

Determination of Feasibility and Plausibility of Using Various Biological Samples for Remote Genetic Testing

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Background

Obtaining a biological sample for sequencing at a remote location can be difficult because blood draws require a clinical visit. For this project, we are testing 49 commercially available DNA extraction kits on dried blood spot cards, saliva, buccal swab, and whole blood samples to determine the best combination to obtain high-quality DNA from individuals that cannot travel to a clinic for sample collection.



Picture 1. Samples that will be tested include saliva, swabs, dried blood spot cards, and buccal swabs.

Results

Number of Lancet Punctures Needed for Blood Analysis

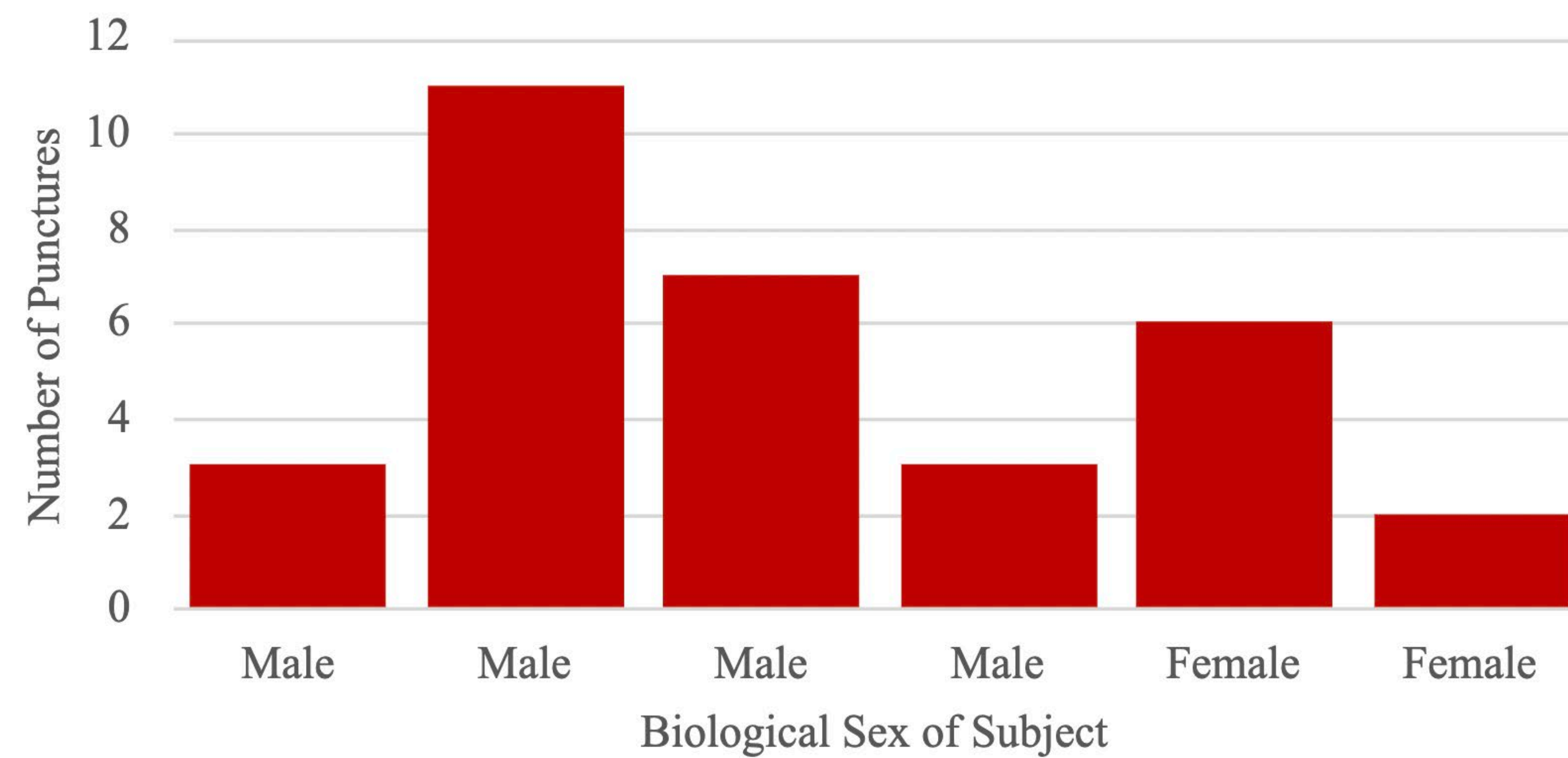


Figure 1. Completion of dried blood spot cards required more lancet punctures than anticipated, with an average of 7 punctures (range 2-14) per card



Picture 2. A lancet of this soft is used for obtaining dried blood spot samples.

