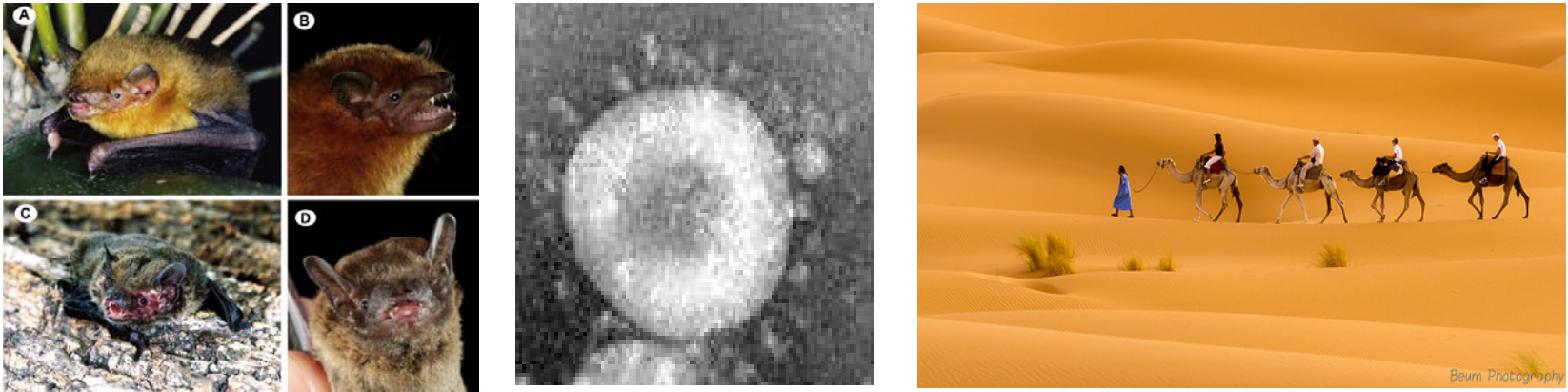


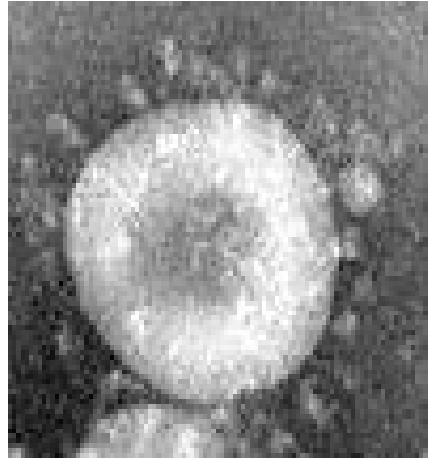
MERS-CoV

Aspects virologiques



