

COMPARATIVE DATA ANALYSIS –
DNA EXTRACTOR WORKFLOW

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Introduction

A comparative data analysis was performed on robotic DNA extraction platform workflows. The comparison contains data on five platforms and two specimen types for each platform. The analysis includes all steps to extract DNA: specimen preparation, reagent loading, and instrument run time.

Platforms included in the study:

1. Roche Diagnostics® MagNA Pure 96
2. QIAGEN® BioRobot Universal
3. QIAGEN® QIA Symphony
4. Life Technologies® MagMAX
5. Biomérieux Nuclisens® EasyMAG

Specimen types for comparison:

1. Whole Blood
2. Buccal Swab

Note: Refer to appendices for data tables and workflow diagram.

Results Summary

For buccal swab specimens, the range of time scores is 139:45 – 390:55 (MM:SS). The Roche MagNA Pure 96 platform was the second-fastest platform at 160:30. The fastest platform was the MagMAX from Life Technologies (the MagMAX has only a 3-minute lysis incubation, while all other platforms are 20-60 minute incubations). However, the MagMAX required approximately 14 minutes more tech time to process 96 specimens than the MagNA Pure 96.

For whole blood specimens, the range of time scores is 116:00 – 288:16 (MM:SS). The Roche platform was the fastest platform at 116:00, which is 38 minutes faster than the second-fastest platform (MagMAX, Life Technologies). The MagNA Pure 96 system also had 54 minutes less tech time to process 96 specimens than the MagMAX.

Notably, the Roche platform compares better in general workflow to the two QIAGEN platforms (QIA Symphony and BioRobot Universal). For workflows that extract directly from primary sample tubes, The QIAGEN platforms have approximately 20-25 minutes less tech time involved; however, the Roche platform takes approximately a third of the time or less to run the instrument than the QIAGEN platforms (Roche run time is 56:00, QIAGEN run times are 171:00 and 240:00).

Instrument setup including loading plastics and reagents, and setting up software was comparable between platforms. The most significant differences that affected total workflow time scores were:

1. Aliquoting specimens (Roche and Life Technologies) vs. loading original specimen collection container directly onto platform (both QIAGEN platforms) (whole blood).
2. Instrument run time (buccal swab and whole blood).

Conclusion

For whole blood specimens, the Roche MagNA Pure 96 system has the fastest total time score of all five platforms, with significantly faster instrument run time than the QIAGEN platforms and less tech time than the MagMAX.

For buccal swab specimens, the Roche MagNA Pure 96 system is the second-fastest platform (20 minutes longer than the fastest), but with 14 minutes less tech time than the fastest platform (MagMAX).

Acknowledgements

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References

1. *MagNA Pure 96 Kits and Protocols. v3.0. Roche Diagnostics; August 2014.*
2. *MagNA Pure 96 User Training Guide. v2.0. Roche Diagnostics; February 2012.*
3. *QIAamp® DNA Blood BioRobot® MDx Kit Handbook. 3rd ed. QIAGEN; April 2010.*
4. *QIAamp® 96 DNA Swab BioRobot® Kit Handbook. 4th ed. QIAGEN; April 2010.*
5. *QIASymphony® DSP DNA Handbook. v1. QIAGEN; February 2012.*
6. *MagMAX™ 96 DNA Multi-Sample Kit. RevB. Life Technologies; August 2009.*
7. *EasyMAG Simplified User Guide. Biomérieux; June 2011.*

Appendix 3. Time Score Summary – Buccal Swab and Whole Blood

BUCCAL SWAB	MagNA Pure (96)	BioRobot (96)	QIASymphony (96)	MagMAX (96)	EasyMAG (24)	EasyMAG (x4=96)
Sample Prep	70:00	32:30*	70:00	84:10	22:00	88:00
Lysis Incubation	20:00	60:00	60:00	/	10:00	40:00
Loading Instrument - <i>Reagent, Sample, Plastics, Software Setup</i>	16:30	18:00	20:55	16:35	06:25	25:40
Run Time	54:00	110:00	240:00	40:00	40:00	160:00
Tech Time:	86:30	50:30	90:55	99:45	28:25	113:40
Total Time:	160:30	220:30	390:55	139:45	78:25	313:40

*Swabs are loaded directly into 96-well plate and not removed, so prep time is lower.

WHOLE BLOOD	MagNA Pure (96)	BioRobot (96)	QIASymphony (96)	MagMAX (96)	EasyMAG (24)	EasyMAG (x4=96)
Sample Prep (<i>aliquot or load original blood tubes in rack</i>)	44:00**	16:00	22:15	101:00	13:33	54:12
Lysis Incubation	/	/	/	/	10:00	40:00
Loading Instrument - <i>Reagent, Sample, Plastics, Software Setup</i>	16:00	20:38	20:25	13:05	06:31	26:04
Run Time	56:00	171:00	240:00	40:00	40:00	160:00
Tech Time:	60:00	36:38	42:40	114:05	22:04	88:16
Total Time:	116:00	207:38	282:40	154:05	72:04	288:16

**Includes pipetting blood into cartridge, which is not required for QIAGEN platforms.