



National Institute for Public Health  
and the Environment  
*Ministry of Health, Welfare and Sport*

## Oral fluid alternative for COVID-19 diagnostics

5.1.2e

webinar WHO | 09-06-2020



## Introduction

### Change in policy

- Schools open again
- Accessible testing through municipal health service (GGD) testing streets
- Hesitance to test young children (< 6 yrs of age) using NP and OP swab
  - Burdensome for child
  - Reluctance parents
  - Reluctance specimen collector
- Oral fluid an option?

### Saliva is more sensitive for SARS-CoV-2 detection in COVID-19 patients than nasopharyngeal swabs

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### Saliva is less sensitive than nasopharyngeal swabs for COVID-19 detection in the community setting

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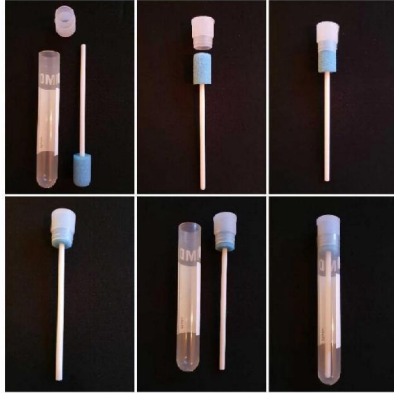


## Design FFX household study

Subject	Day															Week
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15-21	4-6
Start questionnaire	x															
Symptoms diary		x	x	x	x	x	x	x	x	x	x	x	x	x		
Final questionnaire																x
Blood (serum / cells)	x														x	x
Nose and throat swab	x														x	
Oral fluid	x														x	x
Feces	x														x	x
Optional nose and throat swab			x			x			x			x				



## Specimen collection



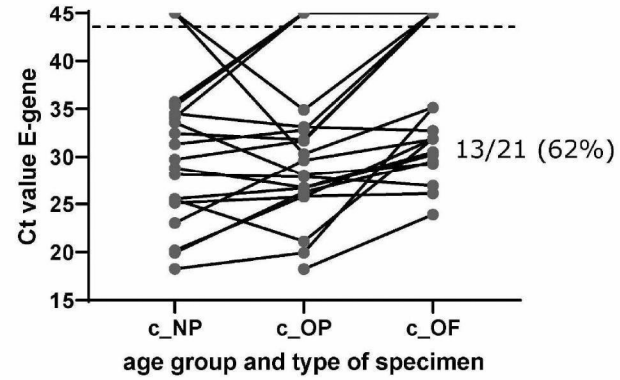
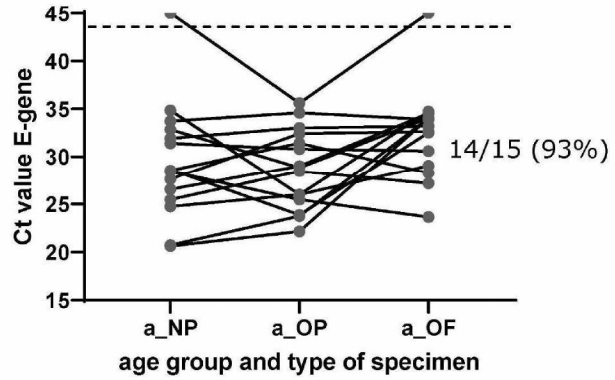
Oracol S10

### Protocol

- No brushing teeth, eating, drinking other than water at least half an hour before specimen collection
- Insert Oracol sponge between cheek and teeth and keep it there about one minute moving back and forth
- Repeat with second sponge
- Transport cooled on wet ice to lab
- In BSC remove and invert sponge in tube
- Centrifuge 10 minutes 3,000 rpm
- Collect oral fluid and store at  $-80^{\circ}\text{C}$
  
- Thaw aliquot and keep cool
- Extract total NA using MagNA Pure MP96
- Perform RT-PCR for E-gene SARS-CoV-2 (Corman et al.)