Picture3. A qPCR machine such as this one will be used to test for the presence of PCR inhibitors and microbial DNA.

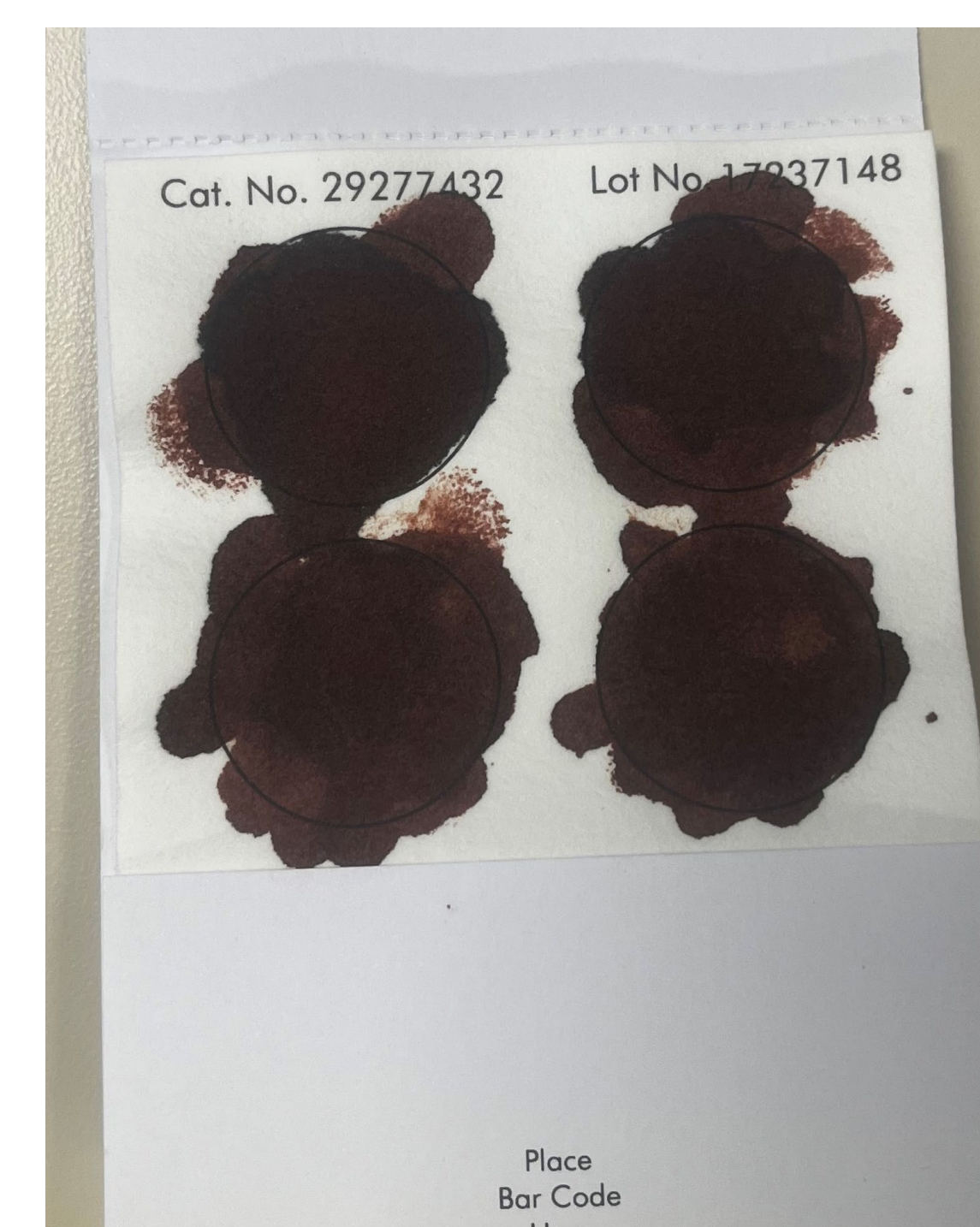


Figure 2. A picture of one of the completed dried blood spot samples on a Qiagen FTA card.

