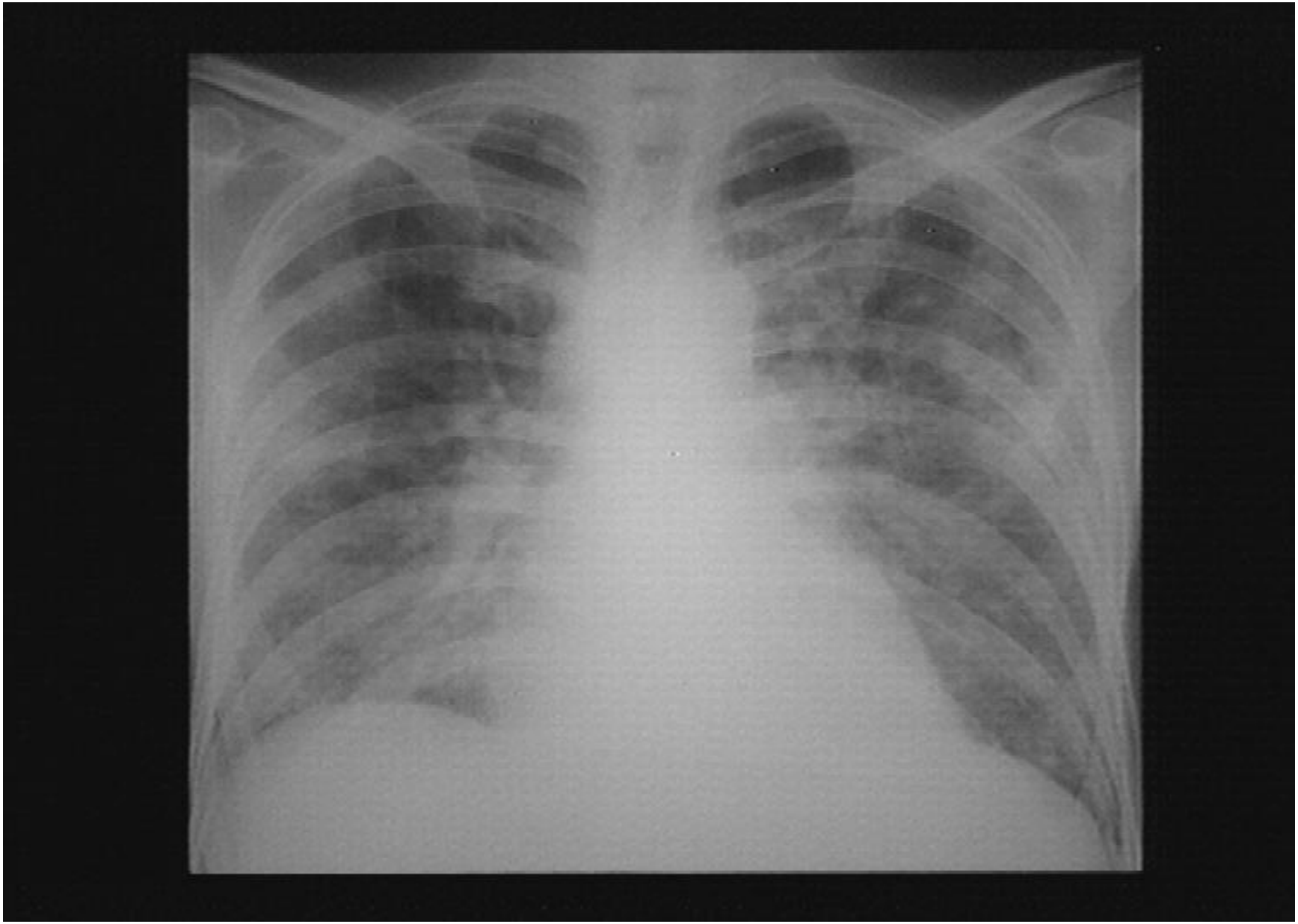
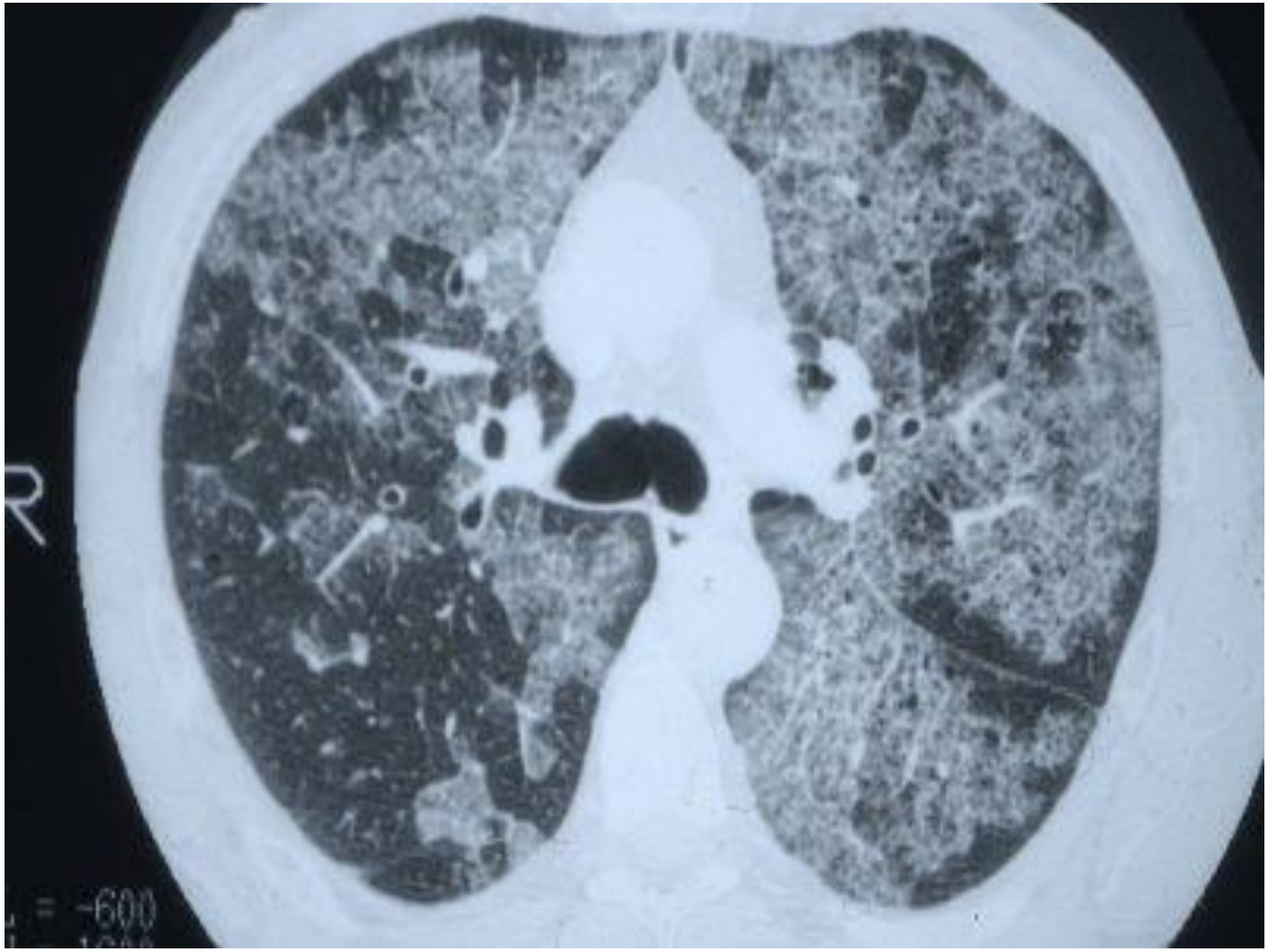
L’insuffisance respiratoire aiguë

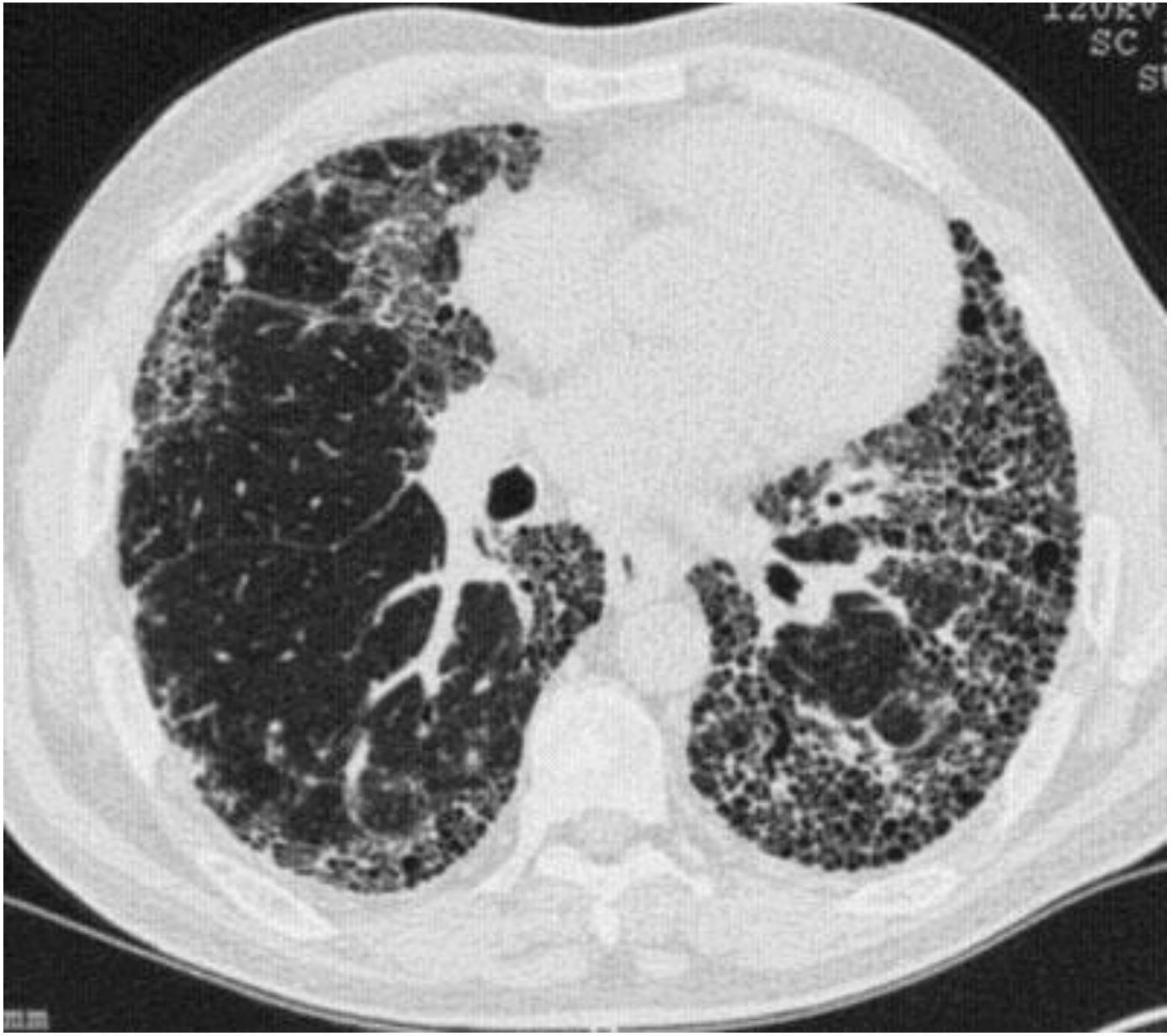
Grands mécanismes de dyspnée chez le cancéreux

Organe atteint	Mécanisme	Exemples
Système nerveux	défaillance commande neuromusculaire	coma myasthénie syndrome de Guillain-Barré
Poumon	1) syndrome obstructif	obstruction des voies aériennes asthme
	2) syndrome restrictif	pneumopathie diffuse épanchement pleural
Circulation pulmonaire	espace mort	embolie pulmonaire
Cœur	défaillance pompe	tamponnade péricardique
Globules rouges	déficit transport oxygène	anémie
Tissus périphériques	blocage consommation oxygène	choc septique

Les pneumopathies diffuses




R
= -600


SC

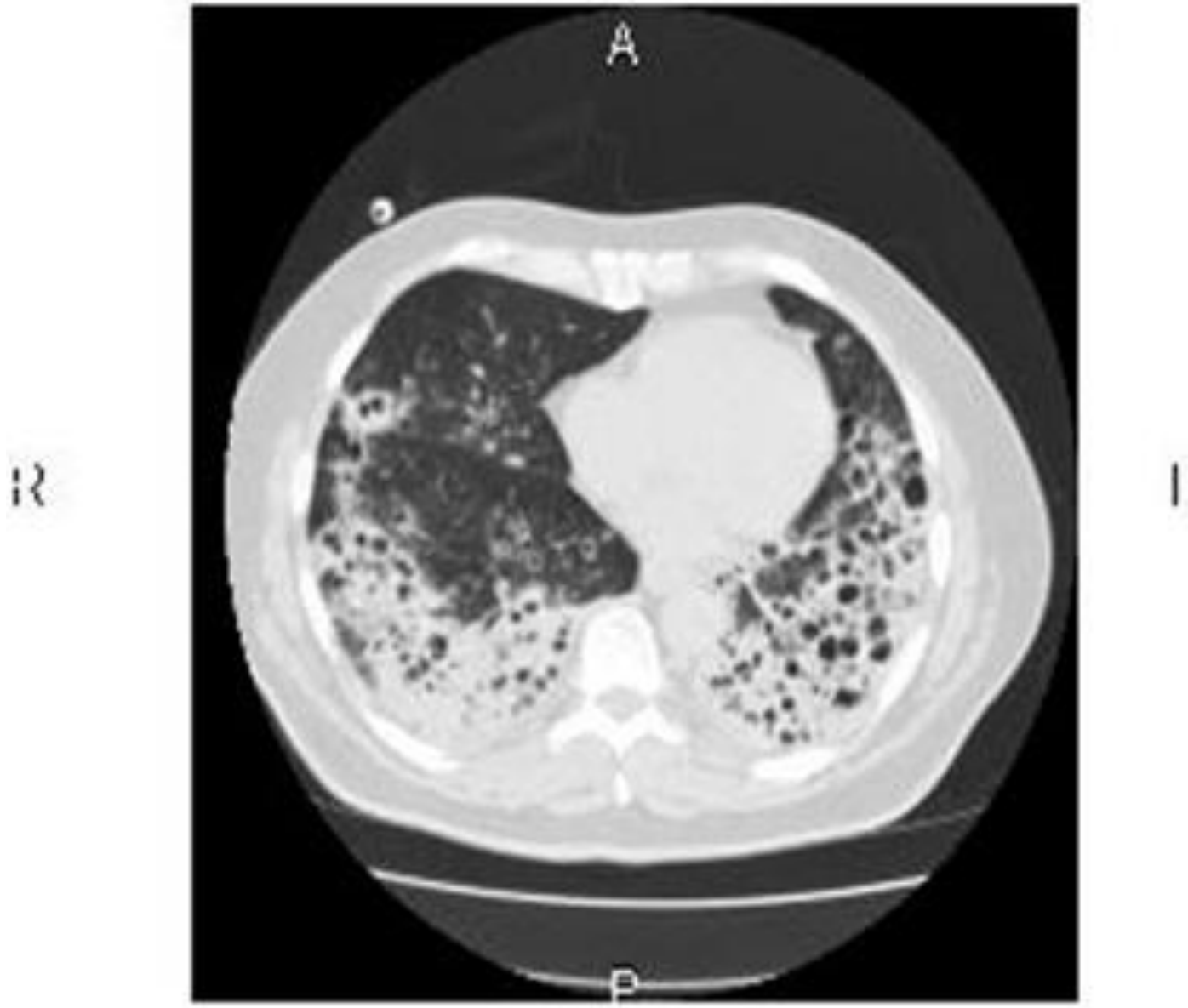

A
R
L
P

Tableau clinique

- insuffisance respiratoire aiguë hypoxémiante par œdème pulmonaire lésionnel (ALI = acute lung injury)
- formes les plus graves : SDRA (syndrome de détresse respiratoire de l'adulte)
- Évolution possible vers la fibrose pulmonaire
- la neutropénie n'empêche pas le développement d'un SDRA qui pourra se majorer lors de la récupération de la leucocytose

Causes infectieuses

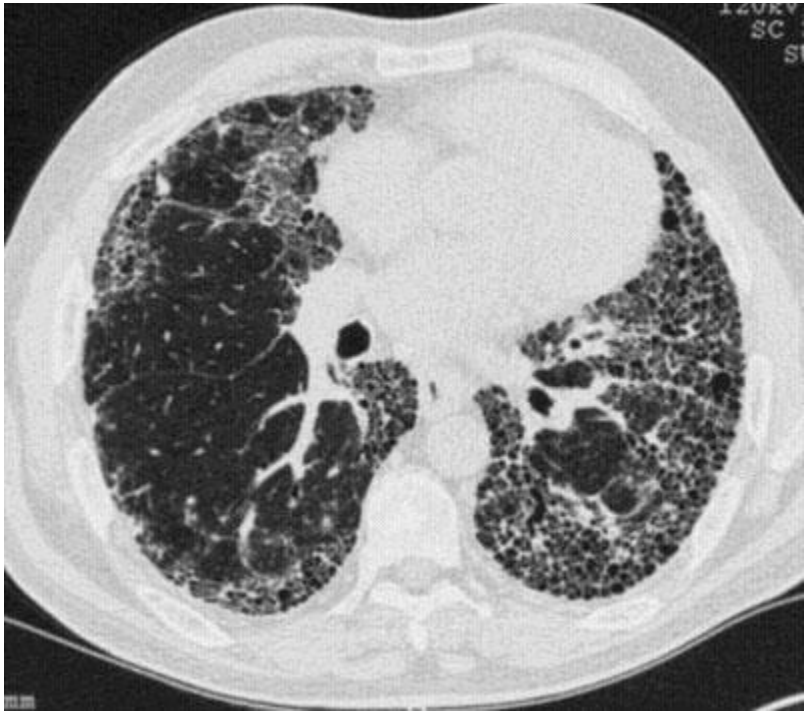
- Pneumocystis jiroveci
- Legionella
- Chlamydiase
- Tuberculose miliaire
- CMV, HSV, RSV, herpès zoster, Covid19
- Aspergillose

Causes non infectieuses

- toxicité médicamenteuse: MTX, BLM, MMC, IL-2, ITK, imunothérapies
- pneumonie radique
- hémorragie alvéolaire
- lymphangite carcinomateuse, leucostase pulmonaire
- œdème pulmonaire cardiogénique
- œdème pulmonaire lésionnel (→ SDRA)
- pneumopathie interstitielle idiopathique (greffe de moelle osseuse)
- pneumopathie aux leucoagglutinines (transfusion)

La fibrose

Complication ultime de certaines pneumopathies diffuses, s'installant rapidement (SDRA, greffe de moelle) ou progressivement (radiothérapie, cytotoxiques) et due à des réactions inflammatoires entraînant une fibrose diffuse des alvéoles et une insuffisance respiratoire majeure de pronostic très réservé.