## Results oral fluid d1



a=adult (15); c=child (21); NP=nasopharyngeal; OP=oropharyngeal; OF=oral fluid



## Results with feces as other alternative specimen

Age group	Day 1			Day 15-21		
<b>0 - &lt;18</b> (n=117)	106 pairs			101 pairs		
		Feces			Feces	
		+	-		+	-
	Respiratory specimens	+ 20	5	Respiratory specimens	+ 5	4
	- 3	78		- 15	77	
<b>≥18</b> (n=123)	120 pairs			113 pairs		
		Feces			Feces	
		+	-		+	-
	Respiratory specimens	+ 42	35	Respiratory specimens	+ 8	17
	- 5	38		- 7	81	



### Added value feces and saliva at d1

Age group	Respiratory positive				Respiratory negative			
0 - <18 (n=28)	21 pairs				6 pairs			
			Feces				Feces	
			+	-			+	-
	Oral fluid	+	12	1	Oral fluid	+	0	0
		-	5	3		-	0	6
≥18 (n=17)	15 pairs				2 pairs			
			Feces				Feces	
			+	-			+	-
	Oral fluid	+	12	2	Oral fluid	+	0	0
		-	0	1		-	1	1



### Alternative saliva collection systems

System	Manufacturer	Model	Buffer
1			
2			
3			
4			
5			
6			
7		5.1.1c	
8			
9			
10			
11			
12			



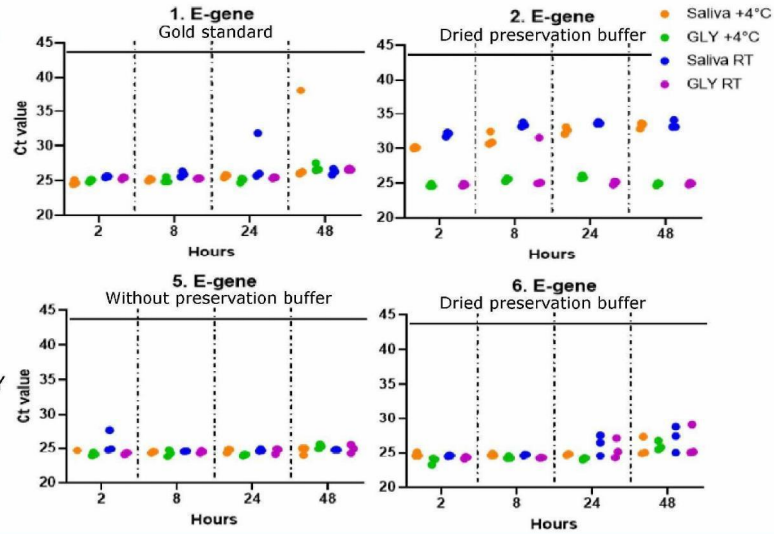
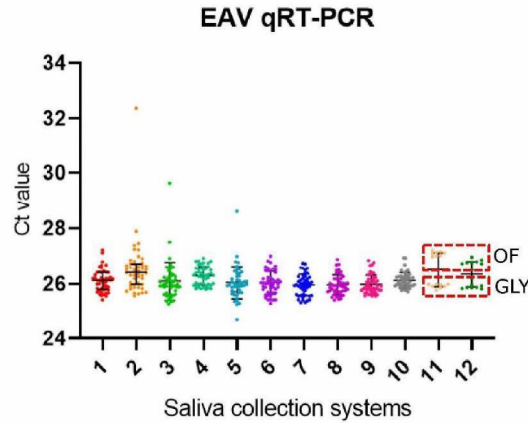


### Criteria for selection

- Practical for children <6 yrs of age
- Stimulant for salivation
- DNA a/o RNA preservative
- Practical for sample collection team
- Safety for sample collection team
- Practical in laboratory (extra pipetting, centrifugation needed)
- Safety in laboratory
- Downstream analysis molecular as well as antibodies
- Spill hazard



