DEPARTMENT OF HEALTH & HUMAN SERVICES

National Institutes of Health
National Cancer Institute

Memorandum

Date October 11, 1988

From Chief, LVC, BCP, DCE, NCI

Subject Genetic Individualization of Cells

To Acting Director, NCI
Through: Director, DCE, NCI

Three cell lines labelled Cox, Mich, and Nies were received from ATCC and tested for identity per your request using both "allozyme genetic signature" and DNA fingerprint detected with the minisatellite hypervariable probe designated 33.15 (Jeffreys et al., Nature 314: 67-73). The isozyme results were performed by Jan Martenson and Karen Richards and the DNA fingerprint by Dennis Gilbert, all members of the LVC.

The results with both procedures were in striking and unequivocal agreement. The Cox and Nies cell lines were derived from the same individual and the Mich cell line was from a different individual.

A photograph of the DNA fingerprint of the three lines plus four additional human lines using two restriction enzymes (HinfI and HaeIII) is enclosed. Based on a recent survey of 46 human cell lines conducted in our lab by Dennis Gilbert and Yvonne Reid, we estimated the frequency of each of 20 bands scored for each cell line and by extension the frequency in human populations. The mean frequency for each DNA fragment is 0.12. We estimate the probability that two unrelated individuals have an identical DNA fingerprint (as Cox and Nies did) by chance alone to be vanishingly slim (3.8×10^{-19}).

The allozyme genetic signature of the three cell lines involved the typing of several enzyme loci which are polymorphic in human populations (See Table 1 attached). The Cox and Nies lines were genotypically identical and distinct from Mich. The probability that the combination of genotypes present in Cox would be found in a second cell line (like Mich) by chance is computed by multiplying the genotype frequencies for each of 7 loci. This value is 0.0087. That value is the probability that Cox and Nies are identical due to chance at the allozyme loci. For further details of this method, I have attached a reprint which explains these calculations in more detail.

In summary, our results are rather clear that Cox and Nies are derived from the same individual. If Cox were the defendant in a rape case and Nies was a semen sample of the victim, Cox would be convicted.

Please let me know if I can be of further assistance.

Stephen J. O'Brien

Enclosures

cc: Mrs. Janice Martenson
Mr. Dennis Gilbert