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Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

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Appendix

COVID-19 in patients with thoracic malignancies (TERAVOLT): first results of an international, registry-based, cohort study

CONTENTS

Supplementary Table S1:
Collected information

Demographics	**COVID-19 diagnosis**
Country and city of diagnosis Gender, Age Ethnicity Smoking status Height, Weight Blood Type Seasonal flu vaccine 2019	**COVID-19 suspicious** (clinical, radiological, laboratory) **Date of COVID-19 diagnosis** **Diagnostic test performed** (RT-PCR, serology, others) **Symptoms** (fever>37.5, cough, dyspnea, nasal congestion, conjunctival congestion, diarrhea, myalgia, otitis, loss of smell and/or taste, headache, fatigue, shivers, other) Close contact with infected people
Clinical informations	**Course of COVID-19**
Comorbidities (COPD, lung fibrosis, diabetes, history of cerebrovascular disease, history of ischemic heart disease, chronic kidney insufficiency, hypertension, autoimmune disease, HBV or HCV chronic hepatitis, history of TBC, others) O_2 requirement prior to Covid-19 **Concomitant medications** (ACE inhibitors, sartan, NSAIDs, immunosuppressive drugs, ASA, anticoagulants, others); chronic supplemental O2 **History of cancer** Histological diagnosis Date of first diagnosis Stage at first diagnosis Surgery or RT for localized disease Stage at last follow up ECOG PS at last follow up Date of last oncologic follow up Stage at COVID-19 diagnosis Sites of metastasis Antineoplastic treatments in the last 3 months	**Complications** (pneumonitis, ARDS, sepsis, coagulopathy, arrhythmia, heart failure, bacterial infection, multi-organ failure, other) **Treatments administered** (antibiotics, antivirals, antifungals, steroids, anti IL-6, chloroquine, other) **Labs at Covid-19 diagnosis** (Hgb, WBC, neutrophils, lymphocytes, eosinophils, platelets, procalcitonin, CRP, IL-6, triglycerides, ferritin, albumin, creatinine, Na, K, Ca, glucose, ALT, AST, LDH, bilirubin, GGT, CPK, d-dimer, PT, troponin I, troponin T, fibrinogen, SpO2, PaO2/FiO2 and PaCO2 on arterial blood gas analysis) **Imaging modality** (CT scan, Chest x-ray) **Radiological abnormalities** (ground-glass, bilateral findings, consolidation, interstitial abnormalities, pleural effusion) **Outcome** Admission to ICU Death (home, hospital, ICU) Reason of death (Cancer progression, COVID-19) Discharged Continuation of oncological treatment after recovery Delay of planned oncological treatment

Information Collected List of abbreviations: body mass index (BMI), chronic obstructive pulmonary disease (COPD), hepatitis B virus (HBV), hepatitis C virus (HCV), tuberculosis (TBC), angiotensin converting enzyme (ACE), non steroid anti-inflammatory drugs (NSAIDs), acetylsalicylic acid (ASA), radiation therapy (RT), Eastern Cooperative Oncology Group (ECOG), performance status (PS), real time polymerase chain reaction (RT-PCR), intensive care unit (ICU), acute respiratory distress syndrome (ARDS), hemoglobin (Hgb),white blood cells (WBC), C-reactive protein (CRP), interleukin-6 (IL-6), O2 saturation by pulse oximetry (SpO2), partial pressure of oxygen (PaO2), fraction of inspired oxygen (FiO2), partial pressure of CO2 (PaCO2), computed tomography (CT).

Measurement Units: cm (height), Kg (weight), mg/dl (Hgb, tryglycerides, creatinine, Ca, glucose, bilirubin, fibrinogen), x 10^9/L (white blood cells), x10^3/mcL (neutrophil and lymphocyte, platelet count), ng/mL (procalcitonin, ferritin, D-dimer), pg/mL (IL-6), gm/dl (albumin), mmol/L (Na, K, CO2), unit/L (ALT, AST, ggT, CPK), U/L (LDH), mg/L (C-reactive protein), ng/L (Troponin I, troponin T), seconds (PT), % (SpO2, PaO2/FiO2). No prespecified cut-offs was used.