## Inhibition of amplification



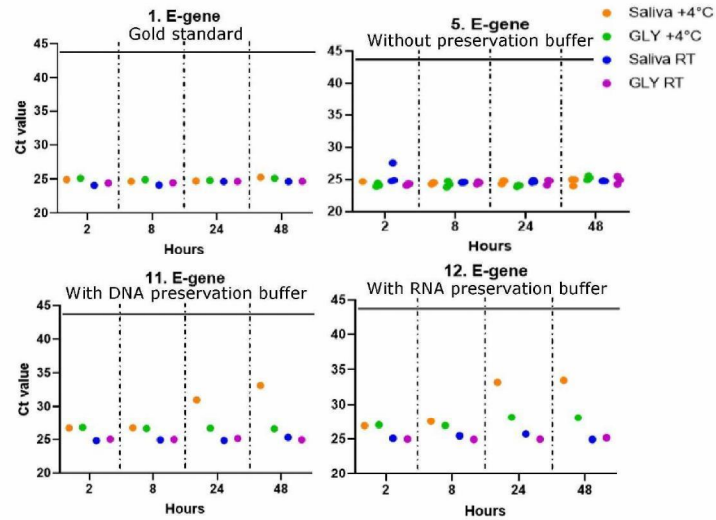


## Variants Isohelix system



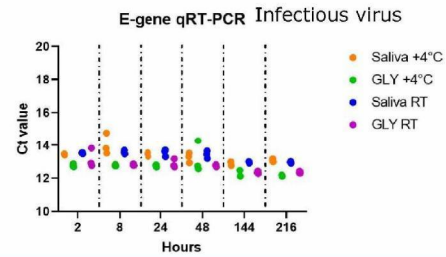
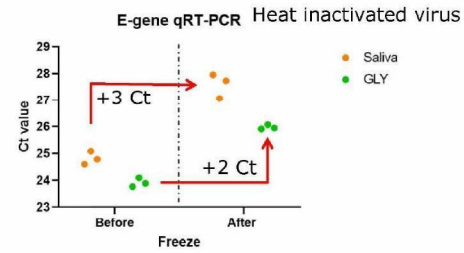
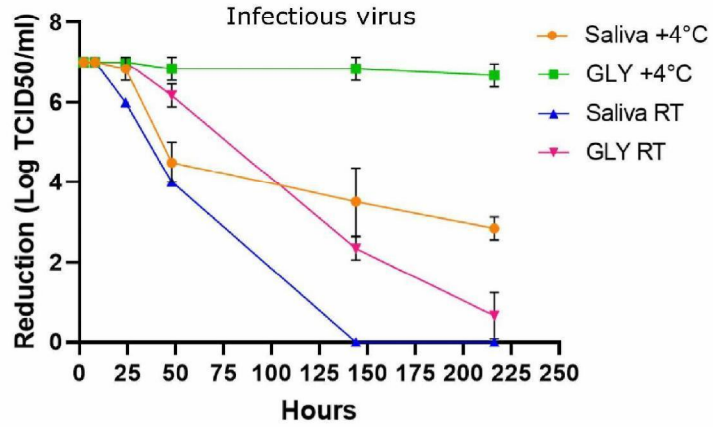
- Without buffer
- With DNA preservation buffer
- With RNA preservation buffer

Manufacturer recommendation:  
With buffer don't store at 4°C





## Storage oral fluid with intact SARS-CoV-2





## How to use during collection and processing in the lab



5.1.1c



## Conclusions

- Oral fluid good alternative to nasopharyngeal and oropharyngeal swabs
- Very low viral loads in NP and OP might be missed
- Feces is another not invasive alternative specimen; together with oral fluid high sensitivity
- In municipal health services testing streets oral fluid is most practical
  
- By combining sponge with collection tube with funnel collection and processing in the lab can conveniently be done
- DNA or RNA preservation buffers for OF do not have added value for SARS-CoV-2 detection
- Working with OF requires strict procedure in the labs to prevent loss of sensitivity; keep cool, work quickly and do not freeze/thaw



## Acknowledgements

- RIVM-IDS Virology

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- RIVM-EPI

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- RIVM-IIV

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