Electronic Supplementary Material (ESI) for Lab on a Chip.

ELECTRONIC SUPPLEMENTARY INFORMATION

The LabTube – A novel microfluidic platform for assay automation in standard laboratory centrifuges

Cartridge design – CAD images

Figure E1 shows different views on the cartridge design, based on CAD data. As visible in these figures, cartridge shell and Revolver II were both designed as an assembly of two components to enable their fabrication and cartridge assembly, respectively.

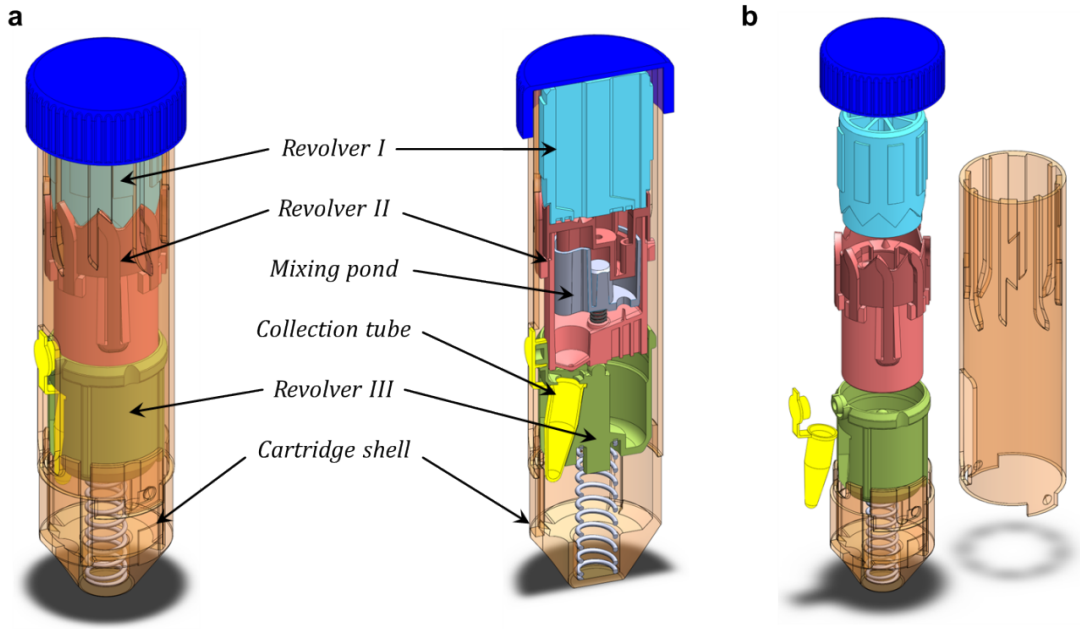


Figure E1. *CAD images of the LabTube cartridge design for DNA extraction. a) Assembly shown from two different points of views as well as in a cross section. b) Exploded view of the cartridge assembly.*

Standard for structured chronological presentation of a LabTube protocol

For visualization of the relative movement of the revolvers during a protocol sequence, we here introduce a 2D illustration concept which we have named "unrolled revolvers". As shown for Revolver I in Figure E2, the 8 chambers of Revolver I (see Figure E2a) are projected onto its skin surface (see Figure E2b). The skin surface is cutted and unrolled (Figure E2c and E2d). In Figure E2d, active outlets for reagent release at the different radial positions are illustrated by small boxes at the bottom of the cavities which are either placed in left, central or right position with respect to the cavity.