Supplementary Table S2:
Univariable analysis

	Hospitalization		Prolonged Hospitalization (>8 days)		Death (die during hospitalization, ICU or at home)	
Characteristic	Patients with Response	Odds Ratio (95% CI)	Patients with Response	Odds Ratio (95% CI)	Patients with Response	Odds Ratio (95% CI)
Age in year - no./total no. (%)						
≤ 65	55/78 (71)	Reference	13/26 (50)	Reference	19/73 (26)	Reference
>65	97/122 (80)	1.623 (0.840 to 3.133)	18/32 (56)	1.286 (0.454 to 3.672)	47/118 (40)	1.881 (1.003 to 3.623)
Smoking Status - no./total no. (%)						
Current/Former	122/159 (77)	1.395 (0.611 to 3.035)	24/41 (59)	2.353 (0.732 to 8.113)	61/153 (40)	4.243 (1.695 to 12.946)
Never	26/37 (70)	Reference	6/16 (38)	Reference	5/37 (14)	Reference
Gender - no./total no. (%)						
Female	42/59 (71)	0.696 (0.352 to 1.407)	8/18 (44)	0.591 (0.188 to 1.808)	14/56 (25)	0.532 (0.258 to 1.049)
Male	110/141 (78)	Reference	23/40 (58)	Reference	52/135 (39)	Reference
Stage of disease at COVID diagnosis - no./total no. (%)						
Stage I/II/III	41/53 (77)	Reference	10/17 (59)	Reference	17/49 (35)	Reference
Stage IV	111/147 (76)	0.902 (0.415 to 1.863)	21/41 (51)	0.735 (0.227 to 2.290)	49/142 (35)	0.992 (0.505 to 1.992)
Diagnosis - no./total no. (%)						
NSCLC	111/151 (74)	Reference	26/41 (63)	Reference	52/144 (36)	Reference
SCLC	23/29 (80)	1.381 (0.553 to 3.958)	2/6 (33)	0.288 (0.037 to 1.660)	10/28 (36)	0.983 (0.409 to 2.252)
Thymoma/Thymic carcinoma/Carcinoid/neuroendocrine/Malignant Pleural Mesothelioma	18/20 (90)	3.243 (0.882 to 20.978)	3/11 (27)	0.216 (0.042 to 0.873)	4/19 (21)	0.472 (0.129 to 1.380)
Current treatment - no./total no. (%)						
Yes	106/147 (72)	0.402 (0.156 to 0.915)	16/35 (46)	0.449 (0.146 to 1.307)	53/142 (37)	1.649 (0.818 to 3.484)
No	45/52 (87)	Reference	15/23 (65)	Reference	13/49 (27)	Reference
Therapy						
None	45/52 (87)	Reference	15/23 (65)	Reference	13/49 (27)	Reference
TKI alone	17/28 (61)	0.240 (0.077 to 0.708)	2/7 (29)	0.213 (0.026 to 1.234)	8/28 (29)	1.108 (0.381 to 3.096)
Chemo alone	35/48 (73)	0.419 (0.144 to 1.134)	2/8 (25)	0.178 (0.022 to 0.974)	22/46 (48)	2.538 (1.089 to 6.113)
IO alone	26/34 (77)	0.506 (0.160 to 1.563)	7/10 (70)	1.244 (0.261 to 7.004)	11/33 (33)	1.385 (0.524 to 3.639)
Chemo-IO	16/20 (80)	0.622 (0.164 to 2.633)	3/7 (43)	0.400 (0.064 to 2.241)	5/19 (26)	0.989 (0.276 to 3.183)
Other	12/17 (71)	0.373 (0.100 to 1.451)	2/3 (67)	1.067 (0.088 to 25.049)	7/16 (44)	2.154 (0.653 to 7.022)
Co-morbidities - no./total no. (%)						
COPD						
Yes	44/51 (86)	2.350 (1.030 to 6.087)	9/13 (69)	2.352 (0.662 to 9.721)	21/49 (42.9)	1.600 (0.816 to 3.116)
No	107/147 (73)	Reference	22/45 (49)	Reference	45/141 (31.9)	Reference

