Internal validation of STRmix™ - A multi laboratory response to PCAST

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The President's Council of Advisors on Science and Technology (PCAST) 2016 report Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature –Comparison Methods included criticism on the interpretation of complex DNA mixtures. The council noted that while "probabilistic genotyping software programs clearly represent a major improvement," there was relatively little published about their validity for complex DNA mixtures. These mixtures were defined as having low mixture proportions and high numbers of contributors. PCAST urged the forensic community to collate and publish validation studies that properly establish the range of reliability for these relatively new and promising approaches.
In response we present here the collated findings of a large inter-laboratory validation study of the probabilistic genotyping software STRmix™. Ground truth known experiments were conducted on 2825 3-to-5 person mixtures developed by 31 laboratories, using a range of mixture proportions, STR multiplexes, and CE platform protocols, all interpreted by STRmix™. The scope and limitations of the software informed by these data are discussed, We provide evidence establishing the range of foundational validity for complex mixture interpretation using this method