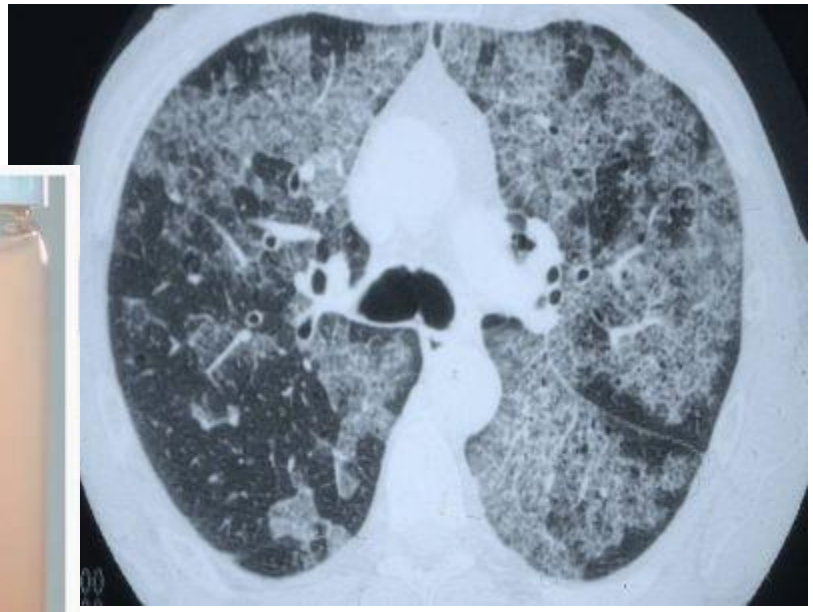
Les toxicités des traitements

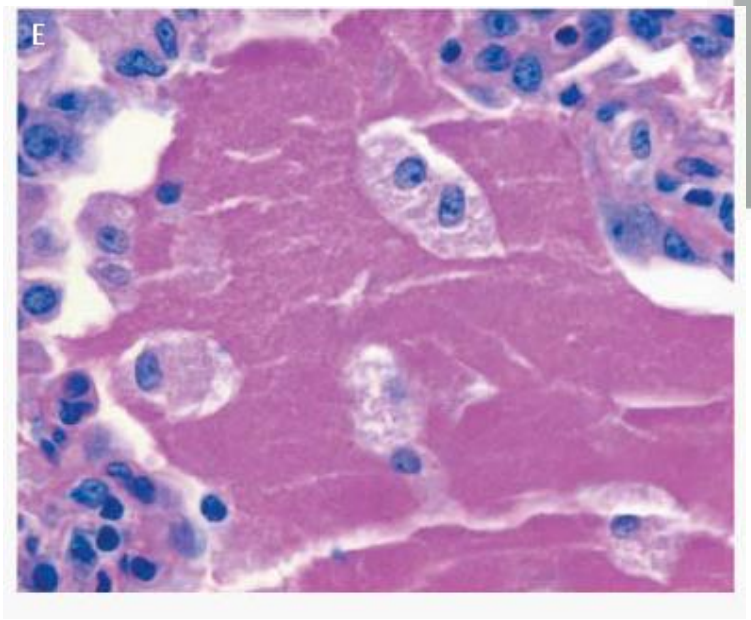
Divers mécanismes

www.pneumotox.com

- bronchospasmes aigus (vinorelbine, paclitaxel, VM26, cisplatine)
- pneumopathies d'hypersensibilité (méthotrexate, cétuximab)
- pneumopathies interstitielles et fibroses pulmonaires (bléomycine, mitomycine, cyclophosphamide, nitrosourées, gefitinib, erlotinib, everolimus, temsirolimus, ITK, inh. points de contact immunitaires)
- pneumopathies à éosinophiles (méthotrexate, bléomycine)
- hémorragie alvéolaire (bévacuzimab)
- œdème pulmonaire lésionnel (cytosine arabinoside, interleukine-2, gemcitabine)
- pleurésies (mitomycine, docétaxel, méthotrexate).

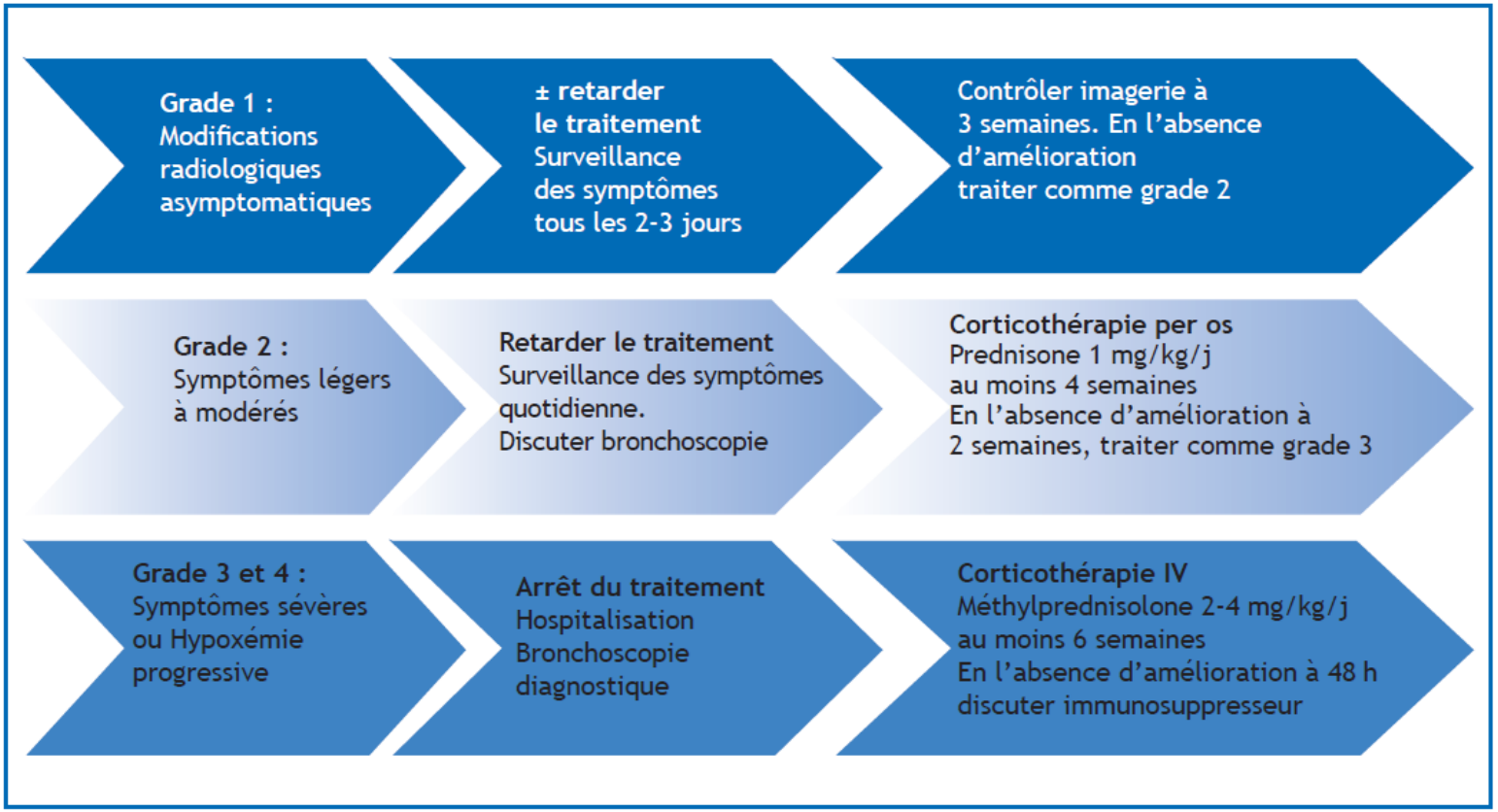
Protéinose alvéolaire secondaire





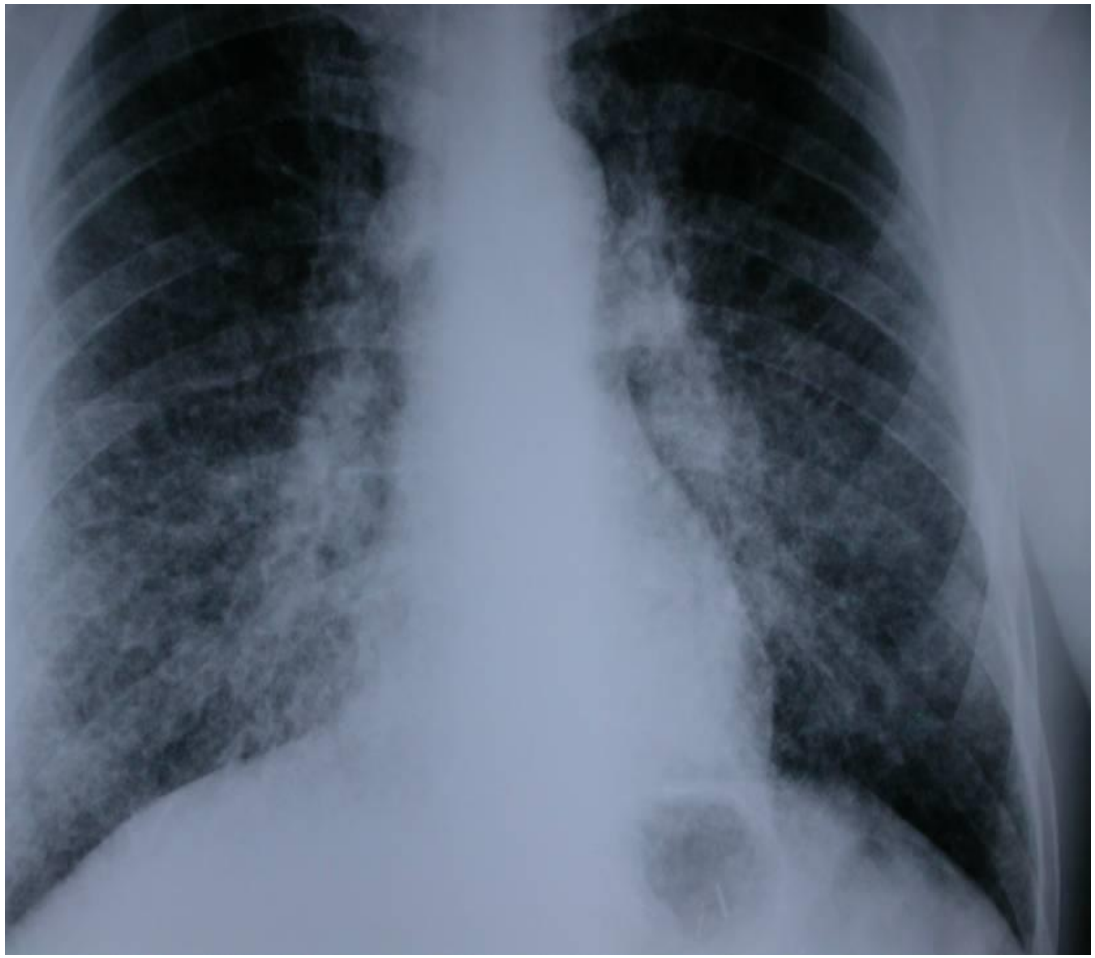
Toxicité inhibiteurs point de contrôle immunitaire

Tableau 1. Recommandations pour la prise en charge de la toxicité pulmonaire des « inhibiteurs de point de contrôle » (d'après [16]).



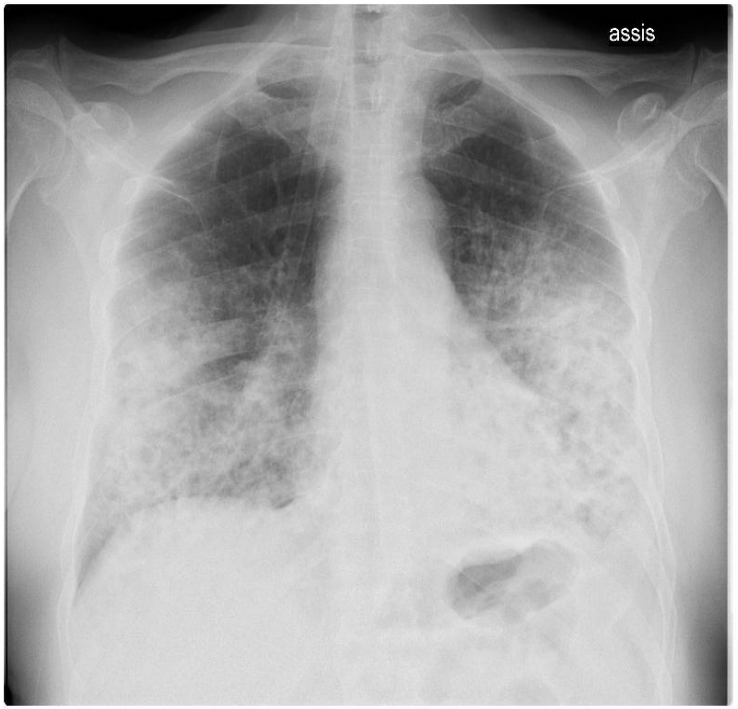
https://doi.org/10.1016/S1877-1203(17)30086-1

La lymphangite carcinomateuse



La lymphangite carcinomateuse

- Mécanisme:
  - Embolie cellules néoplasques
  - Adénopathies médiastinales (a retro)
  - À partir tumeur pulmonaire
- dyspnée, parfois aiguë avec tableau type embolie pulmonaire
- toux non productive
- hypoxémie
- RX et TDM thorax : d'abord normale (stade des emboles vasculaires) puis pneumopathie interstitielle diffuse (stade de la lymphangite périvasculaire)
- finalement HT pulmonaire avec cœur pulmonaire



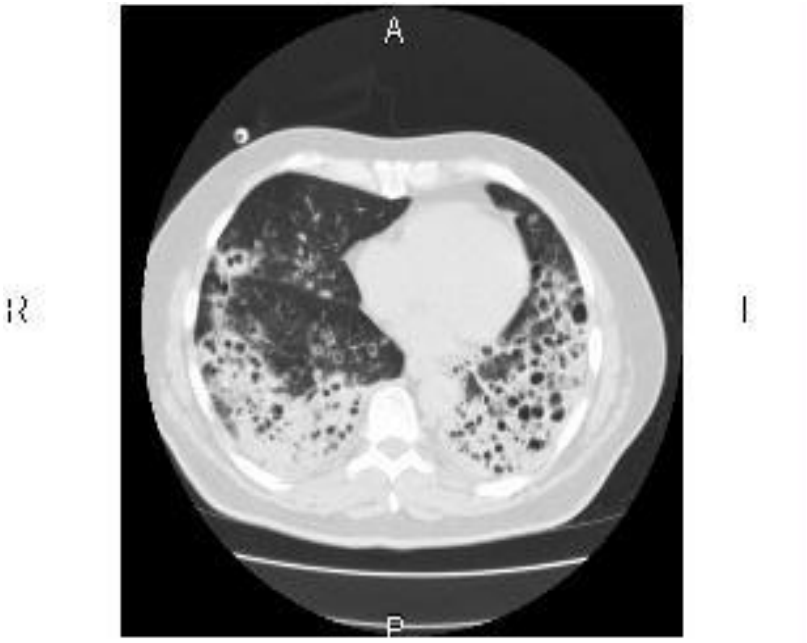
Diagnostic

Diagnostic différentiel

- au début : embolie pulmonaire
- ensuite : cf pneumopathies interstitielles diffuses

Diagnostic

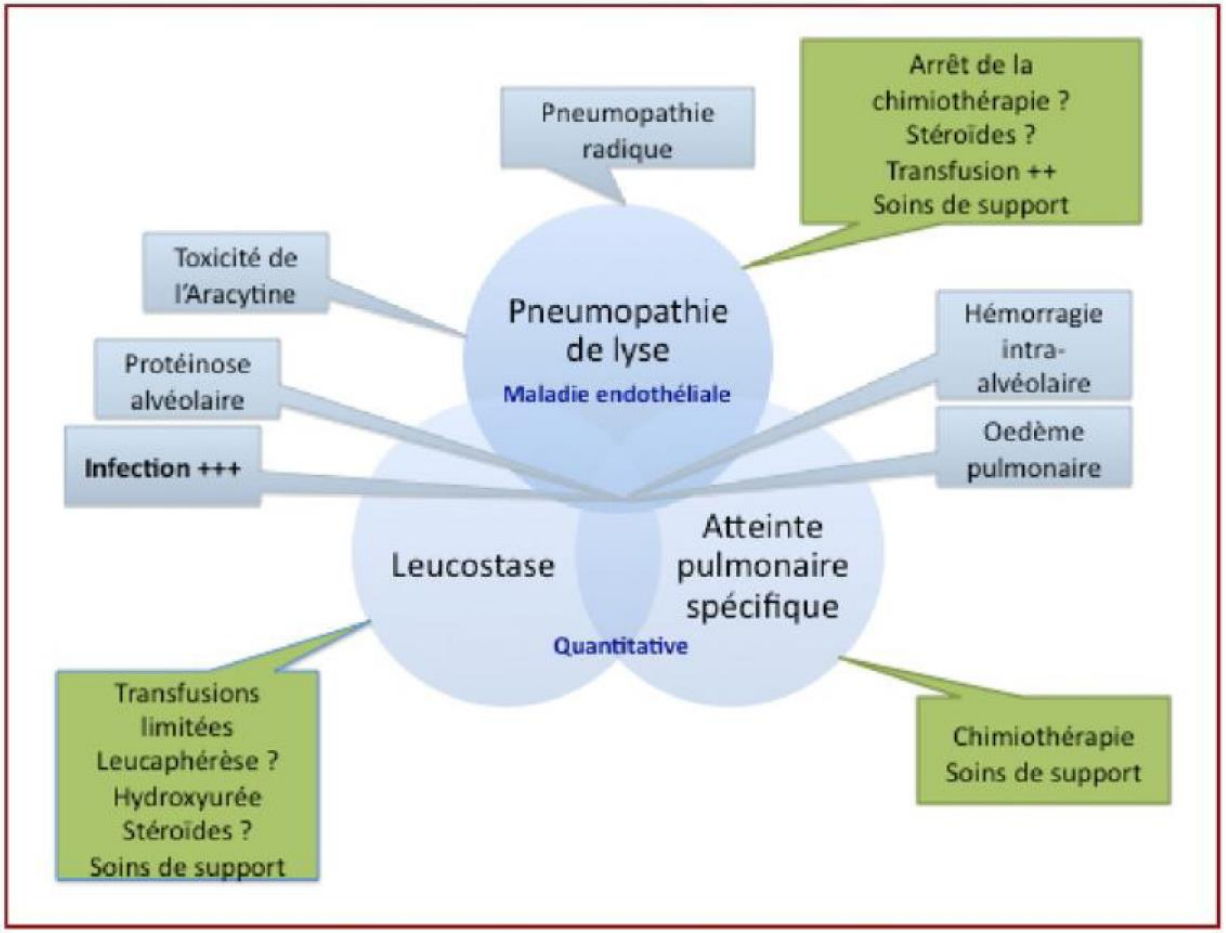
- TDM thorax
- bronchoscopie avec LBA et biopsies transbronchiques



Traitement

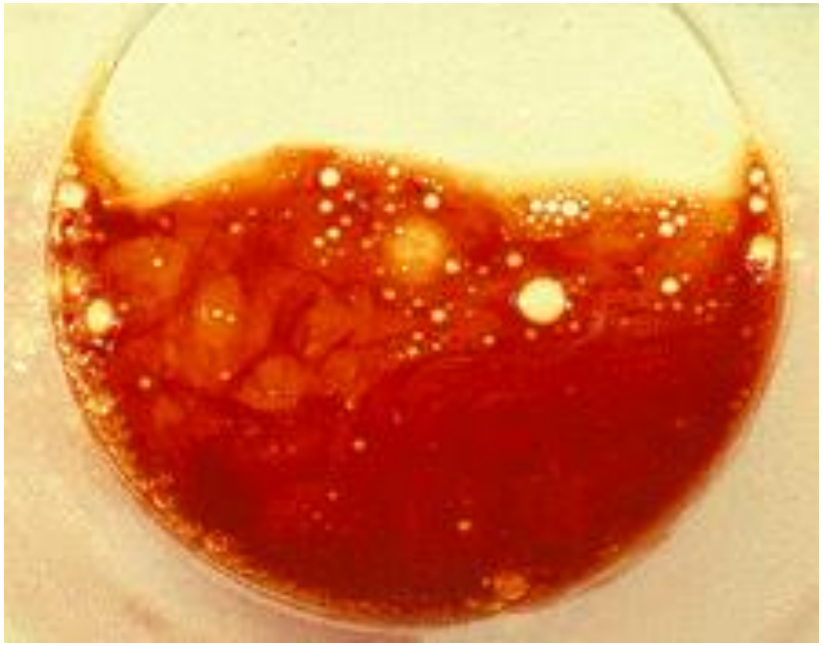
- oxygénothérapie
- chimiothérapie dirigée contre la tumeur sous-jacente
- corticothérapie : méthylprednisolone 1 mg/kg/j à adapter à l'effet symptomatique

Leucostase et pneumopathie de lyse



Revue des Maladies Respiratoires (2012) 29, 743–755

L'hémoptysie massive



ORIGINAL ARTICLE
LUNG CANCER AND CRITICAL CARE

Severe haemoptysis in patients with nonsmall cell lung carcinoma

Keyvan Razazi[1], Antoine Parrot[1], Antoine Khalil[2], Michel Djibre[1], Valerie Gounant[3,4], Jalal Assouad[4,5], Marie France Carette[2,5], Muriel Fartoukh[1,5] and Jacques Cadranel[3,5]

Affiliations: [1]AP-HP, Hôpital Tenon, Unité de Réanimation Médico-Chirurgicale, Pôle Thorax Voies Aériennes, Groupe Hospitalier des Hôpitaux Universitaires de l'Est Parisien, Paris, France. [2]AP-HP, Hôpital Tenon, Service de Radiologie, Pôle Imagerie, Groupe Hospitalier des Hôpitaux Universitaires de l'Est Parisien, Paris, France. [3]AP-HP, Hôpital Tenon, Service de Pneumologie – Centre Expert en Oncologie Thoracique, Pôle Thorax Voies Aériennes, Groupe Hospitalier des Hôpitaux Universitaires de l'Est Parisien, Paris, France. [4]AP-HP, Hôpital Tenon, Service de Chirurgie Thoracique, Pôle Thorax Voies Aériennes, Groupe Hospitalier des Hôpitaux Universitaires de l'Est Parisien, Paris, France. [5]Sorbonne Universités, UPMC Univ Paris 06, Paris, France.