Lung Fibrosis						
Yes	3/3 (100)		0/0		2/3 (67)	3.844 (0.362 to 83.639)
No	148/195 (78)		31/58 (53)		64/187 (34)	Reference
Diabetes						
Yes	20/29 (69)	0.645 (0.277 to 1.595)	3/5 (60)	1.339 (0.206 to 10.797)	9/28 (32)	0.873 (0.356 to 2.008)
No	131/169 (78)	Reference	28/53 (53)	Reference	57/162 (35)	Reference
H/O Ischemic heart disease						
Yes	23/30 (78)	1.027 (0.428 to 2.747)	7/8 (88)	7.583 (1.223 to 147.264)	10/28 (36)	1.052 (0.440 to 2.393)
No	128/168 (76)	Reference	24/50 (48)	Reference	56/162 (35)	Reference
H/O Cerebrovascular disease						
Yes	8/10 (80)	1.259 (0.302 to 8.541)	3/5 (60)	1.339 (0.206 to 10.797)	1/10 (10)	0.197 (0.011 to 1.080)
No	143/188 (76)	Reference	28/53 (53)	Reference	65/180 (36)	Reference
Chronic kidney insufficiency						
Yes	13/15 (87)	2.120 (0.558 to 13.884)	1/2 (50)	0.867 (0.033 to 22.650)	5/14 (36)	1.047 (0.310 to 3.171)
No	138/183 (75)	Reference	30/56 (54)	Reference	61/176 (35)	Reference
Chronic hepatitis						
Yes	2/3 (67)	0.617 (0.058 to 13.464)	1/2 (50)	0.867 (0.033 to 22.650)	0/3 (0)	
No	149/195 (76)	Reference	30/56 (54)	Reference	66/187 (35)	
Autoimmune disease						
Yes	6/6 (100)		1/2 (50)	0.867 (0.033 to 22.650)	3/6 (50)	1.921 (0.347 to 10.639)
No	145/192 (76)		30/56 (54)	Reference	63/184 (34)	Reference
Hypertension						
Yes	76/93 (82)	1.788 (0.919 to 3.570)	13/21 (62)	1.715 (0.583 to 5.268)	35/88 (40)	1.512 (0.831 to 2.768)
No	75/105 (71)	Reference	18/37 (49)	Reference	31/102 (30)	Reference
H/O viral Hepatitis B						
Yes	6/8 (75)	0.931 (0.206 to 6.506)	2/3 (67)	1.793 (0.163 to 39.919)	1/8 (13)	0.257 (0.014 to 1.490)
No	145/190 (76)	Reference	29/55 (53)	Reference	65/182 (36)	Reference
H/O viral Hepatitis C						
Yes	5/5 (100)		1/3 (33)	0.417 (0.019 to 4.596)	0/5 (0)	
No	146/193 (76)		30/55 (55)	Reference	66/185 (36)	
H/O tuberculosis						
Yes	3/3 (100)		1/1 (100)		0/3 (0)	
No	148/195 (76)		30/57 (53)		66/187 (35)	
Other						
Yes	77/93 (83)	2.016 (1.031 to 4.066)	14/28 (50)	0.765 (0.269 to 2.152)	35/89 (39)	1.464 (0.804 to 2.677)
No	74/105 (70)	Reference	17/30 (57)	Reference	31/101 (31)	Reference
Co-morbidities - Any - no./total no. (%)						
Yes	134/166 (81)	3.695 (1.661 to 8.214)	25/48 (52)	0.725 (0.167 to 2.862)	60/158 (38)	2.653 (1.094 to 7.458)
No	17/32 (53)	Reference	6/10 (60)	Reference	6/32 (19)	Reference
Number of comorbidities - no./total no. (%)						
0	18/34 (53)	Reference	6/10 (60)	Reference	6/33 (18)	Reference
1	44/60 (73)	2.426 (0.989 to 6.039)	6/19 (32)	0.308 (0.058 to 1.469)	23/56 (41)	3.020 (1.123 to 9.158)