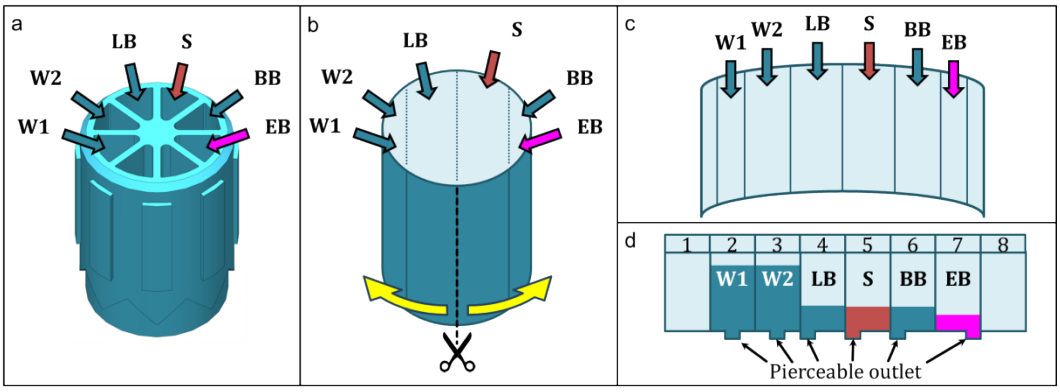
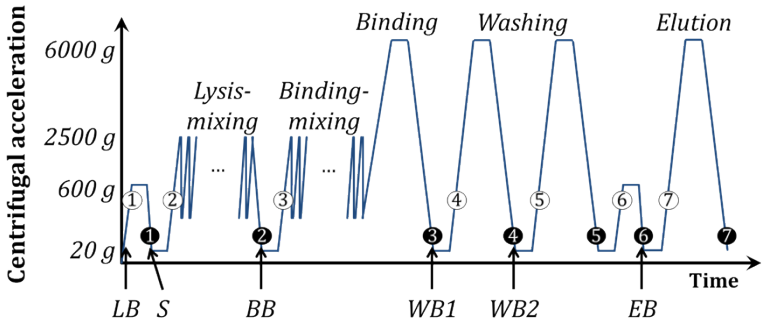
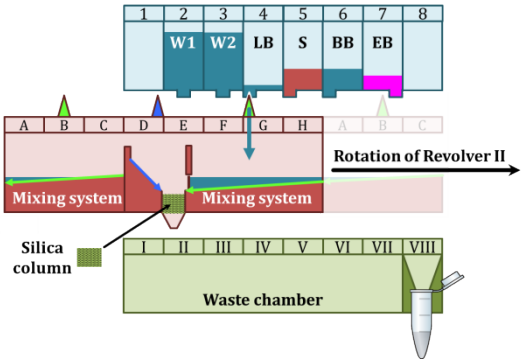
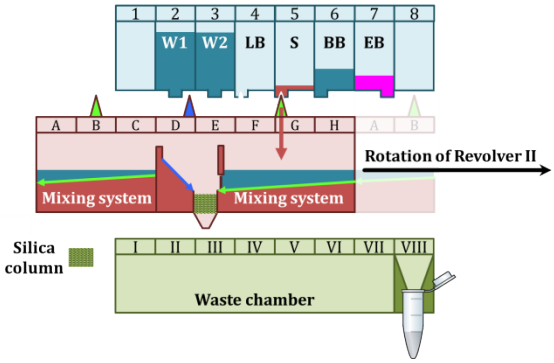
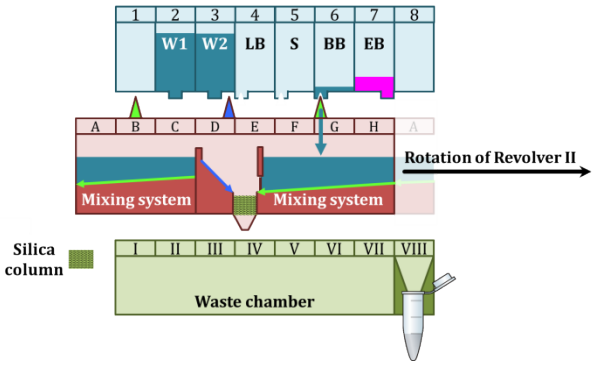
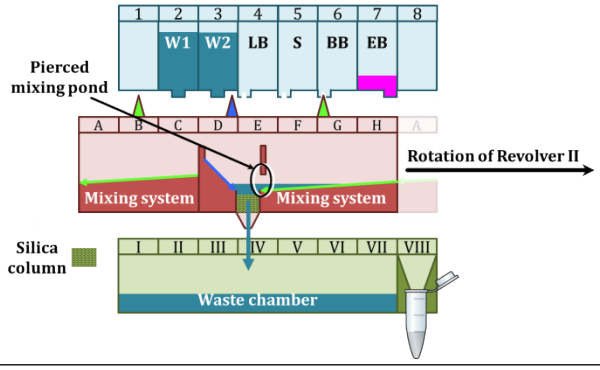