Eur Respir J 2015; 45: 756–764

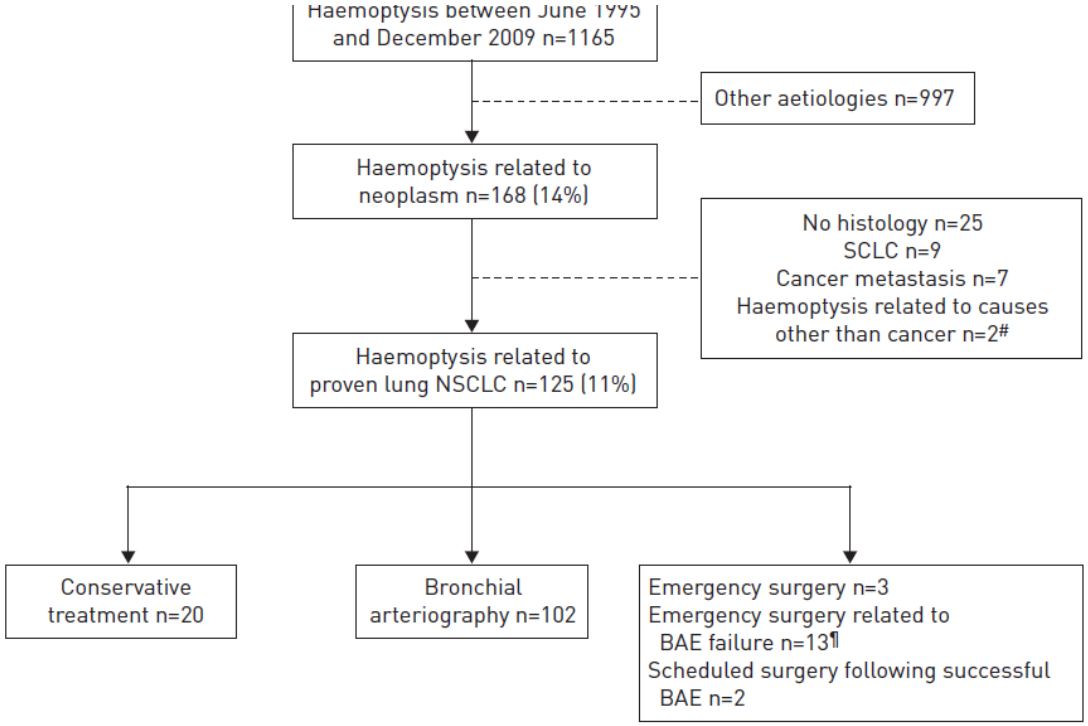


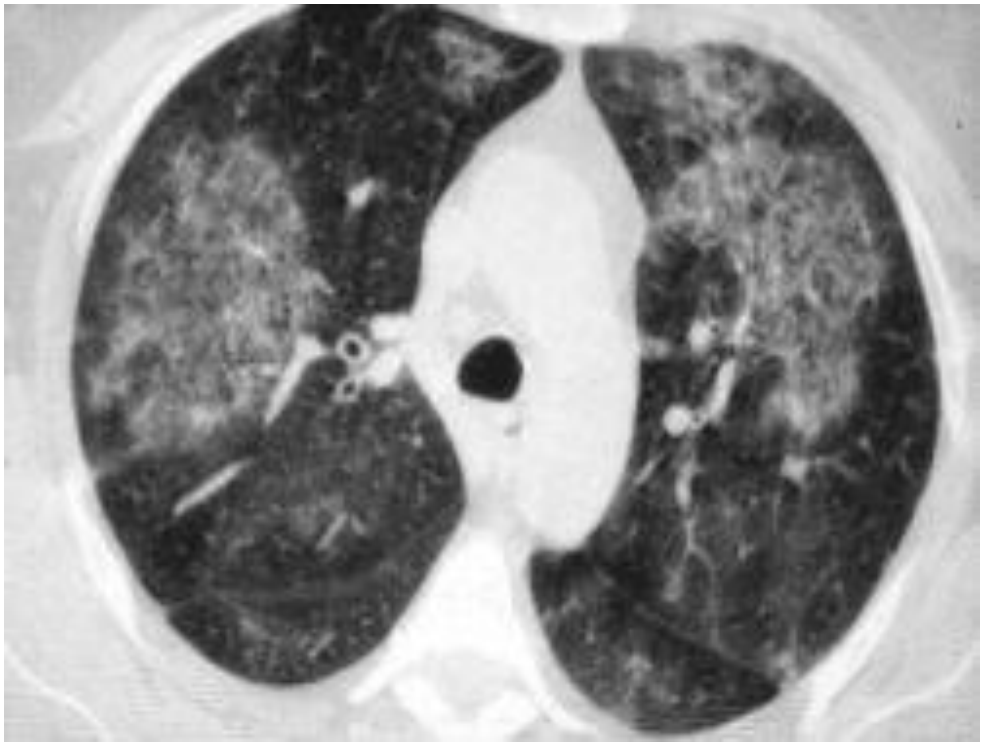
FIGURE 1 Flow chart of patients admitted for severe haemoptysis to Tenon Hospital (Paris, France) between June, 1995 and December, 2009. NSCLC: nonsmall cell lung cancer; SCLC: small cell lung cancer; BAE: bronchial arteriography embolisation. #: bronchiectasis n=1 and pulmonary embolism n=1; ¶: emergency surgery in patients in whom bleeding was not controlled after BAE.

TABLE 2 Univariate and multivariate analyses of variables associated with in-hospital mortality

Variable	Patients n	Hospital mortality n (%)	Univariate analysis		Multivariate analysis	
			OR (95% CI)	p-value	OR (95% CI)	p-value
Age years			0.98 (0.95–1.01)	0.18		
Alcohol abuse						
No	94	29 (31)	1			
Yes	31	10 (32)	1.07 (0.45–2.6)	0.9		
Performance status						
0–1	79	17 (22)	1		1	
2–4	46	22 (48)	3.34 (1.5–7.3)	0.003	3.6 (1.3–9.6)	0.012
COPD/CVD						
No	34	10 (29)	1			
Yes	91	29 (32)	1.12 (0.5–2.7)	0.8		
Anticoagulants and/or antiplatelet treatment						
No	81	27 (33)	1			
Yes	44	12 (27)	0.75 (0.33–1.7)	0.5		
SCC						
No	60	23 (38)	1			
Yes	65	16 (25)	0.5 (0.3–1.1)	0.01		
Advanced NSCLC[#]						
No	37	3 (8)	1		1	
Yes	87	35 (40)	7.6 (2.2–27)	0.002	8.6 (2–37)	0.004
Cavitation or necrosis						
No	99	29 (29)	1			
Yes	26	10 (38)	1.5 (0.61–3.7)	0.37		
Central location[¶]						
No	31	6 (19)	1			
Yes	91	32 (35)	2.3 (0.84–6.1)	0.11		
Cancer progression						
No	94	24 (26)	1			
Yes	31	15 (48)	2.7 (1.2–6.4)	0.02		
Mechanical ventilation						
No	87	14 (16)	1		1	
Yes	38	25 (66)	10 (4.2–24)	<0.001	13 (4.5–36)	<0.001
Vasopressors						
No	104	24 (23)	1			
Yes	21	15 (71)	8.3 (2.9–24)	<0.001		
Transfusion						
No	96	24 (25)	1			
Yes	29	15 (52)	3.2 (1.4–7.6)	0.008		
SAPS II (per point)			1.07 (1.04–1.1)	<0.001		
Vasoconstrictive agents						
No	68	16 (24)	1	1		
Yes	57	23 (40)	2.2 (1.02–4.8)	0.05		
Bronchial arteriography						
No	23	11 (48)	1			
Yes	102	28 (27)	0.41 (0.16–1.04)	0.06		

COPD: chronic obstructive pulmonary disease; CVD: cardiovascular disease; SCC: squamous cell carcinoma; NSCLC: nonsmall cell lung cancer; SAPS: Simplified Acute Physiology Score. [#]: in one stage III NSCLC patient the A or B staging could be not determined; [¶]: central location could not be determined in three patients.

L'hémorragie alvéolaire



Souvent de mécanismes multiples

- augmentation de la pression capillaire: OPH, maladie veino-occlusive, infarcissements (aspergillose)
- lésion membrane alvéolocapillaire : infections, amiodarone, chimiothérapie, radiothérapie, infiltration néoplasique
- troubles de l 'hémostase : thrombopénie sévère, CIVD, avitaminose K

Tableau clinique

moins dramatique que chez le non cancéreux !

- dyspnée, hémoptysie, anémie aiguë, SDRA
- opacités alvéolaires diffuses en verre dépoli
- LBA : liquide rouge-rosé, présence d'hématies et d'hémosidérine

Traitement

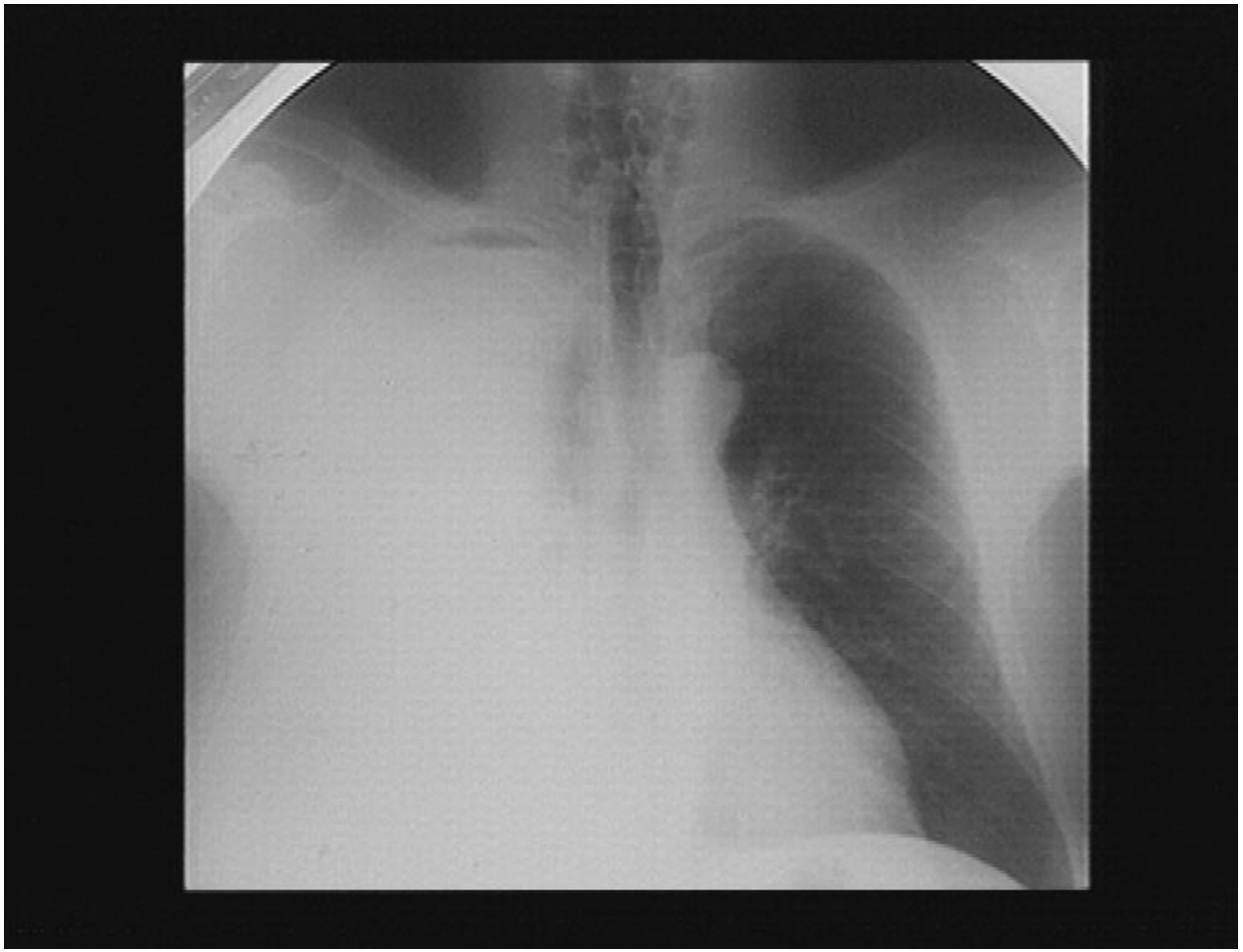
- corriger les troubles de l'hémostase
- corriger une éventuelle cause cardiovasculaire (↑ Pcap)
- rechercher l'aspergillose (LBA) : éviter dans ce cas les corticoïdes et traiter à l'amphotéricine B
- corticothérapie à haute dose (lésions toxiques : cf contexte de chimiothérapie intensive et de TBI) : Solumédrol^{R} 15 mg/kg (sans dépasser 1g) 3 jours en bolus iv puis 1 à 2 mg/kg/j pendant quelques semaines
- oxygénothérapie, VNI, ventilation mécanique invasive

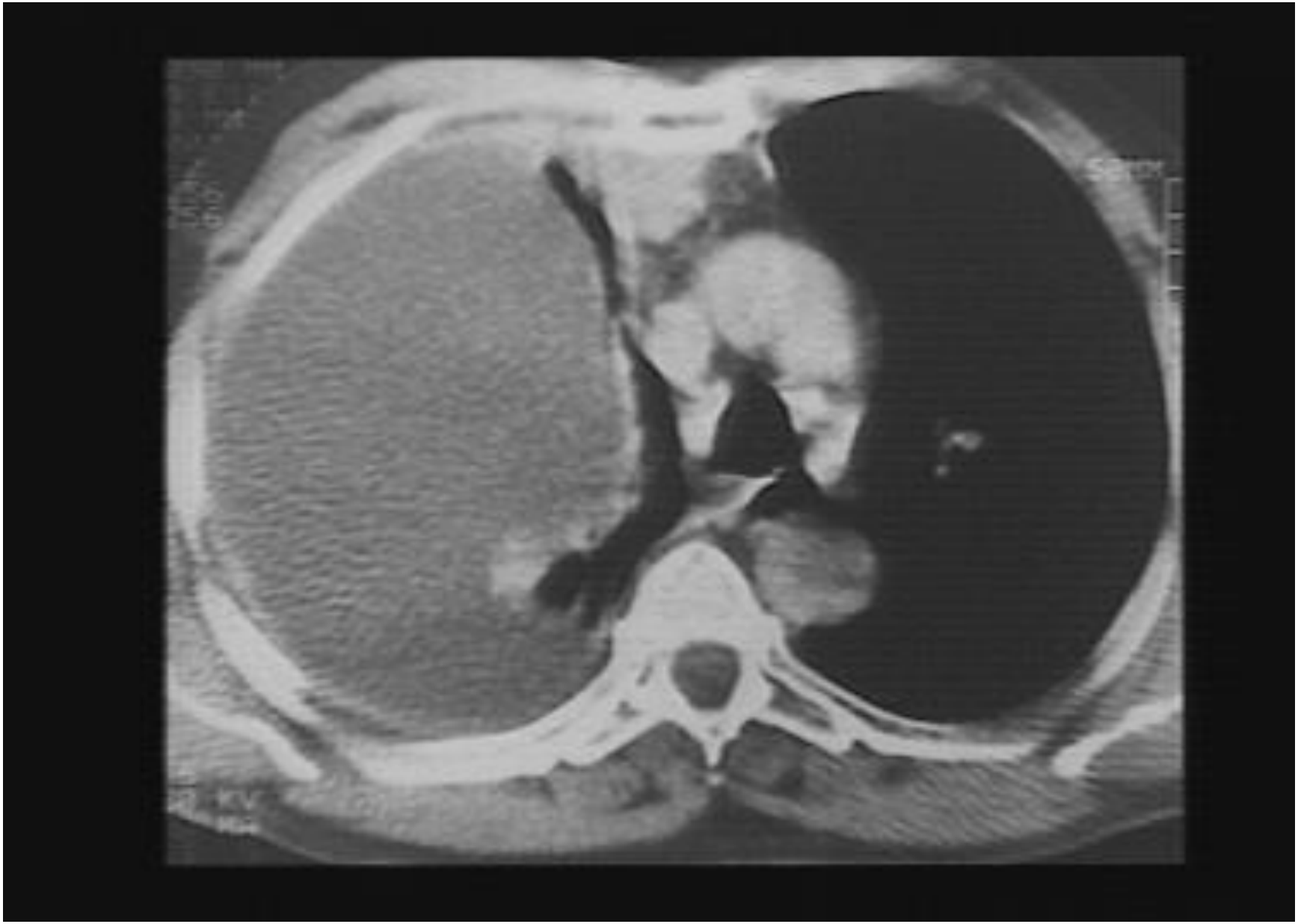
Hémorragie alvéolaire diffuse : stéroïdes.