2	45/53 (85)	4.963 (1.828 to 14.413)	8/16 (50)	0.667 (0.126 to 3.276)	22/51 (43)	3.287 (1.208 to 10.069)
≥3	45/53 (85)	4.963 (1.828 to 14.413)	11/13 (85)	3.667 (0.548 to 32.697)	15/51 (29)	1.806 (0.640 to 5.634)
Concomitant Medications - no./total no. (%)						
ACE inhibitors						
Yes	23/30 (77)	1.051 (0.438 to 2.814)	4/4 (100)		10/28 (36)	1.091 (0.456 to 2.486)
No	125/165 (76)	Reference	27/54 (50)		54/160 (34)	Reference
Sartan						
Yes	21/25 (84)	1.778 (0.633 to 6.347)	2/5 (40)	0.552 (0.068 to 3.589)	7/25 (28)	0.723 (0.268 to 1.768)
No	127/170 (75)	Reference	29/53 (55)	Reference	57/163 (35)	Reference
Nonsteroidal anti-inflammatory drug (NSAID)						
Yes	1/2 (50)	0.313 (0.012 to 8.017)	0/0		0/2 (0)	
No	147/193 (76)	Reference	31/58 (53)		64/186 (34)	
Steroids (>10 mg of prednisone or equivalent)						
Yes	31/42 (74)	0.867 (0.405 to 1.961)	3/10 (30)	0.306 (0.060 to 1.246)	17/42 (40.5)	1.432 (0.698 to 2.894)
No	117/153 (77)	Reference	28/48 (58)	Reference	47/146 (32.2)	Reference
Immunosuppressive drugs						
Yes	2/2 (100)		1/1 (100)		0/2 (0)	
No	146/193 (75.6)		30/57 (53)		64/186 (34)	
Aspirin (ASA)						
Yes	30/39 (77)	1.073 (0.483 to 2.580)	8/13 (62)	1.530 (0.441 to 5.743)	8/37 (22)	0.468 (0.189 to 1.052)
No	118/156 (76)	Reference	23/45 (51)	Reference	56/151 (37)	Reference
Anticoagulants						
Yes	42/50 (84)	1.932 (0.869 to 4.760)	12/18 (67)	2.211 (0.711 to 7.447)	22/50 (44)	1.796 (0.919 to 3.497)
No	106/145 (73)	Reference	19/40 (48)	Reference	42/138 (30)	Reference
Other chronic and domiciliary therapy						
Yes	76/98 (78)	1.199 (0.622 to 2.328)	15/31 (48)	0.645 (0.223 to 1.818)	34/93 (37)	1.249 (0.683 to 2.293)
No	72/97 (74)	Reference	16/27 (59)	Reference	30/95 (32)	Reference
None						
Yes	25/35 (71)	0.752 (0.338 to 1.771)	9/12 (75)	3.273 (0.852 to 16.196)	11/34 (32)	0.911 (0.400 to 1.976)
No	123/160 (77)	Reference	22/46 (48)	Reference	53/154 (34)	Reference
Metastatic disease at the time of COVID-19 lung diagnosis - no./total no. (%)						
Yes	111/147 (76)	0.902 (0.415 to 1.863)	21/41 (51)	0.735 (0.227 to 2.290)	49/142 (35)	0.992 (0.505 to 1.992)
No	41/53 (77)	Reference	10/17 (59)	Reference	17/49 (345)	Reference
Site of metastatic disease at the time of COVID-19 diagnosis - no./total no. (%)						
Lung						
Yes	80/102 (78)	1.313 (0.686 to 2.534)	13/27 (48)	0.671 (0.234 to 1.890)	33/98 (34)	0.923 (0.507 to 1.678)
No	72/98 (73)	Reference	18/31 (58)	Reference	33/93 (35)	Reference
Liver						
Yes	17/23 (74)	0.881 (0.341 to 2.572)	3/4 (75)	2.786 (0.333 to 58.281)	7/21 (33)	0.941 (0.340 to 2.393)