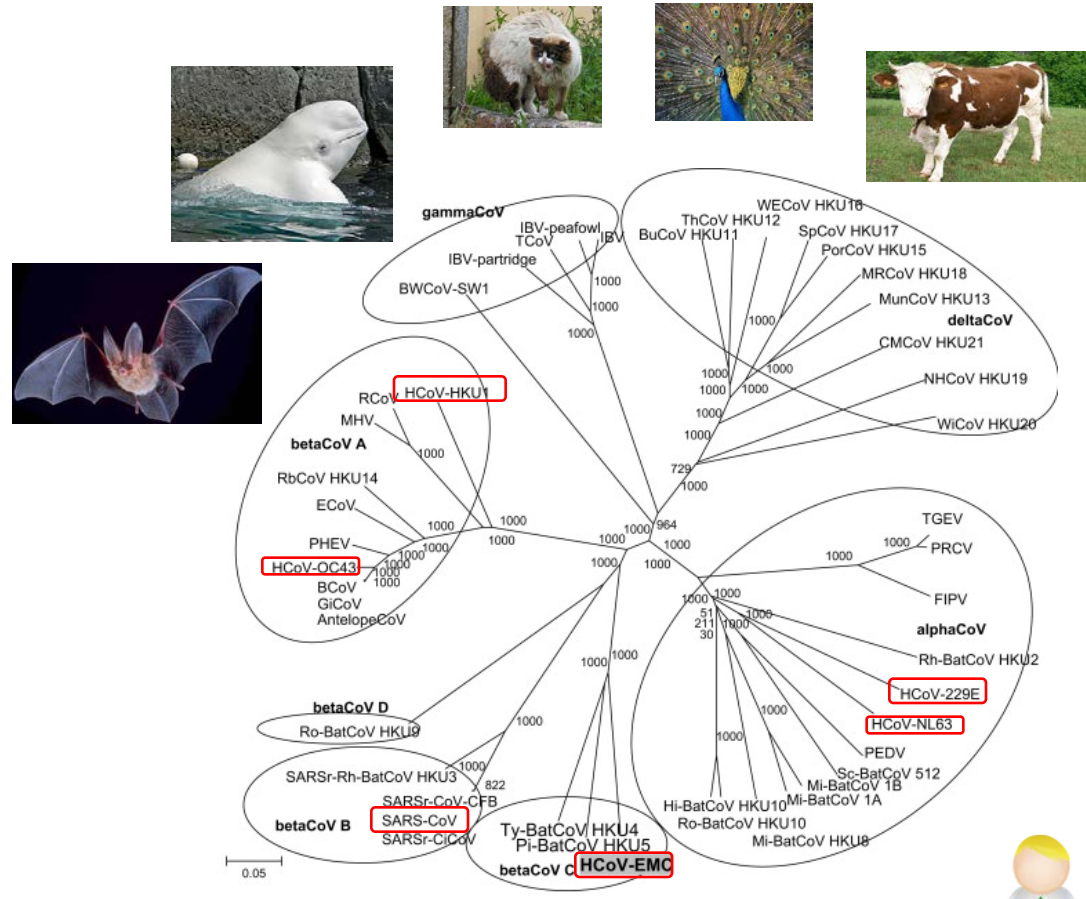
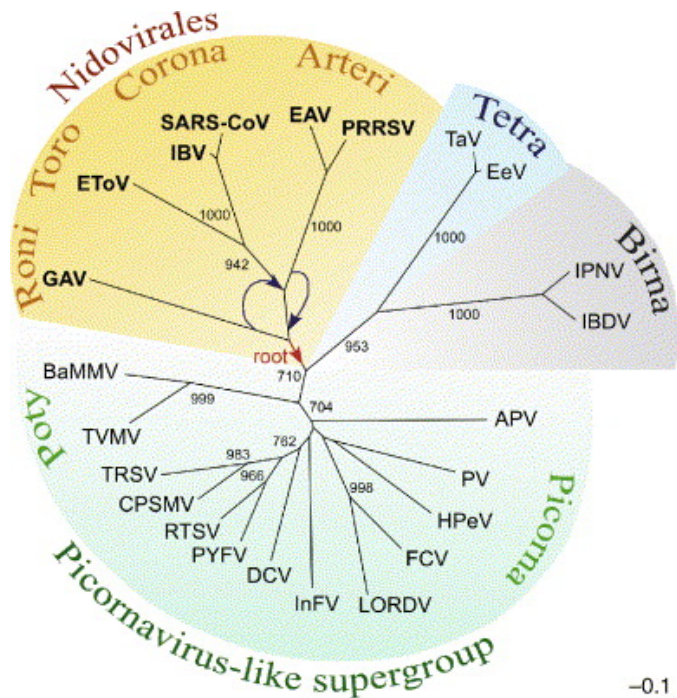
Dr Anne Goffard
MCU-PH
Université Lille 2 - CHRU de Lille