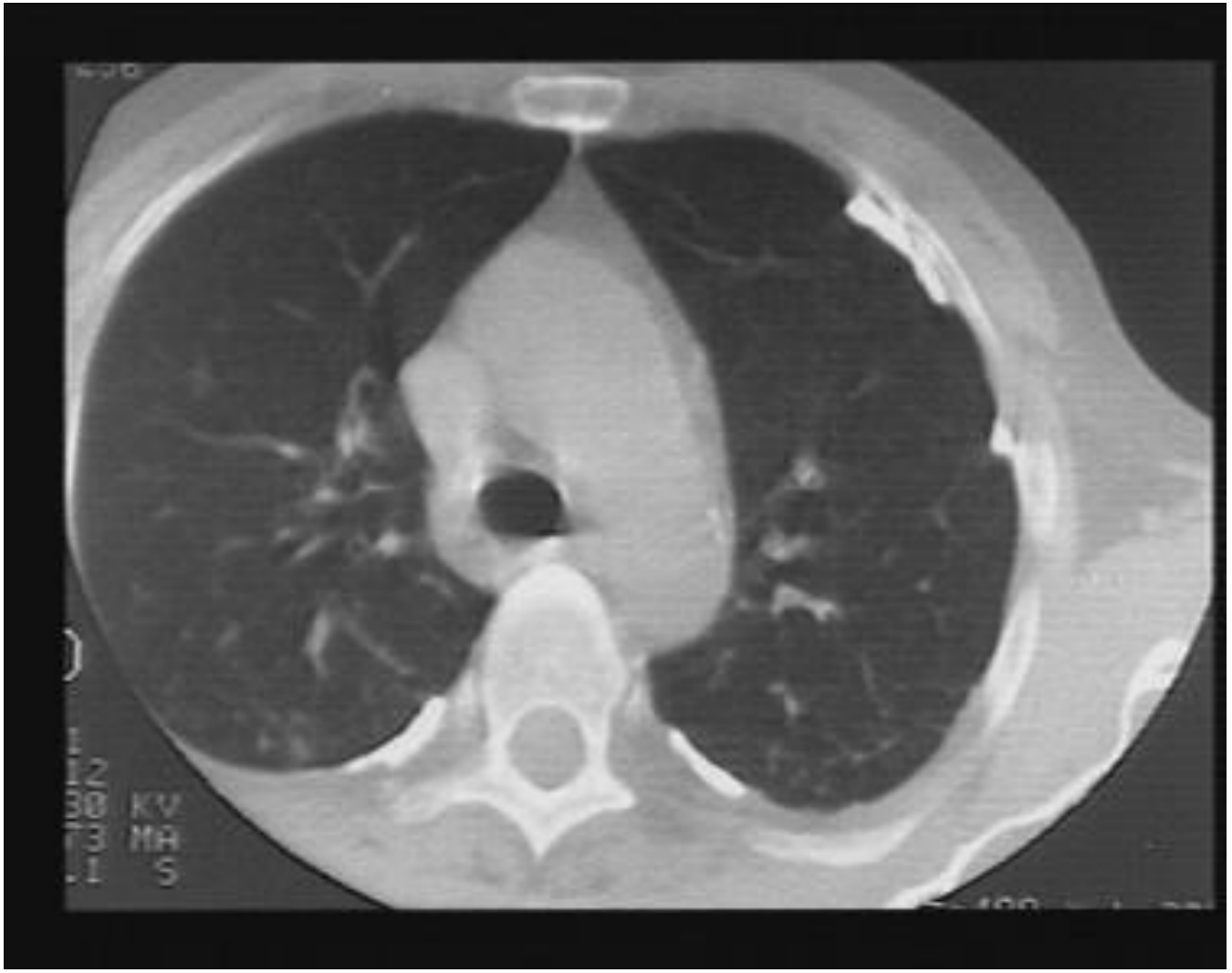
Metcalf, Am J Med 96:327;1994

Méthylprednisolone	*-*	*< 30 mg*	*> 30 mg*	*p*
n	12	10	43	
intubés	7	5	21	
décès	11	9	29	S
VA post-diagnostic	5/5	4/5	10/22	S
infections II	5	3	18	NS

Les épanchements pleuraux






KV
MA
S

Abord thérapeutique

- Spécifique : traitement de la cause
- Symptomatique : contrôle de la formation de l'épanchement pleural :

  - ponction-vidange
  - pleurodèse
  - pleurectomie

La ventilation mécanique

Indications

- Les pathologies respiratoires
- Les pathologies non respiratoires

Peu de ces affections ont fait jusqu'à présent l'objet d'études spécifiquement en rapport avec la ventilation mécanique

Les pathologies respiratoires

- *Les pneumopathies infectieuses diffuses, principalement dues à :*
  - *Pneumocystis jirovecii*
  - *Cytomégalovirus*
  - *Aspergillose invasive*
  - *Infections bactériennes ordinaires (Pneumocoque, Pseudomonas aeruginosa, entérobactéries, …)*
  - *Infections virales diverses (adénovirus, virus respiratoire syncytia, …)*
- *Les hémorragies*
  - *hémorragie alvéolaire diffuse*
  - *hémoptysie massive*
- *Les atteintes néoplasiques*
  - *obstruction et compression tumorales*
  - *embolie de cellules tumorales et lymphangite carcinomateuse*
  - *leucostase*
  - *fausse déglutition et/ou fistule oesophagorespiratoire*
- *Les effets toxiques du traitement*
  - *Chimiothérapie*
  - *Thérapies ciblées*
  - *Immunothérapies*
  - *Radiothérapie*
  - *pneumopathie de lyse tumorale*
  - *syndrome de l'acide rétinoïque*
  - *pneumopathie aux leucoagglutinines*
  - *syndrome de fuite capillaire*
- *La protéinose alvéolaire secondaire*
- *Les complications des greffes de moelle*
  - *syndrome de fuite capillaire*
  - *pneumopathie interstitielle idiopathique*
  - *maladie veino-occlusive pulmonaire*
  - *Bronchiolite oblitérante*

Les pathologies non respiratoires

1. *Les états de choc (essentiellement choc septique)*
2. *L'insuffisance cardiaque avec œdème pulmonaire hémodynamique*
3. *Le SDRA dans le cadre d'un syndrome de défaillance multiviscérale (souvent d'origine septique)*
4. *L'embolie pulmonaire cruorique*
5. *L'insuffisance ventilatoire d'origine neurologique*
6. *L'arrêt cardio-respiratoire*

Intensive Care Med (2011) 37:1605–1612
DOI 10.1007/s00134-011-2344-8

ORIGINAL

Gaston Burghi
Virginie Lemiale
Amélie Seguin
Jérôme Lambert
Claire Lacroix
Emmanuel Canet
Anne-Sophie Moreau
Patricia Ribaud
David Schnell
Eric Mariotte
Benoît Schlemmer
Elie Azoulay

Outcomes of mechanically ventilated hematology patients with invasive pulmonary aspergillosis

CRITICAL CARE MEDICINE

complic. respir

Vol. 21, No. 3
Printed in U.S.A.

Laser bronchoscopy in respiratory failure from malignant airway obstruction

IOANNIS T. STANOPOULOS, MD; JOHN F. BEAMIS, JR, MD; FERNANDO J. MARTINEZ, MD; KONSTANTINOS VERGOS, MD; STANLEY M. SHAPSHAY, MD

ORIGINAL ARTICLE

Radiotherapy for Intubated Patients with Malignant Airway Obstruction

Futile or Facilitating Extubation?

Alexander V. Louie, MD,† Sophia Lane, MD,* David A. Palma, MD, PhD, MSc,*† Andrew Warner, MSc,† Jeffrey Q. Cao, MD, MBA,*† and George B. Rodrigues, MD, MSC*†‡*

Introduction: The optimal approach to patients with malignant airway obstruction who require intubation and mechanical ventilation but are ineligible for bronchoscopic interventions is uncertain. Radiotherapy (RT) may be delivered but requires substantial resources in this patient

Key Words: Radiotherapy, Malignant airway obstruction, Intensive care unit.

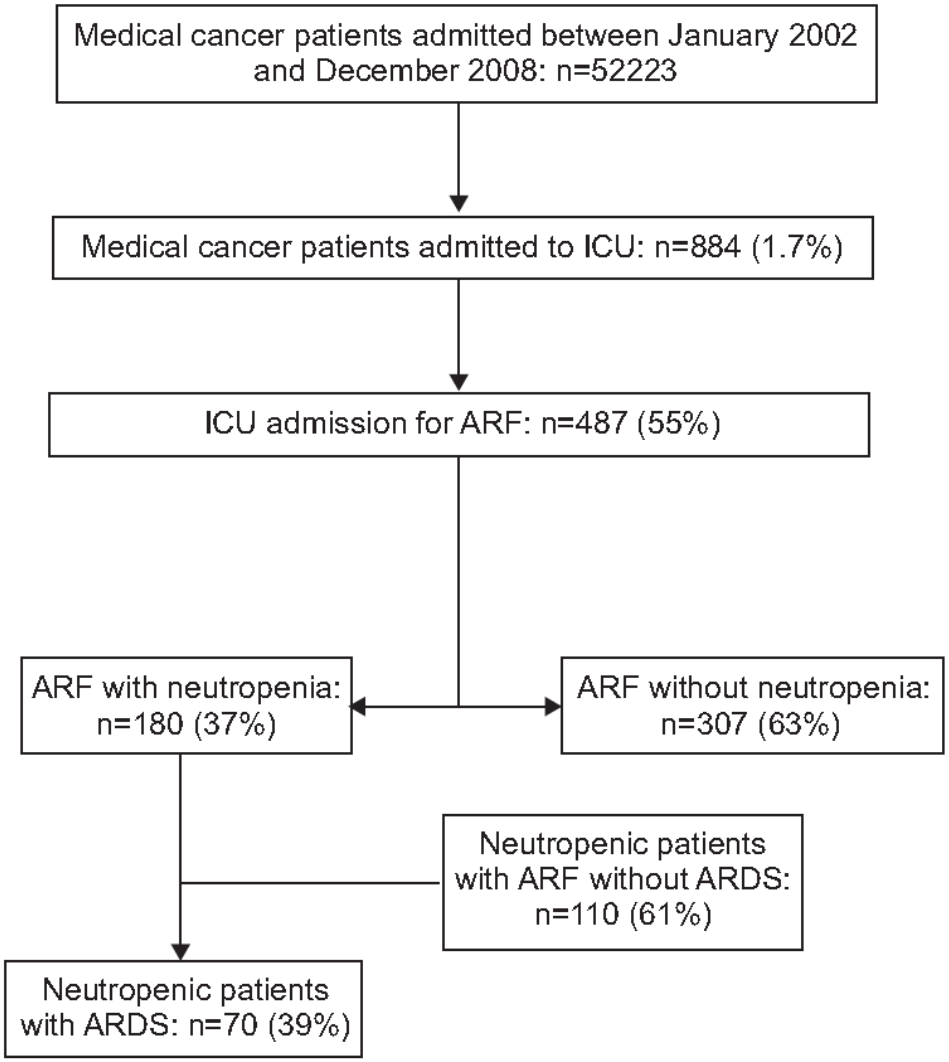
(*J Thorac Oncol*. 2013;8: 1365–1370)

SDRA

Eur Respir J 2012; 40: 169–176
DOI: 10.1183/09031936.00150611

Prognosis of acute respiratory distress syndrome in neutropenic cancer patients

Djamel Mokart*, Thomas van Craenenbroeck*, Jérôme Lambert#, Julien Textoris*, Jean-Paul Brun*, Antoine Sannini*, Laurent Chow-Chine*, Smail Hamouda*, Louis Fouché*, Florence Ettori*, Marion Faucher* and Jean-Louis Blache*


Medical cancer patients admitted between January 2002 and December 2008: n=52223
Medical cancer patients admitted to ICU: n=884 (1.7%)
ICU admission for ARF: n=487 (55%)
ARF with neutropenia: n=180 (37%)
ARF without neutropenia: n=307 (63%)
Neutropenic patients with ARF without ARDS: n=110 (61%)
Neutropenic patients with ARDS: n=70 (39%)

mortalité hospitalière de 64 %

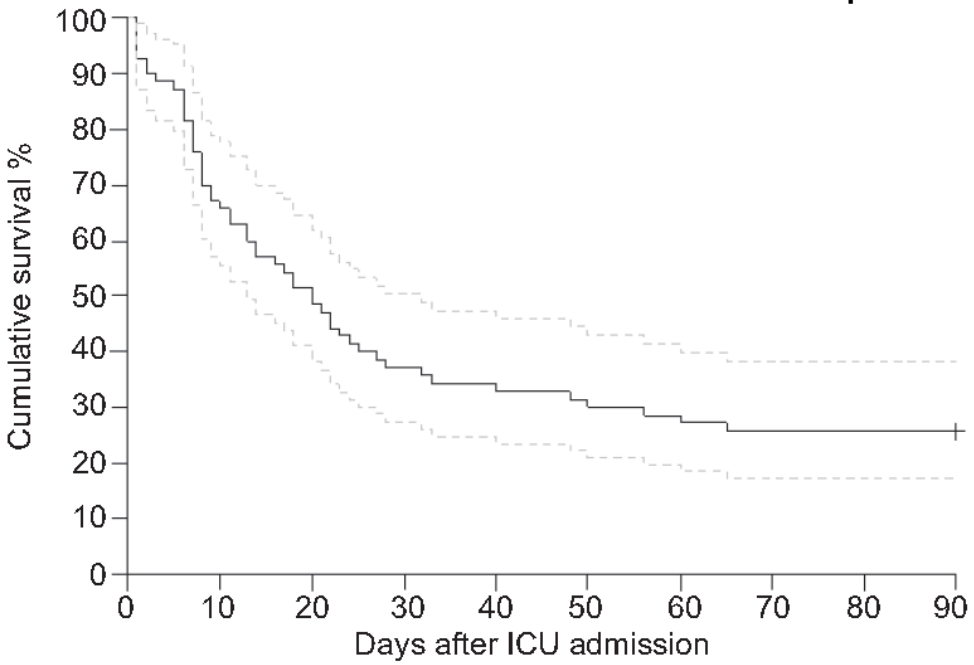


FIGURE 2. Survival in neutropenic patients with aquired respiratory distress sydrome. Overall survival is truncated at 90 days. -----: 95% confidence interval. ICU: intensive care unit.

TABLE 1 Patients characteristics at intensive care unit (ICU) admission

	Survivors	Nonsurvivors	p-value
Subjects n	26	44	
Females	11 (42)	22 (50)	0.62
Age yrs	54 (37–66)	55 (49–65)	0.43
Underlying malignancy			
Acute leukaemia	18 (69)	21 (48)	0.20
Lymphoma	7 (27)	12 (27)	
Myeloma	1 (4)	3 (7)	
Solid tumours	0 (0)	4 (9)	
Other malignancies	0 (0)	4 (9)	
Delay since malignancy days	15 (7–39)	180 (18–601)	0.0011
Status of malignancy			
First-line chemotherapy	22 (85)	19 (43)	0.0041
Complete remission	0 (0)	5 (11)	
Relapse	4 (15)	16 (36)	
Secondary acute leukaemia	0 (0)	4 (9)	
Delay since neutropenia at ICU admission days	4 (0–8)	5 (3–13)	0.12
BMT	2 (8)	12 (27)	0.065

Causes of ARDS			
Unknown	8 (31)	11 (25)	0.91
Nonseptic ARDS	1 (4)	3 (7)	
Septic ARDS	17 (65)	30 (68)	
Gram-negative bacilli	5 (19)	12 (27)	0.41
Gram-positive cocci	4 (15)	5 (11)	
Fungi	5 (19)	9 (21)	
Viruses	1 (4)	4 (9)	
Other infections	2 (8)	0 (0)	
Invasive pulmonary aspergillosis	3 (12)	5 (12)	>0.99
Extrapulmonary ARDS#	5 (28)	16 (49)	0.23
Pulmonary ARDS#	13 (72)	17(52)	
Lung morphology on CT			
Diffuse ARDS	12 (46)	31 (71)	0.027
Patchy ARDS	4 (15)	8 (18)	
Lobar ARDS	10 (39)	5 (11)	
Antimicrobial treatment			
Initial antibiotic treatment active on DTT bacteria	16 (62)	12 (27)	0.0061
Microbiological documentation at ICU admission¶	9 (56)	15 (50)	0.76

Conclusions

À l'admission en USI, la chimiothérapie de première ligne, le SDRA lobaire et l'utilisation d'un traitement antibiotique actif sur les bactéries difficiles à traiter sont associés à la survie.

Pendant le séjour en soins intensifs, la récupération de la neutropénie semble être un point important de récupération, tandis que la persistance de défaillances d'organes et l'utilisation de vasopresseurs sont associées à la mort.