No	135/177 (76)	Reference	28/54 (52)	Reference	59/170 (35)	Reference
Bone						
Yes	37/52 (71)	0.708 (0.350 to 1.472)	10/14 (71)	2.738 (0.785 to 11.216)	17/51 (33)	0.929 (0.464 to 1.812)
No	115/148 (78)	Reference	21/44 (48)	Reference	49/140 (35)	Reference
Brain						
Yes	28/44 (64)	0.452 (0.219 to 0.946)	5/9 (56)	1.106 (0.262 to 4.938)	12/43 (28)	0.674 (0.310 to 1.392)
No	124/156 (79)	Reference	26/49 (53)	Reference	54/148 (36)	Reference
Lymph nodes						
Yes	61/83 (73)	0.792 (0.412 to 1.531)	14/23 (61)	1.647 (0.571 to 4.911)	31/82 (38)	1.285 (0.704 to 2.347)
No	91/117 (78)	Reference	17/35 (49)	Reference	35/109 (32)	Reference
Adrenal						
Yes	15/22 (68)	0.641 (0.252 to 1.776)	2/3 (67)	1.793 (0.163 to 39.919)	7/21 (33)	0.941 (0.340 to 2.393)
No	137/178 (77)	Reference	29/55 (53)	Reference	59/170 (35)	Reference
Other						
Yes	24/28 (86)	2.063 (0.746 to 7.306)	3/9 (33)	0.375 (0.072 to 1.594)	13/26 (50)	2.113 (0.911 to 4.914)
No	128/172 (74)	Reference	28/49 (57)	Reference	53/165 (32)	Reference
Not applicable						
Yes	1/1 (100)		0/0		0/1 (0)	
No	151/199 (76)		31/58 (53)		66/190 (35)	
Diagnosis - no./total no. (%)						
NSCLC	111/151 (74)	0.724 (0.253 to 1.809)	26/41 (63)	3.467 (0.603 to 27.228)	52/144 (36)	1.017 (0.444 to 2.443)
SCLC	23/29 (79)	Reference	2/6 (33)	Reference	10/28 (36)	Reference
Therapy						
TKI alone	17/28 (61)	Reference	2/7 (29)	Reference	8/28 (29)	Reference
Chemo alone	35/48 (73)	1.742 (0.643 to 4.725)	2/8 (25)	0.833 (0.075 to 9.156)	22/46 (48)	2.292 (0.860 to 6.511)
IO alone	26/34 (76)	2.103 (0.709 to 6.487)	7/10 (70)	5.833 (0.777 to 61.719)	11/33 (33)	1.250 (0.421 to 3.827)
Chemo-IO	16/20 (80)	2.588 (0.720 to 10.891)	3/7 (43)	1.875 (0.206 to 20.390)	5/19 (26)	0.893 (0.228 to 3.267)
Other	12/17 (71)	1.553 (0.439 to 6.005)	2/3 (67)	5.000 (0.305 to 154.514)	7/16 (44)	1.944 (0.535 to 7.170)
Symptoms						
Fever (>37.5 degrees C)						
Yes	104/127 (82)	2.457 (1.266 to 4.804)	24/42 (57)	1.714 (0.539 to 5.649)	46/121 (38)	1.614 (0.857 to 3.117)
No	46/71 (65)	Reference	7/16 (44)	Reference	19/69 (28)	Reference
Cough						
Yes	83/103 (81)	1.734 (0.902 to 3.383)	16/31 (52)	0.853 (0.300 to 2.407)	38/100 (38)	1.430 (0.783 to 2.636)
No	67/95 (71)	Reference	15/27 (56)	Reference	27/90 (30)	Reference
Dyspnea						
Yes	89/106 (84)	2.661 (1.369 to 5.318)	13/28 (46)	0.578 (0.200 to 1.627)	53/105 (50)	6.200 (3.102 to 13.228)
No	61/92 (66)	Reference	18/30 (60)	Reference	12/85 (14)	Reference
Nasal Congestion						
Yes	5/6 (83)	1.621 (0.253 to 31.467)	1/2 (50)	0.867 (0.033 to 22.650)	2/6 (33)	0.960 (0.131 to 5.059)
No	145/192 (76)	Reference	30/56 (54)	Reference	63/184 (34)	Reference
Conjunctival Congestion						

