Simultaneous Versus Serial DNA Identification of Related Disaster Victims

Charles Brenner
DNA View, Oakland, California, USA

DNA has proven to be a major and essential tool for identification in recent mass fatality incidents including wars, bombings, airplane crashes, and the World Trade Center attack. The same is clearly true of the hundreds of thousands of victims of the 2004 Indian Ocean tsunami as well as of the victims of Hurricane Katrina. Among the many mathematical complications of these latter mass fatalities is the prevalence of related victims. When several bodies are found that are suspected of being members of the same family and are to be identified through DNA profile comparison with other, living family members, the right method of analysis is to consider all the identities at once. Only a *simultaneous* approach takes full account of the power of the evidence, takes into account the extent to which each dead body's identity is supported by its DNA similarity to the other dead bodies. By contrast, the *serial* method, which assigns the identities one at a time, thus letting each victim identity once established participate in the identification of the subsequent bodies, is superficially attractive but unfortunately it often understates the true value of the evidence. As an extreme example, imagine a father and daughter as the only two related victims of a small airplane crash. The two of them can probably be picked out and therefore identified from the DNA similarity even if no reference relatives are available, so simultaneous consideration of their types is almost infinitely better in this case. A realistic example shows how the logic and confidence of identification is stronger than using a serial identification approach,