La plupart des survivants ont un séjour en USI > 3 semaines

Intensive Care Med (2014) 40:1106–1114
DOI 10.1007/s00134-014-3354-0

ORIGINAL

Elie Azoulay
Virginie Lemiale
Djamel Mokart
Frédéric Pène
Achille Kouatchet
Pierre Perez
François Vincent
Julien Mayaux
Dominique Benoit
Fabrice Bruneel
Anne-Pascale Meert
Martine Nyunga
Antoine Rabbat
Michael Darmon

Acute respiratory distress syndrome in patients with malignancies

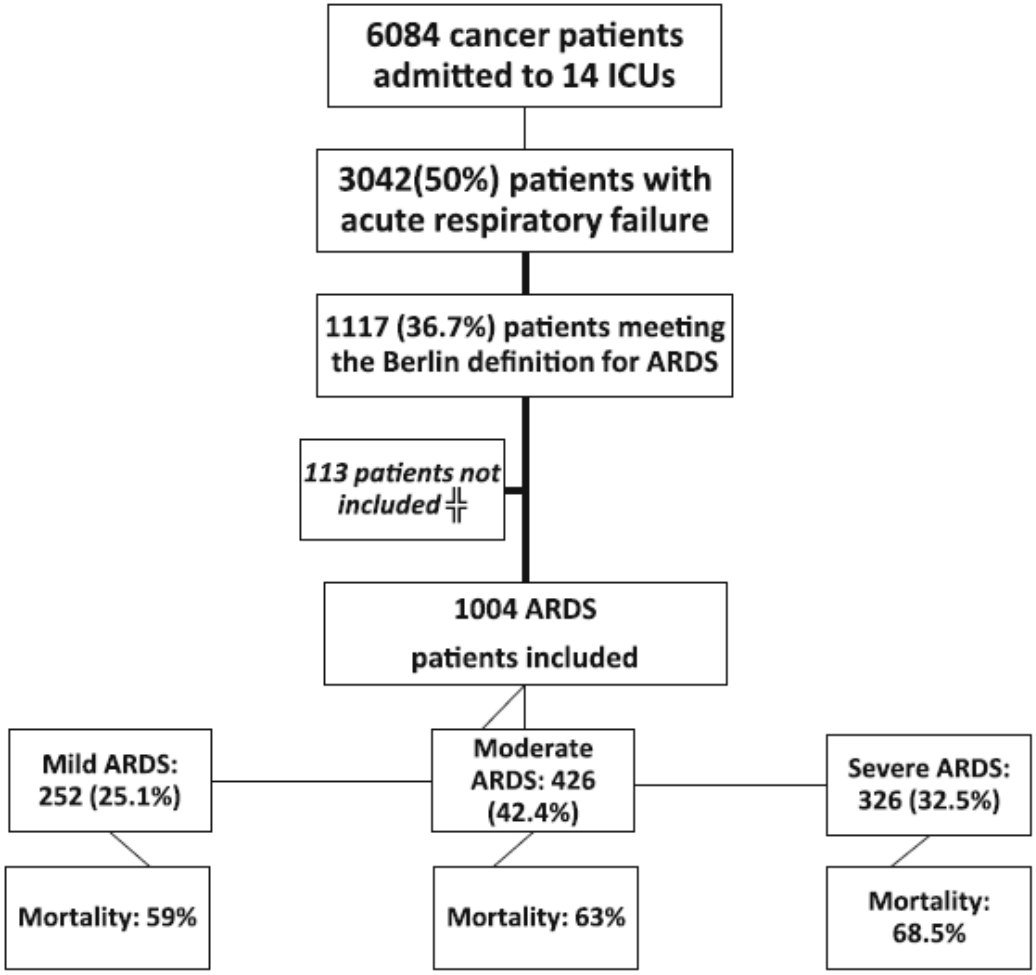


Fig. 1 Patient flow chart and distribution among in three ARDS severity categories in the Berlin definition. ╬ reasons for non-inclusion were as follows: 55 patients did not receive noninvasive or endotracheal mechanical ventilation and vital status at hospital discharge was unknown in 58 patients

Table 1 Patient characteristics at admission to the intensive care unit

Median (IQR) or *n* (%)	Study population (*n* = 1,004)	Survivors (*n* = 364)	Non-survivors (*n* = 640)	*p* value
Male gender	642 (63.9 %)	240 (65.9 %)	402 (62.8 %)	0.32
Age (years)	58 (48–67)	57 (47–67)	58 (48–67)	0.33
Underlying malignancy				
Acute leukemia	298 (29.7 %)	96 (26.4 %)	202 (31.6 %)	0.08
Non-Hodgkin's lymphoma	318 (31.7 %)	115 (31.6 %)	203 (31.7 %)	0.97
Myeloma	113 (11.3 %)	34 (9.3 %)	79 (12.3 %)	<0.0001
Solid tumor	147 (14.6 %)	60 (16.5 %)	87 (13.6 %)	0.21
Miscellaneous	95 (9.5 %)	46 (12.6 %)	48 (7.7 %)	0.01
Allogeneic BMT/HSTC[a]	115 (11.5 %)	36 (9.9 %)	79 (12.3 %)	0.23
Neutropenia	444 (44.2 %)	148 (40.7 %)	296 (46.3 %)	0.08
Stage				
Progressive	458 (45.6 %)	171 (47.0 %)	287 (44.8 %)	0.0003
Partial/complete remission	237 (23.6 %)	100 (27.4 %)	137 (21.4 %)	
Newly diagnosed	72 (7.2 %)	33 (9.1 %)	39 (6.1 %)	
Unknown	237 (23.6 %)	60 (16.5 %)	177 (27.7 %)	

[a] Bone-marrow transplantation/hematopoietic-stem-cell transplantation

Table 2 ARDS causes, severity and treatment, and hospital mortality

Median (IQR) or *n* (%)	Study population (*n* = 1,004)	Survivors (*n* = 364)	Non-survivors (*n* = 640)	*p* value
SOFA score (31) on day-1	12 [10–13]	10 [8–12]	13 [10–13]	<0.0001
mSOFA score on day-1	9 [6–11]	7 [5–10]	9 [7–11]	<0.0001
Emergency surgery	64 (6.4 %)	34 (9.3 %)	30 (4.7 %)	0.004
Sepsis	745 (74.2 %)	275 (75.5 %)	470 (73.4 %)	0.46
Cause of ARDS				
Pulmonary infection[a]	662 (65.9 %)	281 (77.2 %)	381 (59.5 %)	<0.0001
Secondary ARDS[a]	225 (22.4 %)	55 (15.1 %)	170 (26.6 %)	<0.0001
Fungal infection[b]	293 (30.7 %)	83 (23.2 %)	210 (35.1 %)	0.0001
Pneumocystis	64 (6.4 %)	30 (8.2 %)	34 (5.3 %)	0.07
No definite diagnosis[c]	41 (5.7 %)	12 (4.5 %)	29 (6.4 %)	0.29
Berlin categories				
Mild (P/F >200)	252 (25.1 %)	103 (28.3 %)	149 (23.3 %)	
Moderate (P/F 100–200)	426 (42.4 %)	158 (43.4 %)	268 (41.8 %)	0.06
Severe (P/F < 100)	326 (32.5 %)	103 (28.3 %)	223 (34.8 %)	
Organ Support				
NIV	387 (38.6 %)	174 (47.8 %)	213 (33.3 %)	<0.0001
NIV failure	276 (27.5 %)	103 (28.3 %)	173 (27.0 %)	0.67
Endotracheal MV	893 (88.9 %)	293 (80.5 %)	600 (93.8 %)	<0.0001
Vasopressors	731 (72.8 %)	241 (66.2 %)	490 (76.6 %)	0.0004
Renal replacement therapy	306 (30.5 %)	99 (27.2 %)	207 (32.3 %)	0.09

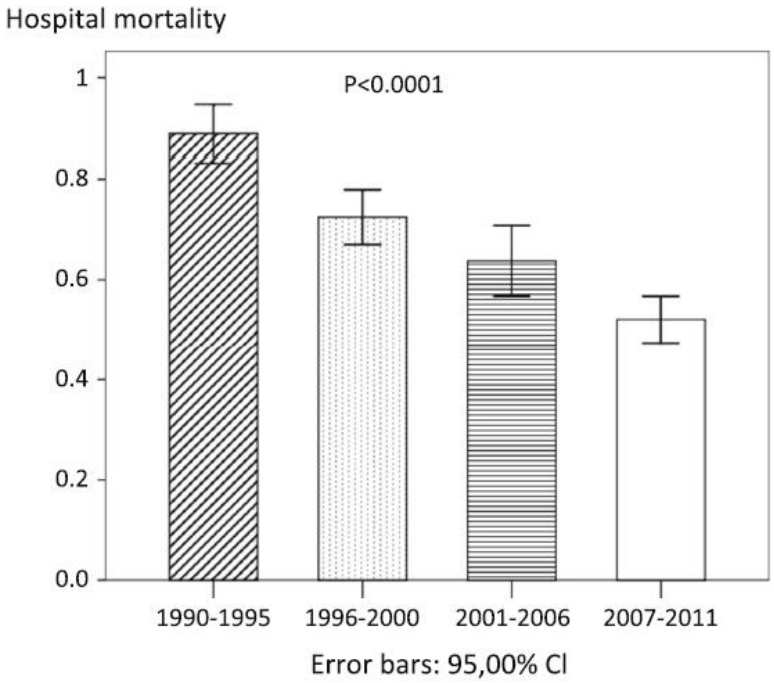


Fig. 2 Hospital mortality according to period of admission to the intensive care unit

Table 3 Factors independently associated with hospital mortality

	OR	95 % CI	*p* value
Solid tumor	0.51	(0.34–0.77)	0.002
Need for emergency surgery	0.61	(0.35–1.05)	0.07
Allogeneic BMT/HSCT	1.71	(1.07–2.71)	0.04
mSOFA (per point)	1.11	(1.06–1.16)	<0.001
Cause of respiratory involvement			
No definite diagnosis	1	(Reference)	–
Primary ARDS	0.41	(0.20–0.88)	0.02
Secondary ARDS	0.90	(0.41–2.01)	0.80
Invasive fungal infection	1.72	(1.25–2.37)	0.001
Ventilation			
NIV	1	(Reference)	–
NIV failure	2.93	(1.80–4.79)	<0.001
Endotracheal MV	3.24	(2.02–5.24)	<0.001
ARDS severity			
Mild	1	(Reference)	–
Moderate	1.25	(0.88–1.78)	0.22
Severe	1.61	(1.10–2.36)	0.01

Conclusions

Les infections pulmonaires ou extrapulmonaires ont causé jusqu'à 90% des cas de SDRA chez les patients atteints de tumeurs malignes. Les infections fongiques invasives représentaient un tiers de ces infections. La mortalité a considérablement diminué au fil du temps.

L'échec de la VNI s'est produit dans 70% des cas et a été associé au décès, notamment chez les patients atteints de SDRA sévère, chez qui la VNI initiale est probablement imprudente.

Parmi les trois catégories de SDRA définies dans la définition de Berlin, seule une SDRA sévère était associée à une mortalité accrue.

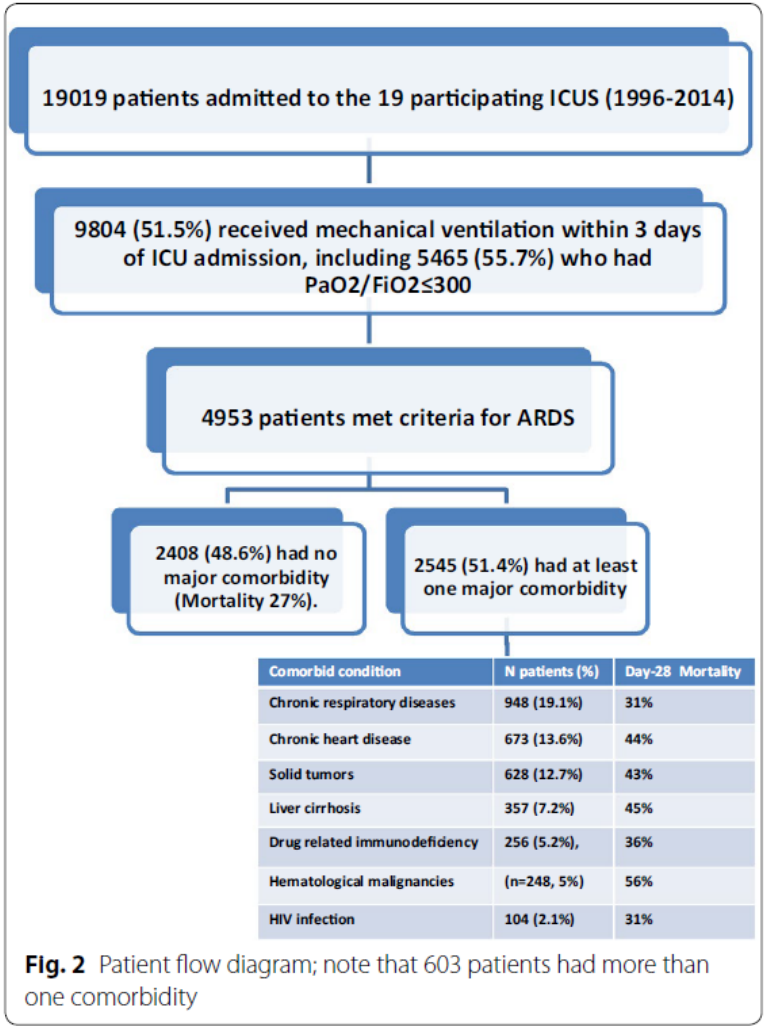
La mortalité élevée chez les patients atteints d'infections fongiques invasives indique un besoin urgent d'études spécifiques de traitement antifongique précoce chez les patients à haut risque.

Intensive Care Med (2018) 44:1050–1060
https://doi.org/10.1007/s00134-018-5209-6

ORIGINAL

Management and outcomes of acute respiratory distress syndrome patients with and without comorbid conditions

Elie Azoulay[1*], Virginie Lemiale[1], Bruno Mourvillier[2], Maite Garrouste-Orgeas[3], Carole Schwebel[4], Stéphane Ruckly[5], Laurent Argaud[6], Yves Cohen[7], Bertrand Souweine[8], Laurent Papazian[9], Jean Reignier[10], Guillaume Marcotte[11], Shidasp Siami[12], Hatem Kallel[13], Michael Darmon[1] and Jean-François Timsit[14] on behalf of the OUTCOMEREA Study Group



Comorbid condition	N patients (%)	Day-28 Mortality
Chronic respiratory diseases	948 (19.1%)	31%
Chronic heart disease	673 (13.6%)	44%
Solid tumors	628 (12.7%)	43%
Liver cirrhosis	357 (7.2%)	45%
Drug related immunodeficiency	256 (5.2%),	36%
Hematological malignancies	(n=248, 5%)	56%
HIV infection	104 (2.1%)	31%

Fig. 2 Patient flow diagram; note that 603 patients had more than one comorbidity

Table 2 Multivariate analysis of factors independently associated with day-28 mortality in patients with ARDS (Cox model stratified on center)

Variable	Hazard ratio (95% confidence interval)	*P* value
Comorbid conditions		
Chronic respiratory disease	0.824 (0.721–0.942)	0.004
Chronic heart failure	1.492 (1.308–1.701)	< 0.0001
Liver cirrhosis	1.124 (0.951–1.329)	0.171
Solid tumor	1.544 (1.350–1.765)	< 0.0001
Drug-related immunodeficiency	1.058 (0.850–1.317)	0.613
Hematological malignancy	1.514 (1.243–1.844)	0.0001
HIV infection	0.767 (0.539–1.091)	0.139
Lowest P_aO_2/F_iO_2 ratio		
200–300 (mild ARDS)	Reference	
100–299 (moderate ARDS)	1.229 (1.094–1.381)	0.0005
< 100 (severe ARDS)	1.692 (1.489–1.923)	< 0.0001
Highest P_aCO_2 on day 1 > 50 mmHg	1.411 (1.252–1.589)	< 0.0001
Pulmonary ARDS	0.680 (0.595–0.775)	<0.0001
SOFA score without respiratory points on day 1		
< 4	Reference	
4–5	1.526 (1.268–1.835)	< 0.0001
5–8	2.329 (1.961–2.766)	< 0.0001
> 8	5.033 (4.254–5.955)	< 0.0001
ICU–acquired events[a]	1.411 (1.252–1.589)	< 0.0001

ARDS acute respiratory distress syndrome, *HIV* human immunodeficiency virus, PaO_2/FiO_2 ratio of partial pressure of oxygen in arterial blood over fraction of inspired oxygen, $PaCO_2$ partial pressure of carbon dioxide in arterial blood, *SOFA* Sequential Organ Function Assessment, *ICU* intensive care unit

[a] Defined as events that were not expected at ICU admission but may affect outcomes, i.e., bleeding, myocardial or mesenteric infarction, atelectasis, cardiac arrest, arrhythmia requiring cardioversion, pulmonary embolism, drug allergy, seizures, medical error, hypoglycemia, and pericarditis requiring drainage

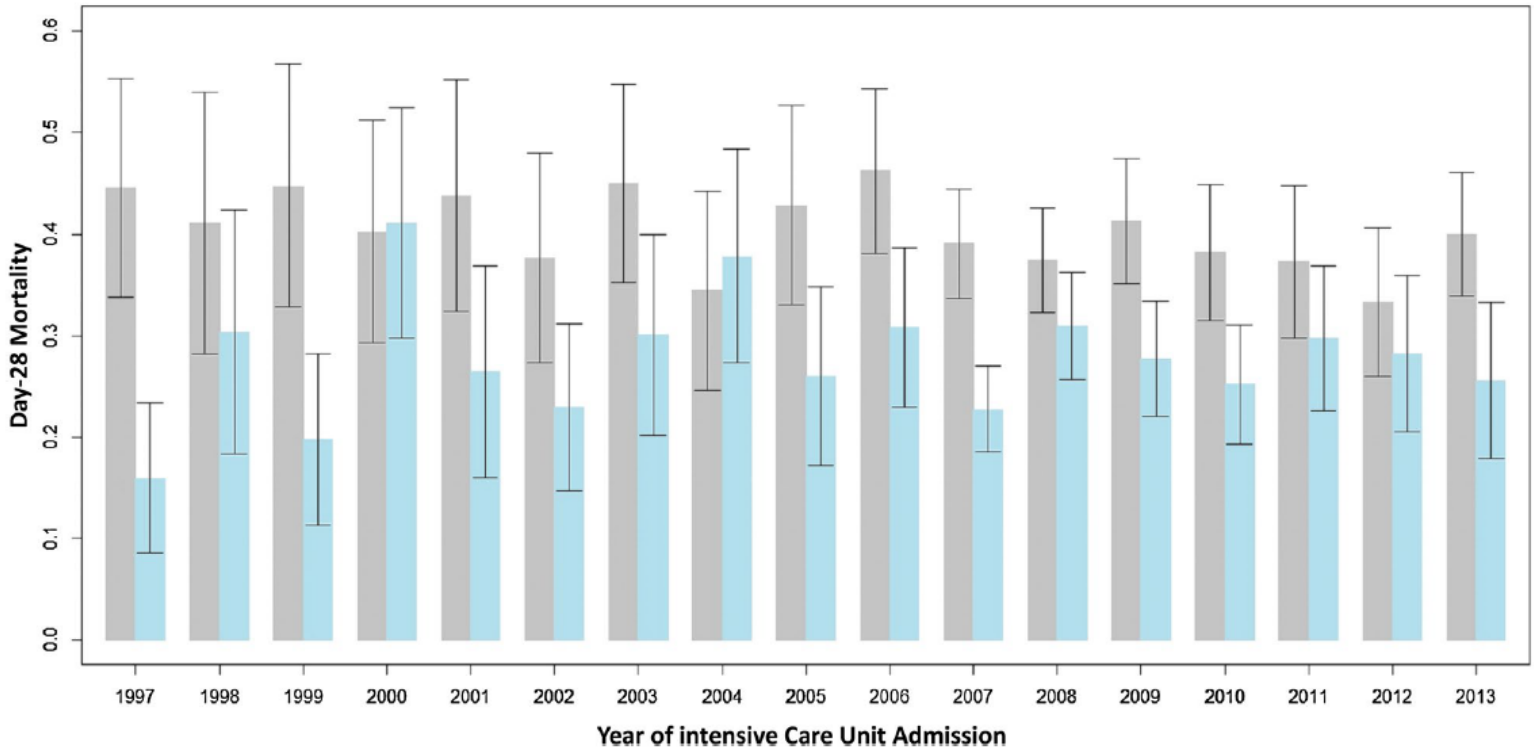


Fig. 5 Day-28 mortality (with 95% confidence intervals) during each study year in patients with at least one comorbidity (*gray bars*) and those with no comorbidities (*blue bars*). The test for trend was non-significant in the group without comorbidities (Cochran–Armitage test, $P = 0.46$) and showed a non-significant trend in patients with at least one comorbidity (Cochran–Armitage test, $P = 0.09$)

Conclusions

La moitié des patients atteints de SDRA présentaient des comorbidités majeures, qui étaient associées à un SDRA sévère, à un dysfonctionnement de plusieurs organes et à une mortalité au jour 28. Ces résultats n'appuient pas l'exclusion des patients atteints de SDRA présentant des comorbidités sévères des essais cliniques randomisés. Des essais chez des patients atteints de SDRA avec n'importe quelle comorbidité sont justifiés.

Les techniques de ventilation mécanique

- La ventilation invasive
- La ventilation non invasive (VNI)
- La ventilation invasive à l'ère de la VNI

La ventilation mécanique invasive

Les résultats

Sculier JP et al :
La ventilation artificielle chez les patients atteints de cancer.
Rev Mal Respir 2001; 18(2):137-154.