Yes	0/1 (0)		0/0		0/1 (0)	
No	150/197 (76)		31/58 (53)		65/189 (34)	
Diarrhea						
Yes	10/10 (100)		2/6 (33)	0.397 (0.052 to 2.218)	4/9 (44)	1.574 (0.378 to 6.154)
No	140/188 (74)		29/52 (56)	Reference	61/181 (34)	Reference
Myalgia						
Yes	9/10 (90)		3/6 (50)	0.857 (0.147 to 5.009)	2/10 (20)	0.464 (0.069 to 1.921)
No	141/188 (75)		28/52 (54)	Reference	63/180 (35)	Reference
Otitis						
Yes	0/0		0/0		0/0	
No	150/198 (76)		31/58 (53)		65/190 (34)	
Anosmia						
Yes	4/7 (57)	0.411 (0.087 to 2.150)	1/2 (50)	0.867 (0.033 to 22.650)	1/7 (14)	0.310 (0.016 to 1.868)
No	146/191 (76)	Reference	30/56 (54)	Reference	64/183 (35)	Reference
Dysgeusia						
Yes	4/7 (57)	0.411 (0.087 to 2.150)	1/3 (33)	0.417 (0.019 to 4.596)	1/7 (14)	0.310 (0.016 to 1.868)
No	146/191 (76)	Reference	30/55 (55)	Reference	64/183 (35)	Reference
Headache						
Yes	10/13 (77)	1.071 (0.312 to 4.931)	2/3 (67)	1.793 (0.163 to 39.919)	4/13 (31)	0.845 (0.222 to 2.710)
No	140/185 (76)	Reference	29/55 (53)	Reference	61/177 (34)	Reference
Fatigue						
Yes	46/54 (85)	2.212 (1.002 to 5.424)	12/20 (60)	1.500 (0.505 to 4.623)	17/54 (31)	0.842 (0.423 to 1.635)
No	104/144 (72)	Reference	19/38 (50)	Reference	48/136 (35)	Reference
Shivers						
Yes	4/4 (100)		2/2 (100)		2/4 (50)	1.952 (0.230 to 16.583)
No	146/194 (75)		29/56 (52)		63/186 (34)	Reference
Other						
Yes	17/19 (89)	2.940 (0.801 to 18.991)	3/7 (43)	0.616 (0.112 to 3.066)	6/19 (32)	0.876 (0.295 to 2.340)
No	133/179 (74)	Reference	28/51 (55)	Reference	59/171 (35)	Reference
None (asymptomatic)						
Yes	9/24 (38)	0.140 (0.055 to 0.343)	1/3 (33)	0.417 (0.019 to 4.596)	1/22 (5)	0.077 (0.004 to 0.384)
No	141/174 (81)	Reference	30/55 (55)	Reference	64/168 (38)	Reference
Loss of smell and/or taste						
Yes	4/6 (67)	0.630 (0.119 to 4.650)	2/2 (100)		0/6 (0)	
No	146/192 (76)	Reference	29/56 (52)		65/184 (35)	

Supplementary Table S3:
List of investigators
(updated on 9th May 2020)

