep from which Dolly was cloned, meaning that Dolly was prematurely "old" and would probably not enjoy a normal lifespan.

However, the BC researchers have found that the telomeres in cloned cows are elongated compared with newborn and age-matched normal animals, meaning that the clones are more youthful than their normal counterparts. "Previously, it was thought that only the cells that produce sperm and eggs, as well as cancer cells, could elongate or maintain telomeres. But our findings clearly show that telomeres can be elongated by cloning as well," says Dr. Peter Lansdorp, senior scientist at the Terry Fox Laboratory.

Lansdorp proposes 2 possible explanations for the longer telomere length in the cows. "It may be that our notions about telomere maintenance in normal biology were wrong. We have evidence that telomeres are maintained in the male germ line, but in the female germ line, we actually never looked. It's possible that there is a need to restore telomere length because the female chromosomes have short telomeres. . . . Alternatively, there may be a safety mechanism, if the telomeres are too short in the fertilized egg."

Lansdorp noted that "the increase in telomere length in the cloned cells from cattle corresponds precisely to an increased ability of the cells to divide in Petri dishes. This research suggests that cloned cows might actually live longer than cows conceived naturally."

There is growing medical research on telomeres, because telomeres do not shorten in cancer cells, making them immortal. A promising approach to eventual cancer treatment in humans may be to inhibit telomerase, which appears to maintain telomeres, in order to reverse the immortality of tumour cells.

Meanwhile, in the burgeoning field of therapeutic cloning, scientists are trying to create embryonic stem cells that can be differentiated to grow replacement tissues or organs in the laboratory. Such differentiated cells already exist in laboratory mice, says Lansdorp. — *Heather Kent*, Vancouver

Death and tax brackets: link between income inequality and mortality holds true in US, but not in Canada

The income gap between the haves and have-nots is not strongly linked to death rates in Canada, unlike in the US, according to recently published international research (*BMJ* 2000;320: 898-902).

When Michael Wolfson and colleagues compared income inequality and all-cause mortality at the state or provincial and at the metropolitan level, they found no association in Canada. There was a strong relation, on the other hand, in the US data — confirming results from previous studies.

The research team defined income inequality as the proportion of total family income received by the less well-off 50% of households. Mortality data were grouped and adjusted by age. Wolfson's study compared 50 US states and 10 provinces, as well as 282 US and 53 Canadian metropolitan areas.

"We were quite surprised by the findings," said Michael Wolfson, director general of the analysis and development branch at Statistics Canada. "We had hypothesized that we would find the same association here as in the United States, just not as steep a slope."

Although the team's findings show that the strong association between income inequality and mortality in the US is absent here, Wolfson is quick to point out that the research provides no evidence why this is so. Possible explanations include the more equitable distribution of wealth and the greater heterogeneity of communities in Canada, says Wolfson. "There appears to be something going on in Canada that has allowed us to grow more 'sharing' cities, which seem to have quite positive health effects." While Canada's health care system likely plays a significant role in dampening the effects of income disparity, Wolfson believes it is not the sole reason for the marked difference between the 2 countries.

In looking at the combined figures for North America, the researchers estimate that if the relationship between income disparity and mortality were causal, a 1% increase in the share of total income for the bottom half of households would prevent 21 deaths per 100 000 population. — *Greg Basky*, Saskatoon