Le pronostic en résumé

Type de population	*Nombre d'études*	*Nombre de patients ventilés*	*Taux de succès (médiane)*
Tout cancéreux	15	10 – 782	4 – 71% (18%)
Tumeurs solides	7	22 – 627	25 – 93% (31%)
Hémopathies malignes	7	17 – 67	8 – 35% (27%)
Greffes de moelle	11	16 - 60	4 – 19% (9%)

L'expérience de l'Institut Bordet

Support Care Cancer (2003) 11:236–241
DOI 10.1007/s00520-002-0436-2

ORIGINAL ARTICLE

F. Vallot
M. Paesmans
T. Berghmans
J. P. Sculier

Leucopenia is an independent predictor in cancer patients requiring invasive mechanical ventilation: a prognostic factor analysis in a series of 168 patients

Table 1 Patients characteristics

Variable		*n*	%
Total number of patients		168	–
Demographic variables			
Age	Median (years)	56	–
	Range	21–86	–
Sex	Male	82	49
	Female	86	51
Cancer-related variables			
Type of tumour	Solid	104	62
	Haematological	64	38
Cancer status	Complete response	7	4
	Partial response	19	11
	Stable disease	14	8
	Progression	93	55
	Induction treatment	35	21
Cancer phase	Diagnosis	5	3
	Curative	56	33
	Control	87	52
	Pivotal	19	11
	Palliative	1	0.5
Cancer evolution duration	Median (months)	14.5	–
	Range	(0–244)	–
Bone marrow graft	No	146	87
	Autologous	12	7
	Allogeneic	10	6
Complications-related variables			
APACHE II score	Median	20	–
	Range	3–43	–
SAPS II score	Median	43	–
	Range	16–93	–
Admission for	Mechanical ventilation	98	58
	Other reason	70	42
Renal failure	Yes	102	61
	No	66	39
Shock	Yes	95	60
	No	73	40
Leukocyte count	<1000/mm^3	44	26
	>1000/mm^3	124	74
Platelet count	<50,000/mm^3	58	35
	>50,000/mm^3	110	65

Table 2 Outcomes results

Duration of mechanical ventilation	
Median Range	111–183
Weaning from mechanical ventilation	43 (26%)
Discharge from ICU	37 (22%)
Duration of ICU stay	
Median	16
Range	1–244
Discharge from hospital	29 (17%)

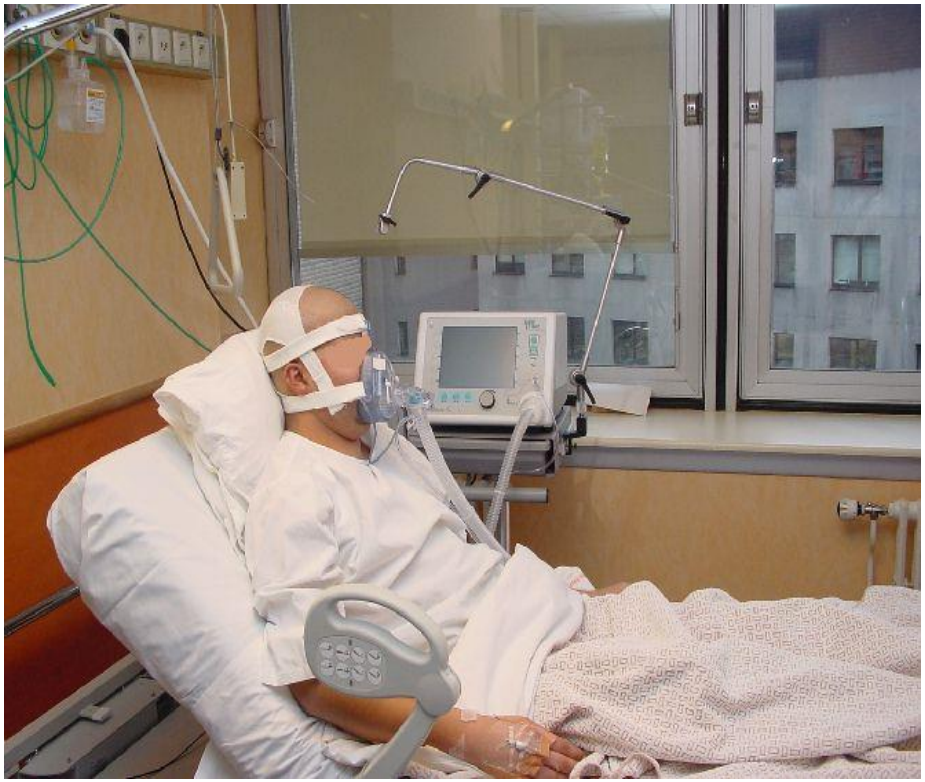
Table 3 Univariate prognostic factors analyses for weaning, ICU mortality and hospital mortality

Variables		Weaning		ICU mortality		Hospital mortality	
		%	*P*	%	*P*	%	*P*
Sex	Male	23	0.60	80	0.56	82	1
	Female	28		76		82	
Age (years)	<60	26	0.94	76	0.62	80	0.55
	>60	25		80		85	
Cancer duration (months)	<14.5	21	0.29	83	0.14	88	0.1
	>14.5	30		73		77	
Bone marrow graft	Yes	27	0.60	77	0.79	82%	0.86
	No	18		82		86	
SAPS II score	<43	31	0.11	73	0.19	79	0.28
	>43	19		83		86	
APACHE II score	<20	32	0.08	74	0.25	79	0.35
	>20	19		82		86	
Leucopenia	Yes	14	0.04	89	0.06	93	0.06
	No	30		74		79	
Thrombopenia	Yes	17	0.09	83	0.37	87	0.28
	No	30		75		80	
Shock	Yes	19	0.11	85	0.06	78	0.20
	No	31		73		87	
Renal failure	Yes	21	0.39	83	0.25	81	0.71
	No	28		74		84	
Cancer phase	Diagnosis-curative	28	0.74	77	0.98	80	0.68
	Other	24		78		84	
Cancer status	Remission	31	0.76	73	0.61	76	0.60
	Other	26		78		83	
Admission cause	Mechanical ventilation	23	0.41	80	0.48	83	0.92
	Other	30		75		86	
Tumour type	Solid	26	1	80	0.59	85	0.30
	Haematological	25		75		78	

Table 4 Multivariate analyses of prognostic factor for weaning, ICU mortality and hospital mortality (n=159)

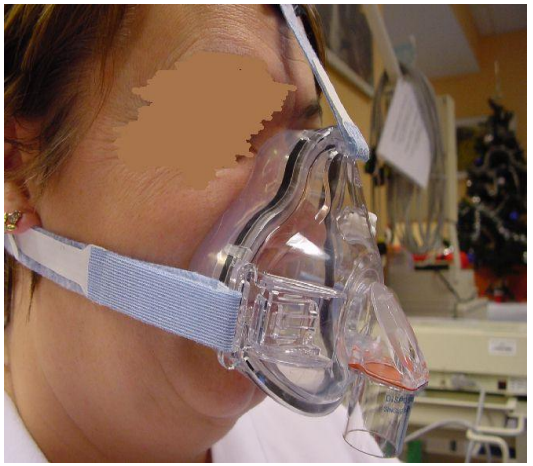
Variables	Weaning[a]			ICU mortality[b]			Hospital mortality[c]		
	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Leucopenia (ref=no)	0.35	0.14–0.89	0.03	0.42	0.15–1.20	0.09	0.23	0.06–0.83	0.03
Shock (ref=yes)	–	–	–	2.04	0.90–4.63	0.08	–	–	–
Cancer evolution duration (ref=>14.5 months)	–	–	–	0.49	0.22–1.07	0.07	0.46	0.19–1.12	0.09
Type of tumour (ref=haemalogical malignancies)	–	–	–	–	–	–	0.45	0.19–1.07	0.07

La ventilation non invasive



Définition

La ventilation non invasive regroupe les méthodes n'ayant pas recours à l'utilisation de sondes d'intubation ou de trachéotomie mais à des interfaces telles que masque nasal, masque facial ou pièce buccale.

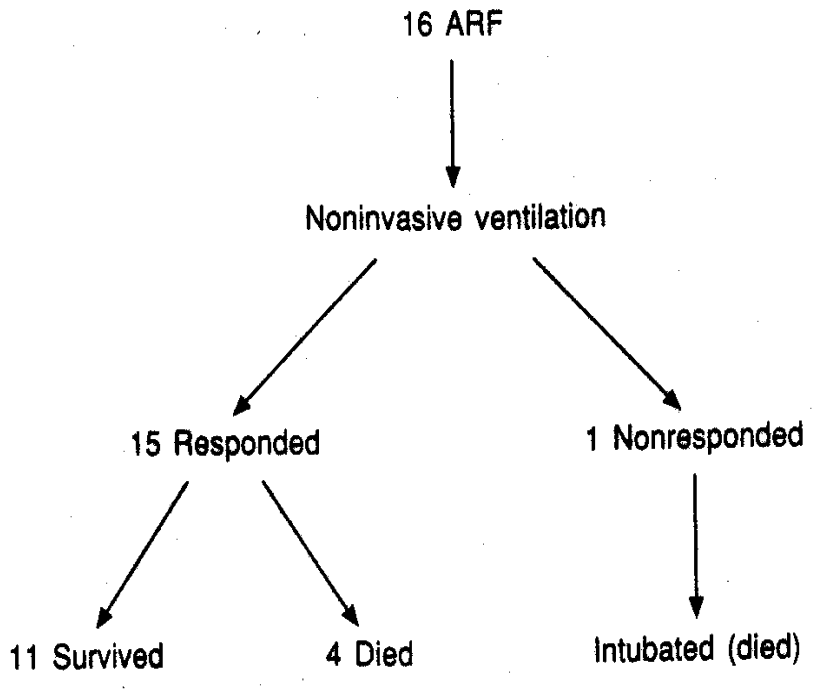


Bases historiques

- a été proposée avec succès chez le patient atteint d'hémopathie maligne sans trouble hémodynamique ni neurologique sévère
- 1982 : CPAP efficace dans les pneumopathies extensives graves dans une série de 11 patients permettant d'éviter l'intubation trachéale dans un nombre non négligeable de cas

La BiPAP oncologie

Noninvasive ventilation (BiPAP) for the treatment of acute respiratory failure in patients with hematologic malignancies: a pilot study par Conti et al (ICM; 24: 1283-8; 1998)



Ventilation non invasive avec intubation si échec

- C'est l'attitude actuellement recommandée (s'il n'y a pas de contre-indication à la VNI)
- Niveau de preuve : études cas-contrôles historiques
  - Effet sur la mortalité : douteux
  - Diminution séjour USI
  - Moins traumatisant

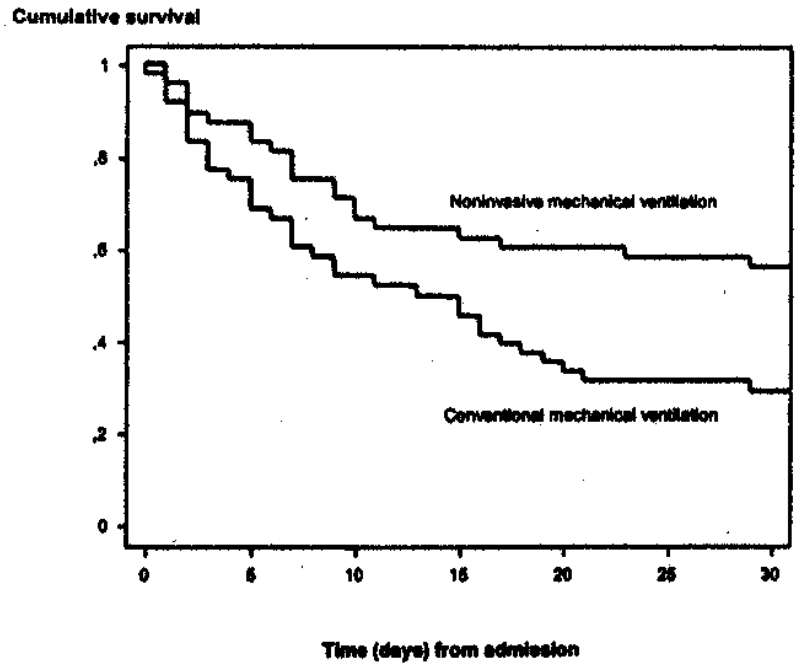
Azoulay, Crit Care Med 29:519-525;2001

Table 4. Characteristics of matched patients with and without exposure to noninvasive mechanical ventilation

	NIMV[a] (n = 48)	Conventional[a] MV(n = 48)	*p* Value
Age (yr)	51.2 (44–65)	56 (45–61)	.73
Female gender	14 (29.2)	16 (33.3)	.66
Underlying malignancy			
Acute leukemia and lymphoma	33 (68.7)	33 (68.7)	—
Myeloma	9 (18.8)	9 (18.8)	—
Solid tumors	6 (12.5)	6 (12.5)	—
Time since diagnosis (days)	296 (30–1101)	130 (29–871)	.89
Poor chronic health status (Knaus C or D)	17 (35.4)	22 (45.8)	.40
Complete remission	17 (35.4)	16 (33.3)	.83
Comorbidities			
Heart failure	5 (10.4)	3 (6.2)	.71
COPD	3 (6.2)	6 (12.5)	.48
Steroids	19 (39.6)	18 (37.5)	.83
Autologous bone marrow transplantation	8 (16.6)	13 (27)	.23
Neutropenia	17 (35.4)	22 (45.8)	.47
Admission between 1996 and 1998	29 (60.4)	29 (60.4)	—
SAPS II score at admission	47 (38–60)	44.5 (36–59)	—
Reason for mechanical ventilation			
Hypoxemic acute respiratory failure	39 (81.4)	33 (68.7)	.002
Cardiogenic pulmonary edema	8 (16.6)	5 (10.4)	.39
Coma	1 (2)	10 (20.8)	.004
Reason for ICU admission			
Shock	11 (22.8)	16 (33.3)	.10
Acute respiratory failure and shock	5 (10.4)	9 (18.8)	.38
Acute renal failure	6 (12.5)	8 (16.6)	.77
Shock after ventilation	0	6 (12.5)	.03
P_aO_2/F_iO_2 ratio	175 (85–187)	175 (158–175)	.37
Need for			
Vasopressors	24 (50)	31 (64.5)	.03
PEEP ≥5 cm H_2O	18 (37.5)	18 (37.5)	.93
Dialysis	13 (27)	12 (25)	.76
Steroids	19 (39.5)	6 (12.5)	.01
Nosocomial infection	8 (16.6)	6 (12.5)	.56
Length of ICU stay			
All patients	7 (4–17)	7 (4–10.5)	.47
Survivors	8 (4–16)	19 (6–34)	.04
End-of-life decision	2 (4.1)	7 (14.5)	.09
30-Day mortality rate	21 (43.7)	34 (70.8)	.008

NIMV, noninvasive mechanical ventilation; MV, mechanical ventilation; COPD, chronic obstructive pulmonary disease; SAPS, simplified acute physiology score; ICU, intensive care unit; PEEP, positive end-expiratory pressure.

[a]Data are expressed as n (%) or median (quartiles).



Depuydt, Chest 2004; 126(4):1299-1306

Table 4—*Characteristics of Matched Patients With and Without Exposure to NPPV

Characteristics	NPPV (n = 26)	Invastve MV (n = 52)	p Value
Age, yr	44.5 (35–63)	57.5 (41–69)	0.06
Female gender	8 (30.8)	19 (36.5)	0.80
Underlyting maltgnancy			
AML	9 (34.6)	13 (25.0)	0.13
ALL	7 (26.9)	4 (7.7)	
Htgh-grade NHL	2 (7.7)	11 (21.2)	
Low-grade NHL	2 (7.7)	6 (11.5)	
MM	3 (11.5)	12 (23.1)	
Other	3 (11.5)	6 (11.5)	
Active disease	7 (26.9)	12 (23.1)	0.78
Allogeneic BMT	5 (19.2)	8 (15.4)	0.75
Leukopenta on ICU admtsston	6 (23.1)	9 (17.3)	0.55
GCS	14.5 (13–15)	15 (15–15)	0.002
SAPS II	46	46	
Pao_2/Fto_2	72 (56–86)	147 (78–201)	< 0.001
PEEP level	5 (5–8)	5 (5–10)	0.17
Vasopressor need	7 (26.9)	25 (48.1)	0.09
Bacteremta < 48 h	5 (20.0)	5 (9.6)	0.2
RRT	4 (15.4)	18 (34.6)	0.08
Leukopenta durtng ICU stay	8 (30.8)	17 (32.7)	0.99
DNR decttion	11 (42.3)	16 (31.4)	0.34
In-hosptlal mortalty	17 (65.4)	34 (65.4)	0.99

*Values gtven as medtan (tnterquartile range) or No. (%), unless otherwtse tndtcated.

Meert, 2005 (2 x 47 patients pairés)

Résultats	Bras		*p*
	VNI	VMI	
Durée ventilation (jour) -médiane (intervalle)	3 (1-26)	10 (0-47)	0,001
Durée hospitalisation USI (jours) -médiane (intervalle)	9 (1-42)	16 (1-91)	0,01
Sortie USI	26 (55,3%)	13 (27,6%)	0,01
Sortie hôpital	23 (48,9%)	11 (23,4%)	0,08

Sous-groupe	Bras				*p*
	VNI		VMI		
	N pts	% sorties	N pts	% sorties	
Tumeurs solides	29	69	28	28,6	0,02
Hémopathies malignes	18	33,3	19	26,3	0,63
Patients leucopéniques	10	10,0	10	20,0	1
Patients non leucopéniques	37	67,5	37	29,7	0,004
Allo-greffés	9	22,2	9	22,2	1
Non allo-greffés	38	63,1	38	28,9	0,004
IRA hypoxémiques	34	47,0	34	20,6	0,02
IRA hypercapniques	10	90	10	40,0	0,13
OPH	3	66,6	3	66,6	NA
Pairés avec contrôles avant 1996	26	61,5	26	11,5	0,004
Pairés avec contrôles après 1996	21	47,6	21	47,9	7

Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

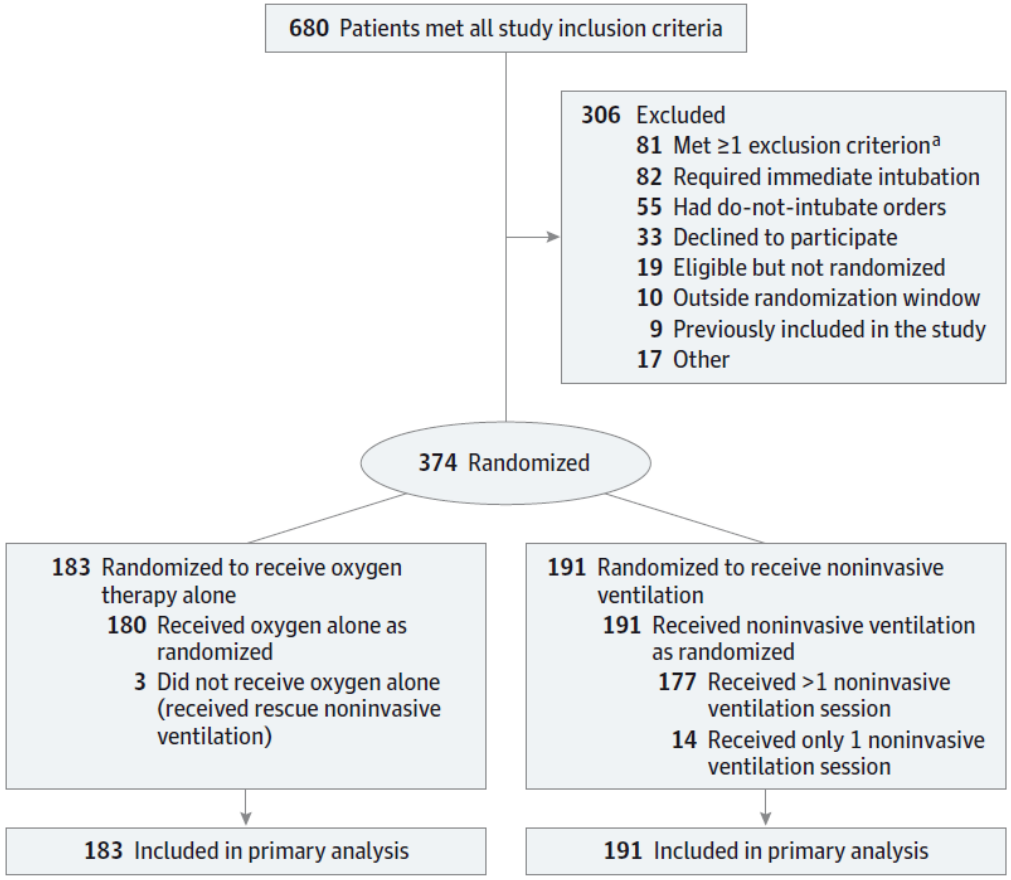
Effect of Noninvasive Ventilation vs Oxygen Therapy on Mortality Among Immunocompromised Patients With Acute Respiratory Failure

A Randomized Clinical Trial

Virginie Lemiale, MD; Djamel Mokart, MD; Matthieu Resche-Rigon, MD, PhD; Frédéric Pène, MD, PhD; Julien Mayaux, MD; Etienne Faucher, MD; Martine Nyunga, MD; Christophe Girault, MD, PhD; Pierre Perez, MD; Christophe Guitton, MD, PhD; Kenneth Ekpe, MD; Achille Kouatchet, MD; Igor Théodose, MS; Dominique Benoit, MD, PhD; Emmanuel Canet, MD; François Barbier, MD, PhD; Antoine Rabbat, MD; Fabrice Bruneel, MD; Francois Vincent, MD; Kada Klouche, MD, PhD; Kontar Loay, MD; Eric Mariotte, MD; Lila Bouadma, MD, PhD; Anne-Sophie Moreau, MD; Amélie Seguin, MD; Anne-Pascale Meert, MD, PhD; Jean Reignier, MD, PhD; Laurent Papazian, MD, PhD; Ilham Mehzari, MD; Yves Cohen, MD, PhD; Maleka Schenck, MD; Rebecca Hamidfar, MD; Michael Darmon, MD, PhD; Alexandre Demoule, MD, PhD; Sylvie Chevret, MD, PhD; Elie Azoulay, MD, PhD; for the Groupe de Recherche en Réanimation Respiratoire du patient d'Onco-Hématologie (GRRR-OH)

JAMA. 2015;314(16):1711-1719. doi:10.1001/jama.2015.12402
Published online October 7, 2015.

