

DNA IDENTIFICATION OF THE AIR FRANCE FLIGHT 447 DISASTER VICTIMS

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BACKGROUND: In the early hours of Monday 1 June 2009, an Air France flight from Brazil to France lost communication and disappeared from radars. Flight AF447 had left Rio de Janeiro at 07:00 p.m (local time) and was bound to Paris. The aircraft, an Airbus A330-200, carrying 228 people, crashed in the sea, in a zone 390 miles north-east of Brazil's Fernando de Noronha island, from causes not fully understood yet. People from 33 different nationalities were on the plane, mostly from France, Brazil and Germany. A huge search and rescue operation was set up by the Brazilian Air Force and Navy, and on Saturday 6 June, the first two bodies were recovered from the sea. The search and rescue operation lasted almost a month, and a total of 50 bodies and 1 body part were recovered. A Disaster Victim Identification (DVI) team, coordinated by the Brazilian Federal Police, was set up by the Brazilian Government a couple days after the crash, including medical examiners, forensic odontologists, forensic fingerprint examiners and forensic geneticists. The collection of ante-mortem data started as soon as the DVI team was set up. In addition, buccal swabs from close victims relatives and personal items containing biological material (such as tooth brushes, hair brushes, razor blades, and others) were collected for DNA profiling and kinship analysis, according to the International Society for Forensic Genetics (ISFG) Recommendations (Prinz et al., 2007. FSI: Genetics 1: 3-12, 2007). As soon as the rescued bodies arrived at the Fernando de Noronha island, post-mortem samples were collected. Two samples of deep red muscle from each body were defined as the standard post-mortem sample for DNA profiling. In particular cases, long compact bones or teeth could be collected. During the whole identification process, a documented chain of custody was established.

METHODS: DNA from post-mortem samples and from victims direct references was extracted using the organic method or the automated Maxwell® 16 System (Promega). DNA from victims relatives buccal swabs was extracted using a Chelex-based method. After DNA extraction, samples were quantified using the Quantifiler™ Human DNA quantification kit (Applied Biosystems). Autosomal STRs were typed using the PowerPlex 16® HS System (kindly donated by Promega) and when needed, the AmpFISTR® Identifiler® PCR amplification kit and AmpFISTR® Minifiler amplification kit (Applied Biosystems). STR DNA profiles were then uploaded into the FBI Laboratory's Combined DNA Index System (CODIS) 6.0 software (kindly donated by the FBI to the Brazilian Federal Police) for databasing, match and kinship analysis.

RESULTS: A total of 430 STR reference profiles were employed in the analysis: 369 from relatives of the missing persons and 61 from direct references. Questioned profiles were obtained from 49 recovered bodies and one body part: 47 from deep muscle tissue and 3 from long compact bones. For those samples, complete profiles (at least 16 loci) were obtained in most cases (48). Once data was uploaded into CODIS 6.0, questioned samples profiles were searched against references. The DNA analysis linked the body part to one of the bodies rescued. Until the moment, 48 bodies were identified by DNA analysis. The DNA identification process lasted approximately four weeks.