Figure E2. *Derivation of "unrolled revolvers". a) CAD image of Revolver I. b) Revolver I reduced to its skin surface. c) Cutted skin surface of Revolver I. d) Unrolled Revolver I with boxes at the bottom for representation of the piercable outlets for reagent release.*

In Figure E3 the protocol sequence of a DNA extraction is presented using "unrolled revolvers". The relative rotation of Revolver II with respect to Revolver I and III is illustrated by a linear movement of Revolver II.



(1) Piercing of lysis buffer (LB) and release to the mixing system in Revolver II.	
(2) Piercing of sample and Proteinase K (S, Proteinase K is prestored inside the S-cavity) for subsequent mixing with lysis buffer in the mixing system (explanation in Figure 4).	
(3) Piercing of binding buffer (BB) for subsequent mixing with the lysate prepared in step (2).	
(3a) High centrifugal acceleration (> 4000 g) is applied to pierce an aluminum foil of the mixing pond (see Figure 4 – state d for details). The mixture is guided onto and through the column.	

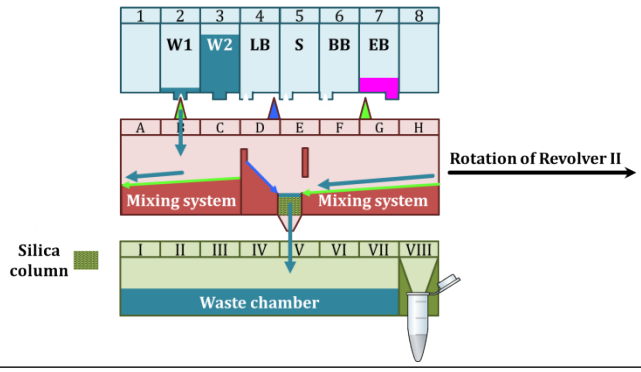
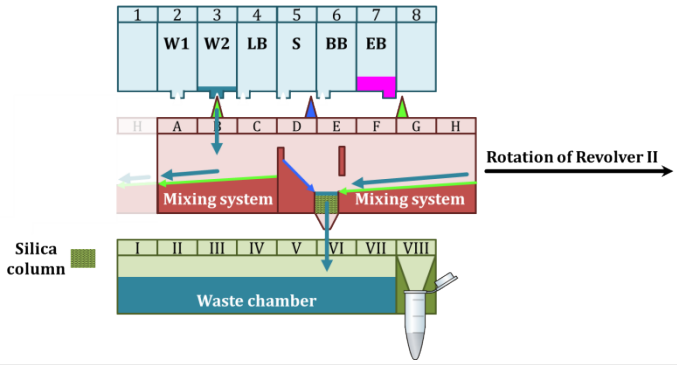
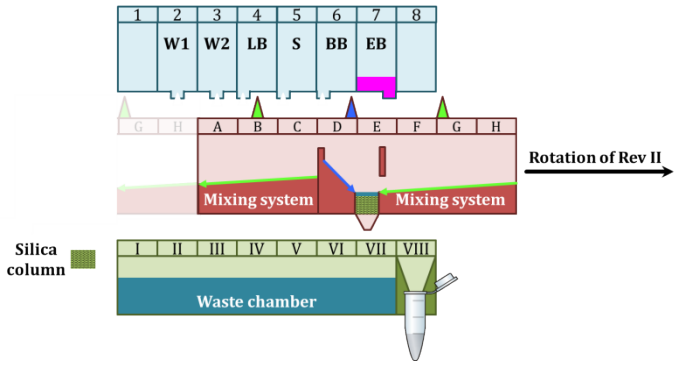
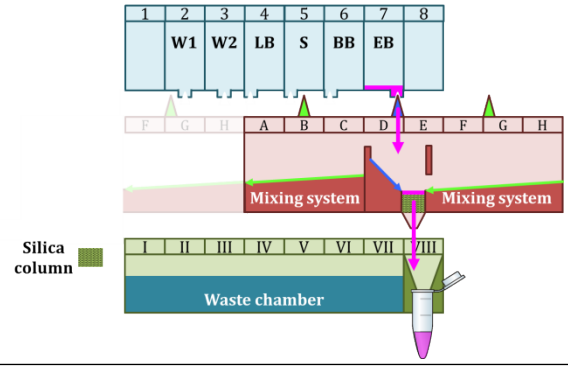
(4) Washing buffer (W1) is pierced and guided through the opened mixing pond and extraction column into the waste chamber.	
(5) Washing buffer (W2) is pierced and guided through the opened mixing pond and extraction column into the waste chamber.	
(6) This step is applied to position the nozzle above the detachable collection tube and results in no liquid release.	
(7) Elution buffer (EB) is released and directly guided onto the column and transferred into the detachable collection tube.	