Figure 1. Flow of Participants Through Study



In both groups, oxygenation modalities and the use of high-flow nasal oxygen were at the clinician's discretion. Noninvasive ventilation was not allowed for patients allocated to the oxygen group except, if needed, for preoxygenation before intubation or for up 2 hours to improve the safety of bronchoscopy and bronchoalveolar lavage.

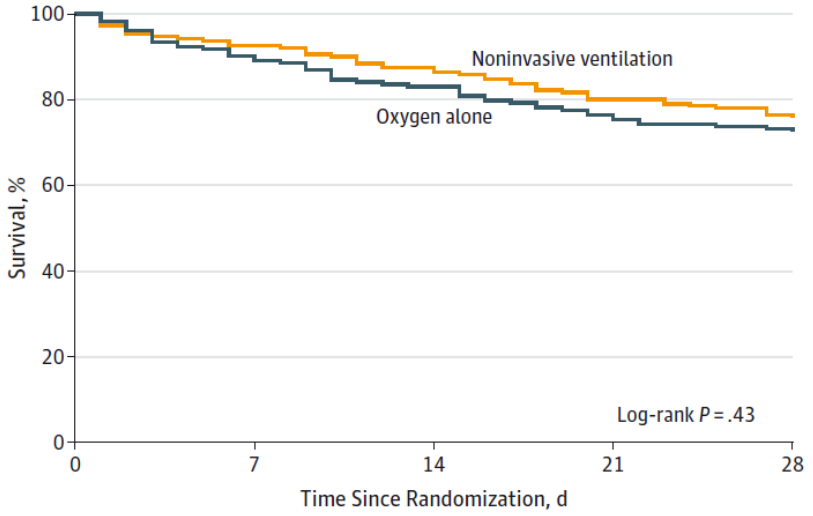
Table 1. Patient Characteristics at Randomization

Characteristic	No. (%)	
	Oxygen Alone (n = 183)	Noninvasive Ventilation (n = 191)
Age, median (IQR), y	64 (53-72)	61 (52-70)
Men	105 (57.4)	117 (61.3)
Underlying conditions	155 (84.7)	162 (84.8)
Cancer		
Hematologic malignancies	113 (61.7)	125 (65.4)
Solid tumors	42 (23.0)	37 (19.4)
Immunosuppressive drugs	28 (15.3)	29 (15.2)
For non-transplant-related reasons	17 (9.3)	16 (8.4)
After solid organ transplantation	11 (6.0)	13 (6.8)
Chemotherapy at admission	84/155 (54.2)	86/162 (53.1)
Chronic hematologic malignancy	35/155 (22.6)	39/162 (24.1)
Allogeneic stem cell transplantation	29/155 (18.7)	26/162 (16.1)
Remission of the malignancy	19/155 (12.3)	18/162 (11.1)

Table 3. Primary and Secondary End Points

	Oxygen Alone (n = 183)	Noninvasive Ventilation (n = 191)	Absolute Difference (95% CI)	*P* Value
Primary End Point				
All cause 28-d mortality, No. (%)	50 (27.3)	46 (24.1)	−3.2 (−12.1 to 5.6)	.47
Secondary End Points				
Need for invasive mechanical ventilation, No. (%)	82 (44.8)	73 (38.2)	−6.6 (−16.6 to 3.4)	.20
SOFA on day 3, median (IQR)	4 (2-6)	4 (2-5)	−0.5 (−1.2 to 0.3)	.17
ICU-acquired infection, No. (%)	46 (25.1)	48 (25.1)	0 (−8.8 to 8.8)	.99
Length of ICU stay, median (IQR), d	7 (3-16)	6 (3-16)	−0.3 (−3.2 to 2.6)	.55
Duration of mechanical ventilation, median (IQR), d	14 (6-33)	17 (6-38)	0.3 (−5.7 to 6.3)	.70
Length of hospital stay, median (IQR), d	22 (14-42)	24 (12-43)	0.3 (−5 to 5.5)	.99
Mortality at 6 mo, No. (%)[a]	82/181 (45.3)	72/182 (39.6)	−5.7 (−16.4 to 3.9)	.23
Good performance status in 6-mo survivors, No. (%)[b]	70/75 (93.3)	85/91 (93.4)	−0.1 (−7.7 to 7.5)	.98

Figure 2. Probability of Survival at Day 28



No. at risk					
Noninvasive ventilation	191	177	167	153	146
Oxygen alone	183	165	152	140	134

Probability of survival and subgroup analyses of the risk of day-28 mortality Kaplan-Meier estimates of the probability of day-28 mortality in immunocompromised patients with acute respiratory failure receiving either early noninvasive ventilation or oxygen only. Statistical test used the log-rank test.

Conclusion

Parmi les patients immunodéprimés admis aux soins intensifs avec une insuffisance respiratoire aiguë hypoxémique, la ventilation non invasive précoce par rapport à l'oxygénothérapie seule n'a pas réduit la mortalité à 28 jours. Cependant, la puissance de l'étude était limitée.

Ventilation non invasive sans intubation en raison du mauvais pronostic du cancer

Support Care Cancer (2006) 14: 167–171
DOI 10.1007/s00520-005-0845-0

ORIGINAL ARTICLE

Anne-Pascale Meert
Thierry Berghmans
Michel Hardy
Eveline Markiewicz
Jean-Paul Sculier

Non-invasive ventilation for cancer patients with life-support techniques limitation

Table 1 Patients characteristics and outcome

	Sex	Age	Cancer	Stage	Cause of ARF	SAPS II	RR	P_aO_2	P_aCO_2	pH	NIV duration	ICU discharge	Hospital discharge
1	Woman	68	Head and neck	Control	Pneumonia	36	35	51	43	7.33	72	No	No
2	Man	62	NSCLC	Control	Pneumonia	42	28	114	56	7.38	6	Yes	Yes
3	Man	65	NSCLC	Control	Pneumonia	58	27	63	26	7.45	33	No	No
4	Woman	64	NSCLC	Control	Pneumonia	27	30	47	32	7.48	39	Yes	Yes
5	Woman	34	NSCLC	Control	Pneumonia	32	37	33	32	7.43	68	Yes	Yes
6	Man	73	NSCLC	Control	Pneumonia	33	28	42	27	7.50	5	Yes	No
7	Man	75	NSCLC	Pivotal	Pulmonary embolism	41	33	45	43	7.47	22	Yes	Yes
8	Man	68	SCLC	Control	Pneumonia	43	25	37	57	7.33	11	Yes	Yes
9	Man	69	SCLC	Diagnostic	Pneumonia	56	36	42	66	7.29	9	No	No
10	Woman	76	Leukemia	Control	Acute pulmonary edema	49	29	81	69	7.16	29	Yes	No
11	Man	80	Prostate	Control	Acute pulmonary edema	46	32	94	66	7.27	13	Yes	No
12	Woman	30	Bladder	Control	Pleural effusion	15	15	55	38	7.47	68	No	No
13	Man	29	NSCLC	Control	Pulmonary embolism	27	40	26	27	7.46	10	Yes	Yes
14	Man	81	Bladder	Control	Pneumonia	40	28	49	29	7.49	49	Yes	No
15	Man	68	NSCLC	Control	Acute pulmonary edema	50	22	50	65	7.21	19	Yes	Yes
16	Woman	77	NSCLC	Control	Pneumonia	23	20	31	61	7.30	30	Yes	Yes
17	Man	60	NSCLC	Control	Pneumonia	47	34	45	25	7.48	70	Yes	Yes
18	Man	46	Head and neck	Pivotal	Pneumonia	45	41	48	40	7.42	138	Yes	Yes

NIV duration is expressed in hours. P_aO_2 and P_aCO_2, value before NIV (mm Hg)
RR Respiratory rate before NIV (breaths/min), *NSCLC* non-small cell lung cancer, *SCLC* small cell lung cancer, *ARF* acute respiratory failure

VNI « NTBR »
Meert, Supp Cancer Care

- Janvier 2000 – avril 2004 : 18 patients
- Cause VNI : insuffisance respiratoire hypoxémique (n = 11) et insuffisance ventilatoire hypercapnique (n= 7)
- Durée médiane VNI : 2,5 j (1 à 8)
- 14 sortis vivants de l'USI et 10 de l'hôpital (55 %)

Conclusions

- La VNI semble particulièrement efficace chez le patient cancéreux (~50 % de réussite), permettant de réduire le taux d'intubation à 25%.
- L'intubation secondaire est de mauvais pronostic (10 % de réussite).
- La VNI semble aussi efficace chez le patient NTBR.

La VMI à l'ère de la VNI

Journal of BUON **16**: 160-165, 2011

ORIGINAL ARTICLE

Invasive mechanical ventilation in cancer patients. Prior non invasive ventilation is a poor prognostic factor

- IJB : janvier 2000 à décembre 2007
- 164 patients :
  - VMI d'emblée : 123
  - VMI puis VNI : 41

Table 1. Patient characteristics on admission

Characteristics	*Whole group*	*NIV followed by IMV*	*IMV alone*	*p-value*
Number of patients	164	41	123	
Median age, years (range)	57 (19-81)	49 (23-78)	59 (20-81)	0.008
Gender				0.86
Male, n	95	23	72	
Female, n	69	18	51	
Median SAPS II score (range)	53 (23-94)	56 (23-83)	47 (30-94)	0.002
Type of malignancy, n (%)				<0.001
Solid tumor	106 (64.6)	16 (39.0)	90 (73.2)	
Haematological malignancy	58 (35.4)	25 (61.0)	33 (26.8)	
Bone marrow /Peripheral blood stem cell transplantation, n (%)	37 (63.8)	19 (76.0)	18 (54.5)	<0.001
Cancer phase* (1,2 vs. 3,4), n (%)				0.006
Phase 1	5 (3.0)	1 (2.4)	4 (3.2)	
Phase 2	60 (36.6)	23 (56.1)	37 (30.1)	
Phase 3	89 (54.3)	17 (41.5)	72 (58.5)	
Phase 4	10 (6.1)	0 (0.0)	10 (8.1)	
Leukopenia at admission, n (%)	40 (24.4)	13 (31.7)	27 (21.9)	0.22
Median PaO_2/FiO_2 ratio (range)	215 (46-590)	183 (52-407)	230 (46-590)	0.02

*Cancer phase: 1= diagnostic, 2= curative, 3= controllable but no longer curable, 4= pivotal. IMV= invasive mechanical ventilation, NIV= non invasive ventilation

Table 2. Reasons for admission to the intensive care unit

Reasons for admission	*Whole group (n=164) %*	*NIV followed by IMV (n=41) %*	*IMV alone (n=123) %*
Respiratory failure	35.3	63.4	26.0
Sepsis/shock	21.3	14.6	23.5
Neurologic disease	12.1	4.8	14.6
Abdominal pathology	10.3	12.1	9.7
Heart disease	7.9	2.4	9.7
Cardiopulmonary resuscitation	7.3	0.0	9.7
Acute renal failure	4.8	2.4	5.7
Other	0.6	0.0	0.8

Table 3. Complications leading to ventilation

Complications	*Whole group (n=164) %*	*NIV followed by IMV (n=41) %*	*IMV alone (n=123) %*
Sepsis/shock	34.7	34.1	34.9
Respiratory failure	33.5	56.1	24.3
Cardiopulmonary resuscitation	15.8	–	21.0
Neurologic disease	10.3	4.8	12.1
Heart disease	3.6	–	4.8
Other	1.8	–	2.4

Résultats

	Total	*VMI après VNI*	*VMI d'emblée*
Sevrage VM	35%	**21,9%**	**39,8%**
Sortie USI	28%	**1,1%**	**31,7%**
Sortie hôpital	24%	**9,8%**	**27,6%**

p = 0,02

Table 5. Multivariate analysis of variables predicting hospital discharge

Variable		*OR (95% CI)*	*p-value*
NIV before IMV vs. immediate IMV	Yes vs. no	0.30 (0.09-0.95)	0.04
Leukopenia	Yes vs. no	0.21 (0.06-0.77)	0.02
Serum bilirubin	≥ 1.1 vs. <1.1 mg/dl	0.38 (0.16-0.94)	0.04

La place controversée de la VNI dans le SDRA

Journal of Critical Care 38 (2017) 295–299

Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.jccjournal.org

Noninvasive ventilation during acute respiratory distress syndrome in patients with cancer: Trends in use and outcome

A. Neuschwander, MD [a], V. Lemiale, MD [a], M. Darmon, PhD [b], F. Pène, PhD [c], A. Kouatchet, MD [d], P. Perez, MD [e], F. Vincent, MD [f], J. Mayaux, MD [g], D. Benoit, PhD [h], F. Bruneel, MD [i], A.P. Meert, PhD [j], M. Nyunga, MD [k], A. Rabbat, MD [l], D. Mokart, PhD [m], E. Azoulay, PhD [a,*],
A Groupe de Recherche en Réanimation Respiratoire en Onco-Hématologie (GRRR-OH) study:

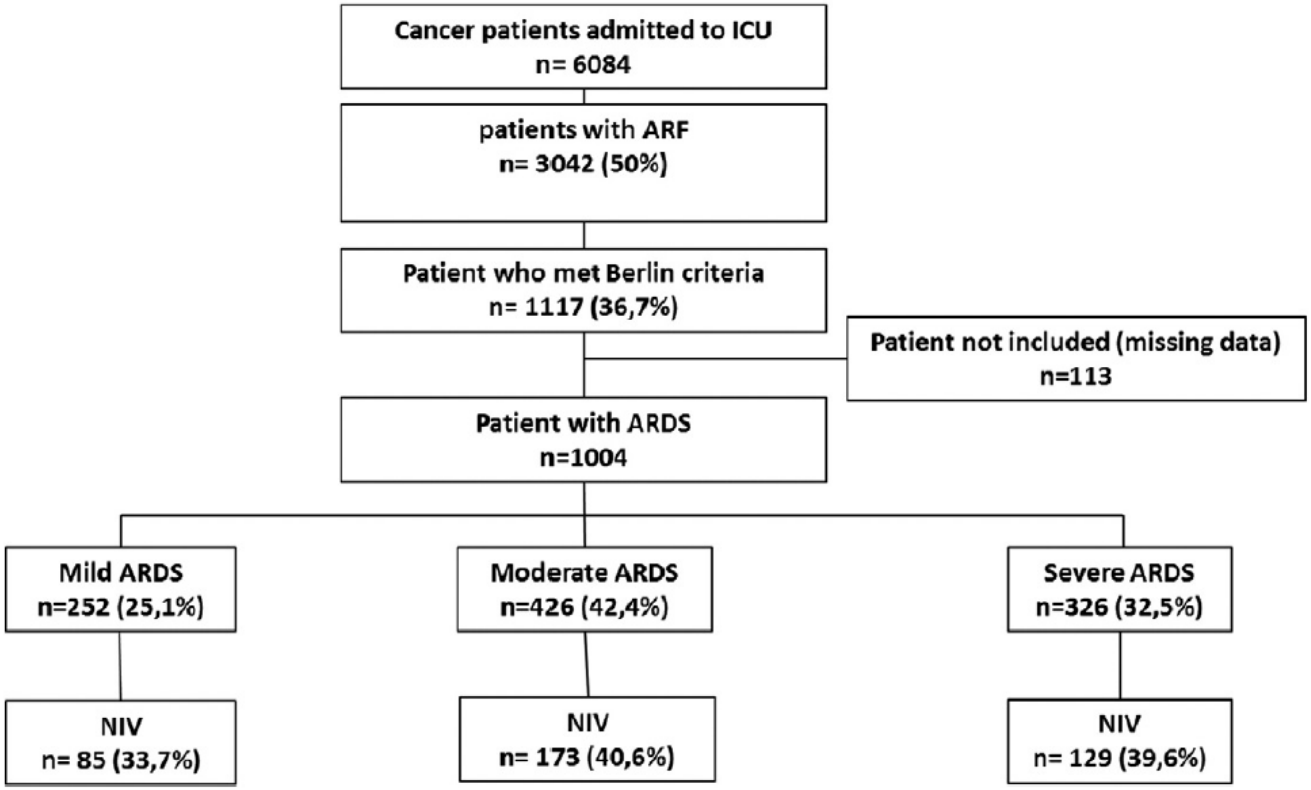


Fig. 2. Flowchart.