Virologie Générale



Dr. Anne GOFFARD

Nidovirales/*Coronaviridae*/Coronavirus

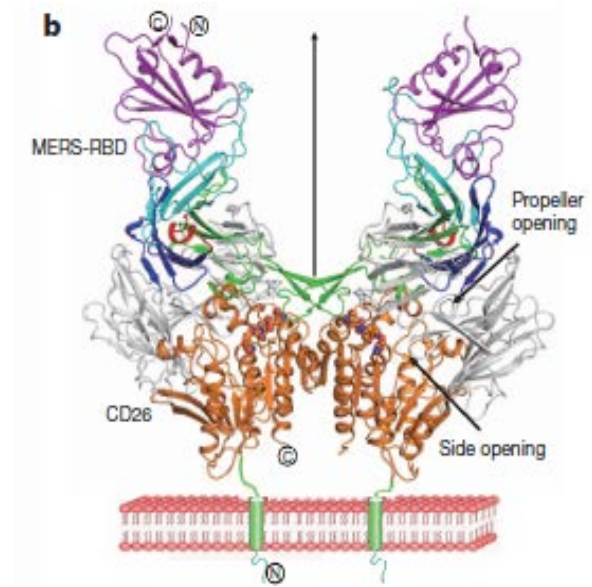
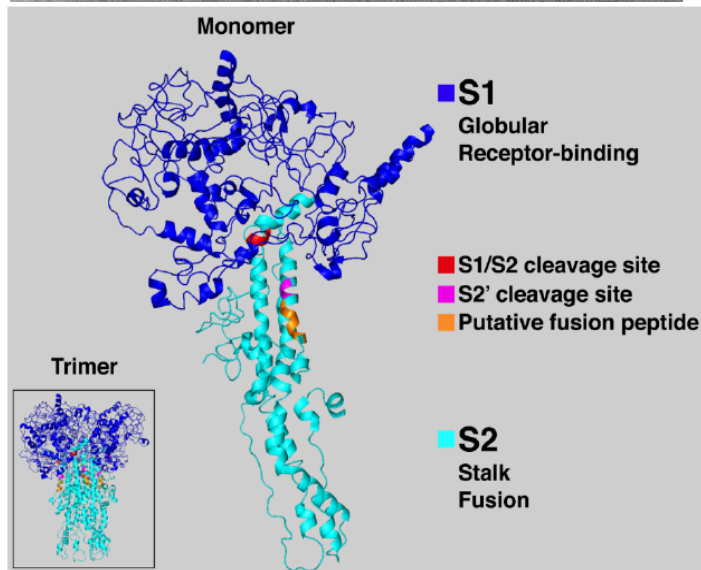
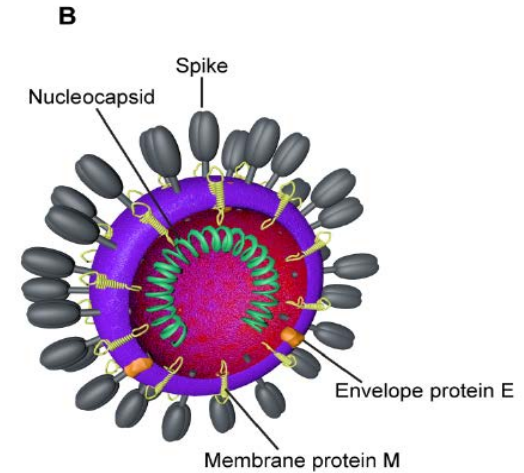
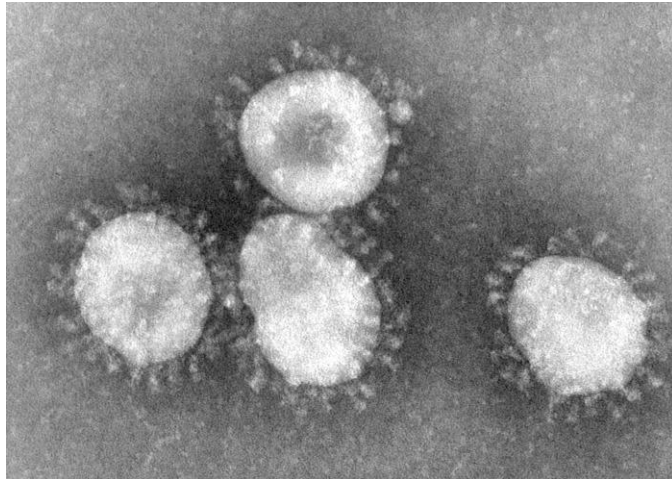