Figure E3. *Chronological presentation of a DNA extraction using "unrolled revolvers". The rotation of Revolver II with respect to Revolver I and III is illustrated by a linear movement of Revolver II. According to the cylindrical shape of the revolvers, zone H of Revolver II is neighboring zone G and zone A.*

Real-time PCR melting curve analysis for lactose intolerance testing

Adult-type hypolactasia, also known as lactase non-persistence or lactose intolerance, is a common autosomal recessive condition resulting from the physiological decline in activity of the lactase-phlorizin hydrolase in intestinal cells [1]. A homocygotic DNA-variant, single nucleotide polymorphism C/T-13910 located 13 910 base pairs (bp) upstream of the lactase gene at chromosome 2q21-22 has been shown to associate with the lactase persistence/non-persistence and its genetic typing is a screening test for adult hypolactasia [2]. A heterocygotic mutation indicates a potential hypolactasia, but there is no necessary correlation.

Table E1. *Temperature peak positions observed in the real-time PCR melting curve analysis for lactose intolerance testing when using eluates prepared by extractions in a MagnaPure LC system (certified workflow at MVZ Clotten) and in LabTube cartridges.*

Patient	Extraction method	Run	Wild type peak position °C	Mutant peak position °C	Resulting diagnosis
Patient A	**MagnaPure LC**	**1**	62,44	57,37	Heterocygotic
		2	62,48	57,39	
		3	62,55	57,48	
Patient A	**LabTube**	**1**	62,88	57,77	Heterocygotic
		2	62,72	57,50	
		3	62,89	57,71	
Patient B	**MagnaPure LC**	**1**	No peak	57,47	Homocygotic mutant
		2		57,52	
		3		57,48	
Patient B	**LabTube**	**1**	No peak	57,68	Homocygotic mutant
		2		57,61	
		3		57,62	
Patient C	**MagnaPure LC**	**1**	62,57	No peak	Homocygotic wild type
		2	62,57		
		3	62,82		
Patient C	**LabTube**	**1**	62,75	No peak	Homocygotic wild type
		2	62,59		
		3	62,73		

References

1. Järvelä, I. Torniainen, S. & Kolho, K.-L. Molecular genetics of human lactase deficiencies. *Ann. Med.* **41,** 568–575 (2009).
2. Enattah, N. S. *et al.* Identification of a variant associated with adult-type hypolactasia. *Nat. Genet.* **30,** 233–237 (2002).