1004 cas en 20 ans

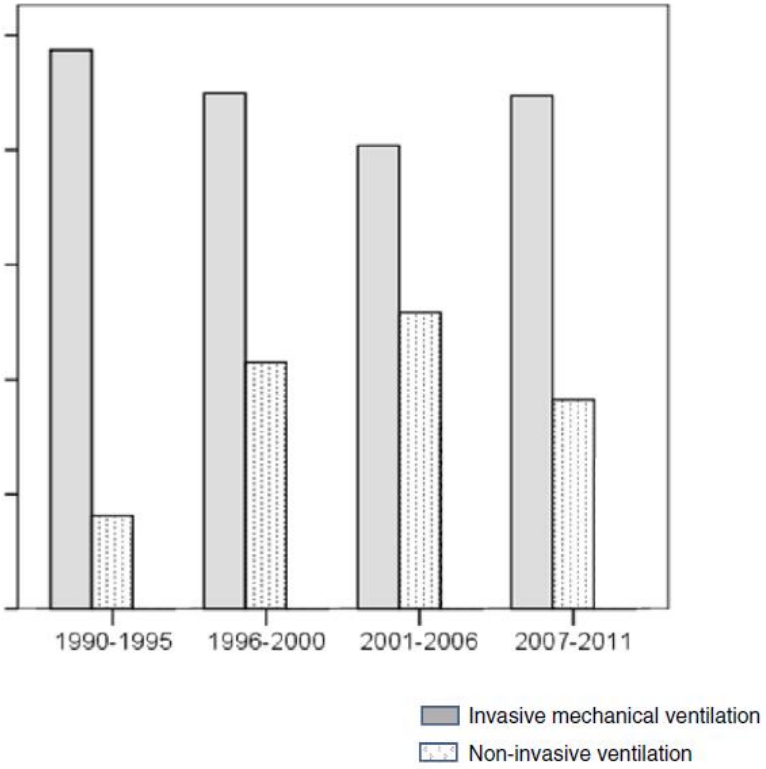


Fig. 1. Noninvasive ventilation use over time.

Table 1
Patients characteristics according to ventilation strategy

Variables	Patients who never receive NIV (n = 617)	Patient who receive NIV (n = 387)	*P*
Baseline characteristics			
Age (y), median [IQR]	58 [48-67]	57 [46-67]	.31
Sex, male	393 (63.7)	249 (64.3)	.88
Underlying disease			<.001
Hematologic malignancy	495 (80.2)	364 (94)	
Acute leukemia	171 (27.7)	127 (32.8)	
Non–Hodgkin lymphoma	189 (30.6)	129 (33.3)	
Myeloma	76 (12.3	37 (9.6)	
Solid tumor	122 (19.7)	23 (5.9)	
Allogenic stem cell transplantation	55 (8.9)	60 (15.5)	.002
ARDS etiology			
Pulmonary Infection	379 (61.4)	283 (73.1)	.002
Extrapulmonary infection	170 (27.5)	55 (14.2)	<.001
Fungus	195 (31.6)	98 (25.3)	.005
Pneumocystis	16 (2.6)	48 (12.4)	<.001
Undetermined	15 (2.4)	26 (6.7)	.003
Neutropenia recovery	288 (46.7)	156 (40.3)	.056
SOFAc J1	9 [7-11]	7 [4-9]	<.001
Shock	502 (81.4)	229 (59.1)	<.001
Acute kidney failure	219 (35.5)	87 (22.5)	<.001
Severity of ARDS			
Mild	167 (27)	85 (21.9)	.18
Moderate	253 (41)	173 (44.7)	
Severe	197 (31.9)	129 (33.3)	
Outcome			
ICU mortality	394 (63.8)	171 (44.1)	<.001
Hospital mortality	427 (69.2)	213 (55.0)	<.001

SOFAc indicates SOFA score without respiratory parameter.

Table 2
Patients characteristics according to NIV failure

Variables	NIV success (n = 111)	NIV failure (n = 276)	*P*
Baseline characteristics			
Age (y), median (IQR]	56 [46-65]	57 [46-67]	.40
Sex, male	46 (41.4)	92 (33.3)	.17
Underlying disease			.32
Hematologic malignancy	107 (96.9)	257 (93.1)	
Solid tumor	4 (3.6)	19 (6.8)	
Allogenic stem cell transplantation	22 (19.8)	38 (13.8)	.18
ARDS etiology			
Pulmonary Infection	74 (66.6)	209 (75.7)	.09
Extrapulmonary infection	20 (18.1)	35 (12.7)	.20
Fungus	19 (17.1)	79 (28.6)	.02
Pneumocystis	23 (20.7)	25 (9.1)	.003
Undetermined	11 (0.09)	15 (0.05)	.11
Neutropenia recovery	34 (30.6)	122 (44.2)	.019
SOFAc J1, median (IQR]	7 [3-8]	8 [5-10]	<.001
Shock	21 (18.9)	208 (75.4)	<.001
Acute kidney failure	2 (1.8)	85 (30.8)	<.001
Severity of ARDS			
Mild	31 (27.9)	54 (19.6)	.13
Moderate	53 (47.8)	120 (43.4)	
Severe	27 (24.3)	102 (36.9)	

SOFAc indicates SOFA score without respiratory parameter.

Table 3
Factors associated with NIV failure

	OR (95% CI)	*P*
Sex, male	0.66 (0.41-1.07)	.053
Mild ARDS	1	Reference
Moderate ARDS	1.28 (0.73-2.28)	.28
Severe ARDS	2.08 (1.10-3.93)	.02
SOFAc	1.15 (1.08-1.23)	<.001
Pulmonary infection–related ARDS	1.77 (1.06-2.98)	.03
Fungal infection	1.90 (1.06-3.41)	.03

SOFAc indicated SOFA score without respiratory parameter.

Table 4
Factors associated with hospital mortality

	OR (95% CI)	*P*
Solid tumor (vs hematologic malignancy)	0.45 (0.19-1.09)	.08
Mild ARDS	1	
Moderate ARDS	0.92 (0.53-1.60)	.77
Severe ARDS	1.99 (1.09-4.28)	.02
SOFAc	1.11 (1.04-1.19)	.001
NIV failure	2.63 (1.63-4.28)	<.001
Extrapulmonary infection	1.78 (0.94-3.37)	.08

SOFAc indicates SOFA score without respiratory parameter.

Conclusion

L'échec de ventilation non invasive chez les patients atteints de SDRA avec une tumeur maligne est fréquent et lié à la gravité du SDRA, au score SOFA et au SDRA lié à une infection pulmonaire.

L'échec de la ventilation non invasive est associé à la mortalité hospitalière.

Les nouvelles techniques

- L'oxygène à haut débit
- L'ECMO

L'oxygène à haut débit

Intensive Care Med (2015) 41:2008–2010
DOI 10.1007/s00134-015-3994-8

Djamel Mokart
Cyrille Geay
Laurent Chow-Chine
Jean-Paul Brun
Marion Faucher
Jean-Louis Blache
Magali Bisbal
Antoine Sannini

High-flow oxygen therapy in cancer patients with acute respiratory failure

Accepted: 14 July 2015
Published online: 4 August 2015

Electronic supplementary material
The online version of this article (doi:10.1007/s00134-015-3994-8) contains supplementary material, which is available to authorized users.

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of High-Flow Nasal Oxygen vs Standard Oxygen on 28-Day Mortality in Immunocompromised Patients With Acute Respiratory Failure

The HIGH Randomized Clinical Trial

Elie Azoulay, MD, PhD; Virginie Lemiale, MD; Djamel Mokart, MD, PhD; Saad Nseir, MD, PhD; Laurent Argaud, MD, PhD; Frédéric Pène, MD, PhD; Loay Kontar, MD; Fabrice Bruneel, MD; Kada Klouche, MD, PhD; François Barbier, MD, PhD; Jean Reignier, MD, PhD; Lilia Berrahil-Meksen, MD; Guillaume Louis, MD; Jean-Michel Constantin, MD, PhD; Julien Mayaux, MD; Florent Wallet, MD; Achille Kouatchet, MD; Vincent Peigne, MD; Igor Théodose, MS; Pierre Perez, MD; Christophe Girault, MD; Samir Jaber, MD, PhD; Johanna Oziel, MD; Martine Nyunga, MD; Nicolas Terzi, MD, PhD; Lila Bouadma, MD, PhD; Christine Lebert, MD; Alexandre Lautrette, MD, PhD; Naike Bigé, MD, PhD; Jean-Herlé Raphalen, MD; Laurent Papazian, MD, PhD; Michael Darmon, MD, PhD; Sylvie Chevret, MD, PhD; Alexandre Demoule, MD, PhD

JAMA. 2018;320(20):2099-2107. doi:10.1001/jama.2018.14282

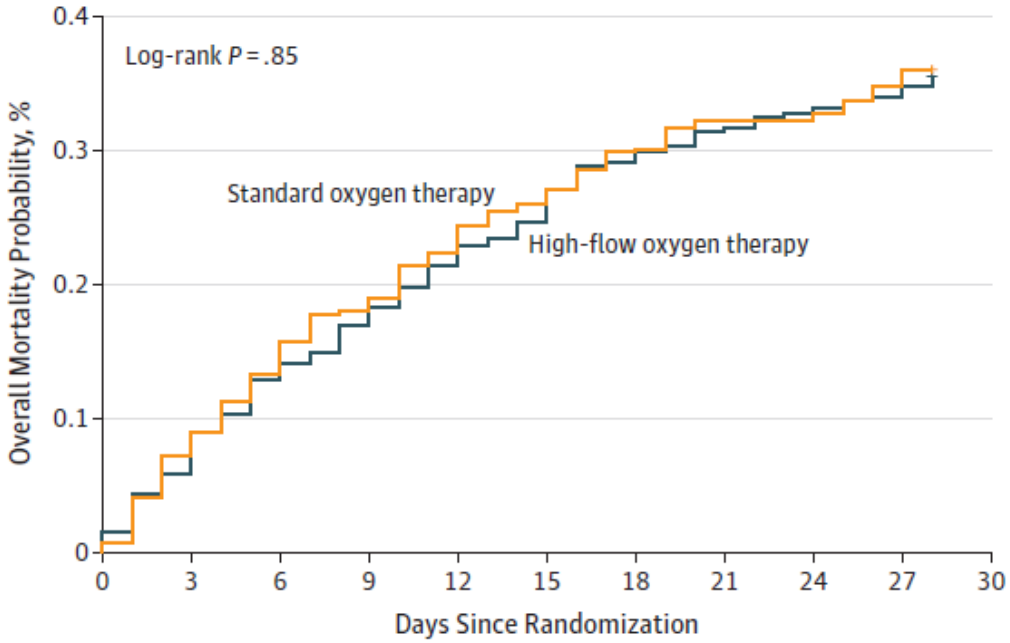
Table 1. Patient Characteristics at Randomization

Characteristic	No. (%)	
	High-Flow Oxygen Therapy (n = 388)	Standard Oxygen Therapy (n = 388)
Demographics		
Age, median (IQR), y	64 (55-70)	63 (56-71)
Sex		
Men	270 (69.6)	247 (63.6)
Women	118 (30.4)	141 (36.4)
Comorbidities		
Chronic		
Respiratory[a]	115 (29.6)	127 (32.7)
Heart failure	23 (5.9)	27 (6.9)
Liver	45 (13.3)	56 (14.4)
Kidney disease	73 (18.8)	69 (20.4)
Charlson Comorbidity Index[b]	5 (4-7)	5 (3-7)
Underlying conditions[c]		
Cancer	294 (75.8)	319 (82.2)
Hematologic malignancies	167 (43.0)	181 (46.6)
Solid tumors	127 (32.7)	138 (35.6)
Immunosuppressive drugs	133 (34.3)	135 (34.8)
Non-transplant-related reasons	89 (22.9)	98 (25.2)
After solid organ transplantation	44 (11.3)	37 (9.5)
Time since diagnosis of underlying condition, median (IQR), mo	6.4 (1-29)	7.0 (0.8-40.0)
Chemotherapy at ICU admission	221/294 (75.2)	228/319 (71.5)
Autologous stem cell transplantation	26/167 (15.6)	22/181 (12.1)
Allogeneic stem cell transplantation	28/167 (16.8)	33/181 (18.2)
Poor performance status (3 or 4)[d]	61 (15.7)	54 (13.9)

Table 2. Primary and Secondary End Points[a]

End Points	No. (%)		Mean Difference, % (95% CI)[b]	Relative Difference (95% CI)	*P* Value
	High-Flow Oxygen Therapy (n = 388)	Standard Oxygen Therapy (n = 388)			
Primary					
All-cause day-28 mortality	138 (35.6)	140 (36.1)	−0.5 (−7.3 to 6.3)	HR, 0.98 (0.77 to 1.24)	.94
Secondary					
Invasive mechanical ventilation[c]	150 (38.7)	170 (43.8)	−5.1 (−12.3 to 2.0)	HR, 0.85 (0.68 to 1.06)[d]	.17
ICU-acquired infection	39 (10.0)	41 (10.6)	−0.6 (−4.6 to 4.1)	HR, 1.01 (0.96 to 1.06)[d]	.91
ICU mortality	123 (31.7)	122 (31.4)	0.3 (−6.3 to 6.8)	RR, 1.01 (0.82 to 1.24)	.64
Hospital mortality	160 (41.2)	162 (41.7)	−0.5 (−7.5 to 6.4)	RR, 0.99 (0.84 to 1.17)	.77
Length of stay, median (IQR), d					
ICU	8 (4-14)	6 (4-13)	0.6 (−1.0 to 2.2)	NA[e]	.07
Hospital	24 (14-40)	27 (15-42)	−2 (−7.3 to 3.3)	NA[e]	.60

Figure 2. Probability of Day-28 Mortality in Immunocompromised Patients With Acute Respiratory Failure Receiving High-Flow Oxygen Therapy or Standard Oxygen Therapy



No. at risk											
High-flow oxygen therapy	388	365	338	322	305	292	275	266	261	256	0
Standard oxygen therapy	388	360	336	318	301	287	272	263	263	253	0

Conclusion

Parmi les patients immunodéprimés gravement malades souffrant d'insuffisance respiratoire aiguë, l'oxygénothérapie à haut débit n'a pas diminué de manière significative la mortalité au jour 28 par rapport à l'oxygénothérapie standard.

ECMO

Wohlfarth *et al. Critical Care* 2014, **18**:R20
http://ccforum.com/content/18/1/R20

CRITICAL CARE

RESEARCH Open Access

Extracorporeal membrane oxygenation in adult patients with hematologic malignancies and severe acute respiratory failure

Philipp Wohlfarth[1], Roman Ullrich[2], Thomas Staudinger[1], Andja Bojic[1], Oliver Robak[1], Alexander Hermann[1], Barbara Lubsczyk[2], Nina Worel[3], Valentin Fuhrmann[4], Maria Schoder[5], Martin Funovics[5], Werner Rabitsch[1], Paul Knoebl[1], Klaus Laczika[1], Gottfried J Locker[1], Wolfgang R Sperr[1], Peter Schellongowski[1*] and Arbeitsgruppe für hämato-onkologische Intensivmedizin der Österreichischen Gesellschaft für Internistische und Allgemeine Intensivmedizin und Notfallmedizin (ÖGIAIN)

Table 1 Individual characteristics and outcomes

Patient number	Malignancy	Therapy status (days since therapy)	Etiology of ARF	SAPS II	LIS	ECMO days	Bleeding	ICU and hospital outcome
1	CNS NHL	Chemotherapy (51)	Pneumonia	45	3.7	9	Minor	Died
2	Hodgkin lymphoma	Allo SCT (111)	Pneumonia	34	3.3	28[b]	Major	Died
3	ALL	Consolidation (13)	Abdominal sepsis	78	2.3	4[c]	-	Alive
4	ALL[a]	Induction on ECMO	TRALI	62	3.3	3	-	Alive
5	Burkitt lymphoma	Induction (16)	Pneumonia	63	3.8	8	-	Alive
6	ALL	Allo SCT (31)	Pneumonia	39	3.5	7	Major	Died
7	Hodgkin lymphoma	Allo SCT (33)	Pneumonia	65	3.3	18	-	Died
8	ALL	Allo SCT (203)	Pneumonia	68	3.3	10	-	Died
9	DLBCL	Induction on ECMO	Pneumonia	102	4.0	4	-	Died
10	Multiple myeloma	Auto SCT (789)	Pneumonia	43	3.7	9	Major	Alive
11	Anaplastic T-cell NHL[a]	Induction on ECMO	Pneumonia	46	3.0	25[d]	Major	Alive
12	DLBCL[a]	Induction on ECMO	NHL	36	3.3	3[c]	-	Alive
13	AML	Consolidation (34)	Pneumonia	48	3.3	34	Major	Died
14	DLBCL[a]	Induction on ECMO	NHL	56	2.3	4[d]	-	Alive

Characteristics and Outcome of Patients After Allogeneic Hematopoietic Stem Cell Transplantation Treated With Extracorporeal Membrane Oxygenation for Acute Respiratory Distress Syndrome*

Philipp Wohlfarth, MD[1]; Gernot Beutel, MD[2]; Pia Lebiedz, MD[3]; Hans-Joachim Stemmler, PhD[4]; Thomas Staudinger, MD[1]; Matthieu Schmidt, PhD[5]; Matthias Kochanek, MD[6]; Tobias Liebregts, MD[7]; Fabio Silvio Taccone, PhD[8]; Elie Azoulay, PhD[9]; Alexandre Demoule, PhD[10,11]; Stefan Kluge, MD[12]; Morten Svalebjørg, MD[13]; Catherina Lueck, MD[2]; Johanna Tischer, MD[4]; Alain Combes, PhD[5]; Boris Böll, MD[6]; Werner Rabitsch, MD[1]; Peter Schellongowski, MD[1] on behalf of Intensive Care in Hematologic and Oncologic Patients (iCHOP) and the Caring for Critically Ill Immunocompromised Patients Multinational Network (NINE-I)

(*Crit Care Med* 2017; 45:e500–e507)

TABLE 1. Allogeneic Hematopoietic Stem Cell Transplantation–Related Characteristics

Variable	All Patients ($n = 37$)	Nonsurvivors ($n = 30$)	Survivors ($n = 7$)	p
Underlying condition				0.000947
Acute leukemia	22 (59)	21 (70)	1 (14)	
Lymphoma	5 (14)	5 (17)	0	
Myelodysplastic syndrome	3 (8)	0	3 (43)	
Other malignant condition	4 (11)	2 (7)	2 (29)	
Nonmalignant disease	3 (8)	2 (7)	1 (14)	
Conditioning therapy[a]				0.27
Myeloablative	27 (79)	24 (83)	3 (60)	
Nonmyeloablative	7 (21)	5 (17)	2 (40)	

	All Patients ($n = 37$)	Nonsurvivors ($n = 30$)	Survivors ($n = 7$)	p
Characteristics during ECMO				
Vasopressors	29 (78)	24 (80)	5 (71)	0.63
Hemofiltration	19 (51)	16 (53)	3 (43)	0.69
Bleeding event	14 (38)	12 (40)	2 (29)	0.69
Neutropenia	18 (49)	15 (50)	3 (43)	1.0
Lowest platelets, G/L	8 (5–17)	8 (5–14)	8 (2–54)	0.69
Packed red cells (0–5/5–10/>10)[b]	8 (23)/11 (31)/16 (46)	6 (21)/9 (32)/13 (46)	2 (29)/2 (29)/3 (43)	1.0
Platelet transfusions (0–5/5–10/>10)[b]	11(31)/9 (26)/15 (41)	7 (25)/9 (32)/12 (43)	4 (57)/0/3 (43)	0.15
Outcome				
Duration of ECMO therapy, d	15 (8–23)	15 (8–23)	10 (4–13)	0.20
ICU length of stay, d	28 (14–33)	22 (12–35)	28 (25–49)	0.28
ICU and hospital survival	7 (19)			

La ventilation en pratique