Chan JF et al. J Infect. 2012

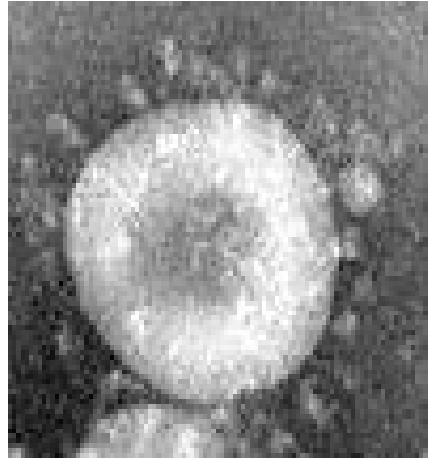
Gorbalenya AE et al. *Virus Res.* 2006 .

Crédits photo : Thurner Hof (Photo taken by user BS Thurner Hof) ; BS Delphinapterus leucas (beluga) head at the Vancouver Aquarium, taken July 2005 by User:Stan Shebs, PD-USGov

Structure du MERS-CoV



Origine du MERS-CoV



Dr. Anne GOFFARD

Origine du MERS-CoV



Anthony SJ et al. J Gen Virol 2013.

Annan et al, EID, 2013

Lau SK et al. J Virol. 2013

Crédits Photos : home77_pascale

Origine du MERS-CoV

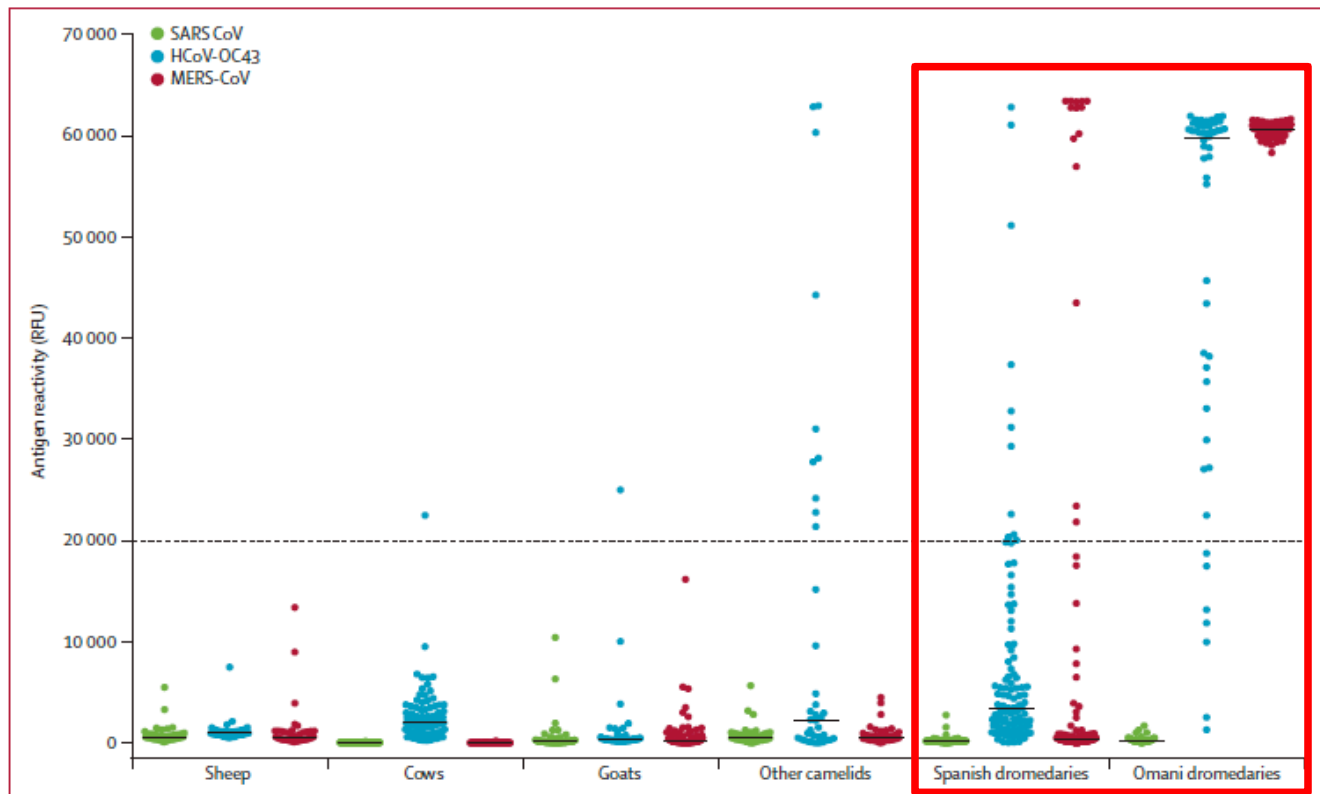


Figure 1: Reactivity of livestock sera with three coronavirus S1 antigens

Fluorescent intensities per antigen at a serum dilution of 1/20. Black lines indicate median. Dashed line is cutoff of the assay. RFU=relative fluorescence units. SARS-CoV=severe acute respiratory syndrome coronavirus. HCoV=human coronavirus. MERS-CoV=Middle East respiratory syndrome coronavirus.