Methods

Swab and saliva kits from Mauwi, Zymo, and DNA Genotek have been purchased for testing. Filter paper for DBS collections have been purchased from Qiagen and Cytiva. DNA extracts will be tested for quantity, fragment length, chemical purity, and proportion of DNA obtained that is human.

Company	Product	Cat. Number
Beckman Coulter	GenFind V3 Readent Kit-50	C34880
Beckman Coulter	DNAdvance	A48705
Biomiga	Biomiga EZgene Tissue DNA Kit 50 Preps	N/A
cytiva life sciences	Tissue and cells genomicPrep Mini Spin Kit	28904275
cytiva life sciences	Nucleon BACC Genomic DNA Extraction Kits	RPN8501
cytiva life sciences	Sera-Xtracta HMW DNA kit	29429140
cytiva life sciences	Blood genomicPrep Mini Spin Kit	28904264
Fortis Life Sciences	Pure Tissue DNA Kit	EB-TDK-50
New England BioLabs	Mondarch Genomic DNA Purification kit	T3010S
New England BioLabs	Monarch HMW DNA Extraction Kit for Blood and Cells	T3050S
Omega Bio Tek	E.Z.N.A. Tissue DNA Kit	D3396-01
Omega Bio Tek	Mag-Bind® Blood & Tissue DNA HDQ 96 Kit	M6399-00
Omega Bio Tek	E.Z.N.A.® Blood DNA Mini Kit	D3392-00
Omega Bio Tek	E.Z.N.A.® SQ Blood DNA Kit	D5032-00
Perkin Elmer	Chemagic DNA Cyte Pure Kit	CMG-196
Promega	Wizard Genomic DNA Purification Kit	A1120
Promega	Wizard SV Genomic DNA Purification System	A2360
Promega	MagaZorb DNA Mini-Prep Kit	MB1004
Promega	ReliaPrep gDNA Tissue Miniprep System	A2051
Promega	Wizard HMW DNA Extraction Kit	A2920
Promega	ReliaPrep™ Blood gDNA Miniprep System	A5081
Qiagen	DNEasy Blood and Tissue Kit	69504
Qiagen	QIAamp Fast DNA Tissue Kit	51404
Qiagen	Puregene Tissue Kit	158063
Qiagen	QIAGEN Genomic-tips 20/G	10223
Qiagen	MagAttract HMW DNA Kit	67563
Qiagen	QIAamp DNA Blood Mini Kit	51104
Qiagen	Blood & Cell Culture DNA Mini Kit (25)	13323
Sigma-Aldrich	Extract-N-AMP Tissue PCR Kit	XNAT2-1KT
Sigma-Aldrich	GenElute Blood Genomic DNA Kit	NA2010-1KT
Takara	NucleoSpin Tissue	740952.5
Takara	NucleoMag Tissue	744300.1
Takara	NucleoSpin® 96 DNA RapidLyse	740110.1
Takara	NucleoBond HMW DNA	740160.2
Takara	NucleoMag DNA Swab	744601.1
Takara	NucleoSpin® Blood	740951.5
Takara	NucleoMag® Blood 200 µL	744501.1
Thermo	DNA Extract All Reagents Kit	4403319
Thermo	MagMax DNA Multi-Sample Kit	4413020
Thermo	JetFlex Genomic DNA Purification Kit	A30700
Thermo	GeneJet Genomic DNA Purification Kit	K0721
Thermo	GeneJet Genomic DNA Purification Kit	K0721
Thermo	PureLink Genomic DNA Mini Kit	K182001
Thermo	PureLink Genomic DNA Mini Kit	K182001
Thermo	ChargeSwitch gDNA Mini Tissue Kit	CS11204
Zymo	Quick-DNA Miniprep	D3024
Zymo	Quick-DNA miniprep plus	D4068
Zymo	Quick-DNA Magbead Plus Kit	D4081
Zymo	Quick-DNA HMW MagBead Kit	D6060

Table 1. Table of kits obtained for DNA extraction from biological samples.