RE-THINKING INTERNATIONAL MISSING PERSONS DNA DATABASES

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ABSTRACT

If scientists, humanitarians, and forensic investigators were to convene to design an international missing persons DNA database system today, it likely would look different from the systems currently in place. The ongoing international mass migrations of the past couple years highlight the disconnectedness of the international missing persons database systems. Hundreds of human remains of unidentified migrants are found along the southern U.S. border each year and thousands of migrants are dying as they cross the Mediterranean Sea. These high-risk populations, especially children, often lack identification documents, so DNA can be used to identify remains and investigate deaths. Cross-border DNA sharing of family reference samples is essential, but requires the resolution of many technical, ethical, political, and administrative challenges, particularly to protect vulnerable populations from abuse of power. Centralization of an international missing persons DNA system will aid existing and future cases, particularly with global migration complicating identification efforts. Networking the multiple efforts around the world is a first step to improved communication and security and careful design of a genetic database system to protect case-sensitive information is vital. Another key is for efforts around the world to communicate in a common genetic language that may include markers other than STRs to improve kinship matching and to develop leads for global ancestry of unidentified remains. The constraints of our current system stretch the capabilities and resources for missing persons' investigations, necessitating novel mechanisms for improving identifications, particularly in humanitarian efforts. Now that genetic technologies have matured, perhaps we can learn from the models we see in the bioinformatics and data sharing communities to improve genetic information sharing and increase identifications of unidentified remains and in missing persons' cases. Perhaps re-thinking the overall design of an international system would improve communication channels across borders and allow a DNA-centric approach to prevail.

Introduction

The use of DNA in missing persons' investigations stands as a legacy for the forensic DNA community. DNA has been invaluable for investigations following mass disasters,[1] for prosecution of historic atrocities, and for individual cases of missing loved ones. This inherent value as a humanitarian tool calcifies the role of forensic DNA in the world now, and for the mass disasters and atrocities to come.[2] But for international missing persons programs, the current infrastructure is dysfunctional and siloed within multiple efforts around the world that lack synergy and common scientific and communication tools.

Current Infrastructure

The foundation for missing persons investigations is run through local or jurisdictional law enforcement. In the U.S., the law enforcement units interconnect missing persons reports via the U.S. Department of Justice supported National Missing and Unidentified Persons System

(NamUs, namus.gov), which houses non-DNA information, including demographic and anthropological details essential for developing leads on cases. DNA samples collected for missing persons cases are funneled to the handful of CODIS laboratories that upload into the indices for missing persons and family reference samples. Non-U.S. countries operate similar law enforcement investigations for missing persons. Interpol (interpol.int) provides a database for unidentified remains and works with police in member countries to compare profiles across borders. International programs like the International Commission on Missing Persons (ICMP, www.icmp.int) and International Committee of the Red Cross (ICRC, icrc.org) work with existing governments to provide resources, training and/or infrastructure to identify remains from conflict and disaster. Several international organizations have published or developed best practice guidance documents for the use of DNA in disaster victim identification.

Cross-Border Challenges

The past few years have seen major migration crises, with 232 million international migrants in 2015, 65 million of them forced to flee regions like Syria, Libya, Eritrea, Myanmar, and other areas of persecution and starvation.[3,4] The humanitarian issue is especially acute for the 31 million child migrants, many traveling unaccompanied or separated from their families during travel.[5] Many migrants' efforts result in death, with an estimated 3,770 deaths in the Mediterranean in 2015 and 321 at the US-Mexico border.[6] Tallying migrant death is a challenging since many go missing without remains and some international migrant deaths are homicides.

We have been examining the policy challenges at the US-Mexico border in DNA data exchange for investigating the missing migrant deaths. This humanitarian crisis at the border highlights the disconnectedness of the international missing persons database systems.[7] Human remains appearing to be undocumented citizens take months or years to analyze, and are many times buried without collecting biometrics.[8] Family members of migrants often struggle to report a missing persons case with law enforcement, whether in the origin or destination countries. Undocumented family members living in the U.S. may fear immigration authorities and neglect to report missing persons' cases. On the remains side, the DNA profiles that are processed for DNA may not be compared to family reference samples in a common database.

Let's Re-consider the Current Paradigm

In an ideal world, all humans would have genetic information stored in a secure biobank for identification of the missing. In fact, government-run biobanks in some countries do just that and can be tapped for the purpose of missing persons' identifications. But of course, we do not live in an ideal world and concerns for security, confidentiality, privacy, and sovereignty prevent such simplicity. But to address the disconnected efforts that prevent resolution of investigations, we need to rethink how the science is applied, communication of data is enabled, and investigations are aided with minimal harm to society. We should consider networking the siloed efforts and databases. We should protect collected and stored data from misuse with secured cloud servers. We should reconsider what type of data can and should be retained and shared pertaining to live family members of the missing. We should consider what markers are ideal and efficient for missing person identification with highest validity.

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