Origine du MERS-CoV

TABLE 1

Screening results for MERS-CoV microneutralisation and MERS-CoV spike protein pseudoparticle neutralisation, human and animal samples from Egypt and Hong Kong, 2012–2013 (n=1,968)

Sera	Source of sera	MERS-CoV micro-neutralisation titre $\geq 1:20$		MERS-CoV spike pseudotype antibody titre $\geq 1:20$	
		Total tested	% Positive (n)	Total tested	% Positive (n)
Human ^a	Egypt	815	0 (0/815)	100	0 (0/100)
Goat ^b		13	0 (0/13)	ND	ND
Sheep ^b		5	0 (0/5)	ND	ND
Water buffalo ^b		8	0 (0/8)	ND	ND
Cow ^b		25	0 (0/25)	ND	ND
Camel ^b		110	93.6 (103/110)	110	98.2 (108/110)
Human	Hong Kong	528	0 (0/528)	115	0 (0/115)
Swine		260	0 (0/260)	ND	ND
Wild bird		204	0 (0/204)	ND	ND

MERS-CoV: Middle East respiratory syndrome coronavirus; ND: not done.

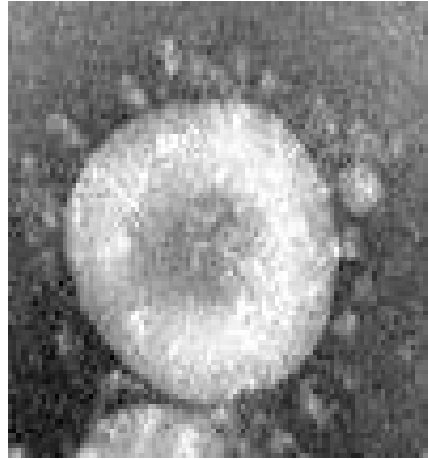
^a Collected in 2012–13.

^b Collected in June 2013.

Details of sera collected in Hong Kong as given in Methods.



Virologie Clinique



Dr. Anne GOFFARD

Principe du diagnostic virologique

Rechercher le génome viral dans des échantillons biologiques

- Prélèvements respiratoires
- Sang
- Selles

Extraction ARN en laboratoire L3

Recherche du génome viral par RT-PCR temps réel



MERS-CoV dans voies respiratoires

7 personnels soignants

Ecouvillonnage nasal

• J+2 = 6 PCR+/7

• J+8 = 1 PCR+/7

Table 1. Characteristics of Health Care Workers with Confirmed MERS-CoV Infection.*							
Characteristic	Health Care Worker						
	1	2	3	4	5	6	7
Age (yr)	42	29	46	39	59	28	56
Sex	Female	Female	Female	Female	Female	Female	Female
Result of chest radiography	Normal	Normal	Normal	Normal	Normal	Normal	Normal
MERS-CoV PCR test	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Viral load (Ct value)	33	37	38	34	35	30	37
Coexisting condition							
Diabetes mellitus	Yes	No	No	No	No	No	No
Other	No	No	No	No	No	No	No
Symptoms							
Feverish feeling	Yes	No	Yes	No	No	Yes	Yes
Fever, measured	Yes	No	No	No	No	No	No
Cough	Yes	No	No	No	No	No	Yes
Sore throat	Yes	No	Yes	No	No	Yes	Yes
Runny nose	No	No	Yes	No	Yes	Yes	Yes
Muscle aches	Yes	No	Yes	No	No	No	Yes
History of exposure	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Memish et al. NEJM aug 7 2013

Infections asymptomatiques sont possibles

Cinétique virale dans LBAs

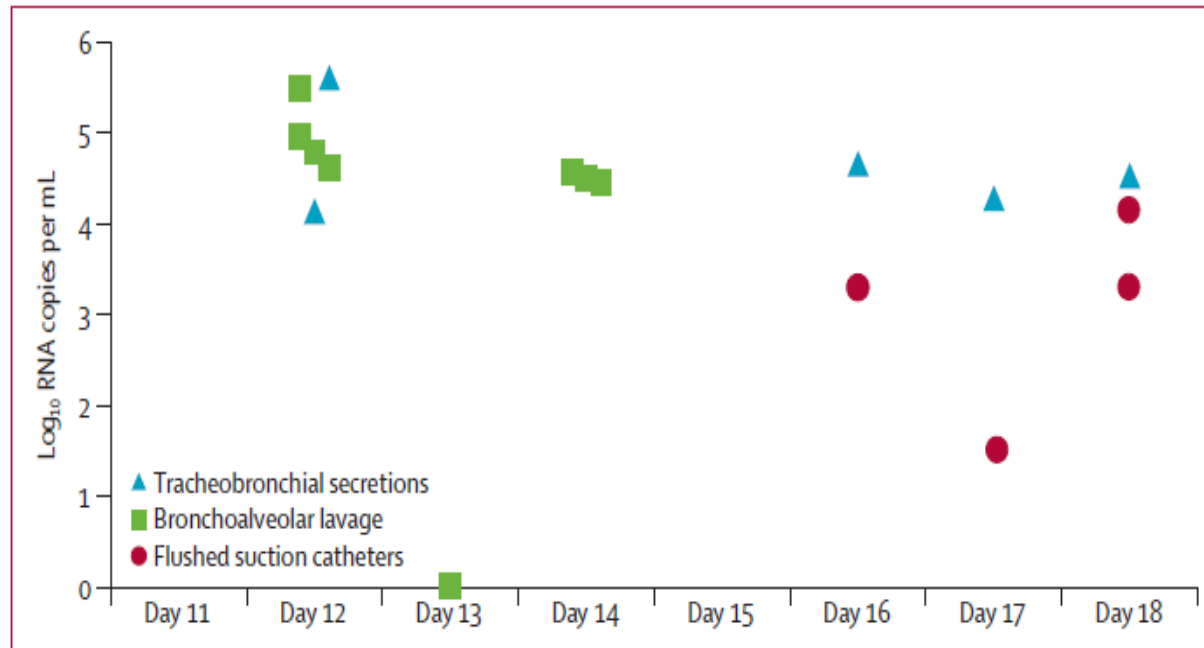


Figure 2: Absolute virus concentrations in respiratory secretions and bronchoalveolar lavage samples

ARN MERS-CoV = $933-1.10^6$ copies/ml

ADN HSV = $6 \times 10^4 - 2.10^7$ copies/ml

ARN Rhinovirus = $4.10^5 - 2.10^7$ copies/ml

MERS-CoV dans voies respiratoires

Expérience lilloise

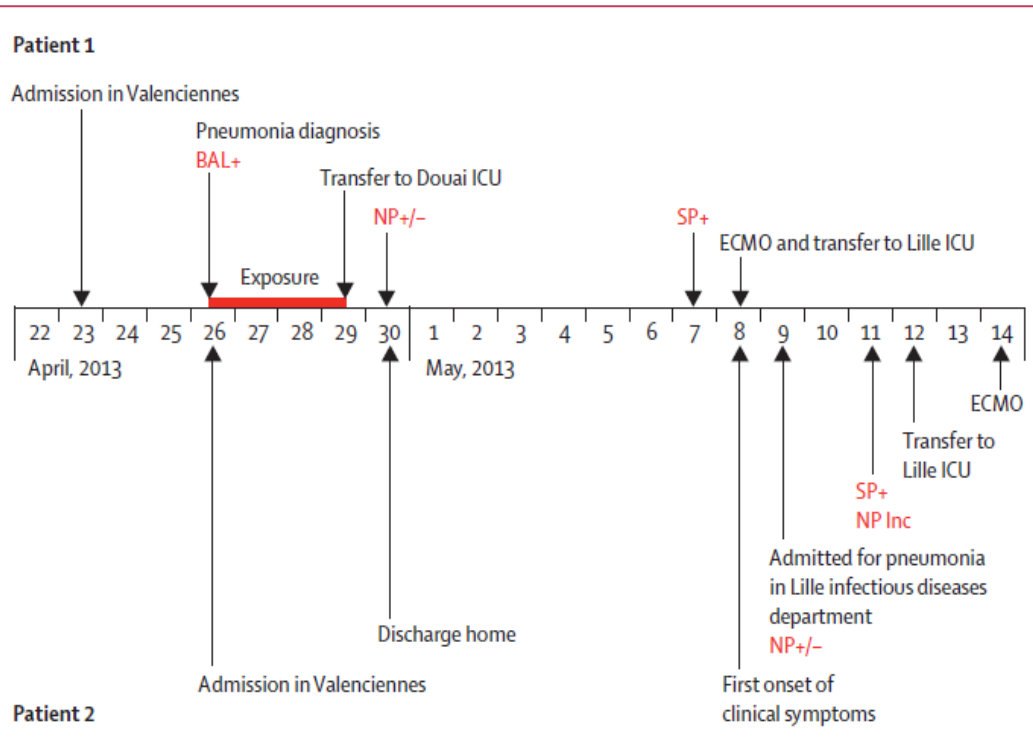


Figure 3: Timeline of pertinent exposure, dates of illness, and virological findings in patients 1 and 2

		Specimen type	Gene	
			upE (Ct)	Orf1a (Ct)
Patient 1				
April 26	BAL*	22.9	24	
April 30	NP	40	40	
April 30	NP†	37.2	40	
May 7	SP‡	28.8	27.2	
May 7	WB	35.9	35.2	
May 9	P	40	38.8	
Patient 2				
May 9	NPa	37	40	
May 9	NPb	37.4	Negative	
May 11	SP*	22.5	23.9	
May 11	NP	Inconclusive	Inconclusive	

Ct=cycle threshold. BAL=bronchoalveolar lavage. NP=nasopharyngeal swab. SP=sputum. NPS=nasopharyngeal swab. WB=whole blood. P=plasma.

*Specimens on which sequencing was done (appendix). †Retest. ‡Specimen from which an isolate was obtained.

Table 3: Genetic analysis of specimens

MERS-CoV est présent

- dans le sang,
- voies aériennes supérieures +/-

Cinétique virale dans les compartiments biologiques

Détection de l'ARN du MERS-CoV

- Urines = 2.10^3 copies/ml insuffisance rénale installée
- Selles = 1.10^3 copies/g
- Sérum = négatif
- Prélèvement oro-nasal = 1+/2

REMERCIEMENTS

CHRU de Lille :

Ensemble du Personnel du laboratoire de Virologie du CBP,

Pr. B. Guéry et son équipe,

Pr. D. Mathieu, Dr. J. Poissy et leur équipe,

Ensemble du Personnel du CBP.

CNR Grippe Nord :

Pr. S. Van der Werf, Dr.V. Enouf et leur équipe.