Country	Site	Principal Investigator
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Chile	Pontifical Catholic University of Chile, Santiago	Pablo Munoz Schuffenegger
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	Centre Hospitalier de la Region D'Annecy, Metz-Tessy	Stephane Hominal
	Centre hospitalier de Villeneuve-Saint-Georges	Pascal Assouline
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	CHITS Sainte Musse, Toulon	Clarisse Audigier-Valette
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	French Military Hospital Saint ANNE, Toulon	Olivier Bylicki
	Meaux hospital	Laurence Moncelly
	Aix-en-Provence Hospital	Stephanie Martinez
	Université Jean Monnet, Saint-Etienne	Pierre Fournel
	Amiens center	Géraldine François
	Chauny hospital center	Patrick Dumont
Germany	Ludwig Maximillians University, Munich	Lukas Kassmann

	Lungen Clinic Grosshansdorf	Martin Reck
	Asklepios Fachkliniken München-Gauting	Niels Reinmuth
Greece	Henry Dunant Hospital Center	Giannis Mountzios
Iran	Vasei Hospital, Sabzevar City	Seyed Alireza Javadinia
Ireland	University Hospital Limerick, Limerick	Linda Coate
Italy	AO Papardo, Palermo	Vincenzo Adamo
	AO San Camillo-Forlanini, Roma	Giuseppe Cardillo
	AO Santi Antonio e Biagio e Cesare Arrigo, Alessandria	Federica Grosso
	AOU Careggi, Firenze	Luca Voltolini
	AOU Federico II, Napoli	Giovannella Palmieri
	AOU Luigi Vanvitelli, Napoli	Floriana Morgillo
	AOU Ospedali Riuniti di Ancona	Rossana Berardi
	AOU Parma	Luca Ampollini Marcello Tiseo
	AOU Policlinico Umberto I, Roma	Alain Gelibter
	AOU Senese, Siena	Luca Luzzi
	ASL Alessandria	Cristina Cosentino
	ASL Latina	Gian Paolo Spinelli
	ASST Cremona	Matteo Brighenti
	ASST dei Sette Laghi, Varese	Alessandro Tuzi
	ASST Fatebenefratelli Sacco, Milano	Nicla La Verde
	ASST Lariana	Micol Gilardoni
	ASST Monza	Stefano Arcangeli
	ASUR Marche Area Vasta 1, Urbino	Rita Emili
	ASST Papa Giovanni XXIII, Bergamo	Anna Cecilia Bettini
	ASST Spedali Civili di Brescia	Paolo Borghetti Salvatore Intagliata
	AUSL della Romagna, Ravenna	Gabriele Minuti
	AUSL Piacenza	Elisa Maria Stroppa
	Fondazione IRCCS Ca' Granda, Policlinico, Milano	Francesco Grossi
	Fondazione IRCCS Istituto Nazionale Tumori, Milano	Marina Chiara Garassino
	Fondazione IRCCS Policlinico San Matteo, Pavia	Francesco Agustoni
	IRCCS Ospedale San Raffaele, Milano	Vanessa Gregorc
	Istituto Clinico Humanitas, Rozzano	Giovanna Finocchiaro
	Istituto Europeo di Oncologia, Milano	Tommaso De Pas Antonio Passaro
	Istituto Oncologico Veneto, Padova	Giulia Pasello
	Istituto Ospedaliero Fondazione Poliambulanza, Brescia	Fausto Meriggi
	Istituto Regina Elena, Roma	Edoardo Mercadante
	Istituto Tumori "Giovanni Paolo" IRCCS, Bari	Domenico Galetta
	Ospedale "Engles Profili", Fabriano	Marianna Tudini
	Ospedale "Ss. Annunziata", Chieti	Domenico Genovesi
	Ospedale Maggiore, Bologna	Piergiorgio Solli
	Ospedale Policlinico San Martino	Carlo Genova
	Ospedale Sant'Andrea, Roma	Raffaele Giusti
	Ospedale SG Moscati, Taranto	Giovanni Silvano
	Ospedali Civico Di Cristina Benfratelli, Palermo	Livio Blasi
	Ospedali Riuniti Padova Sud	Rita Chiari
	Ospedali Riuniti, Palermo	Francesco Verderame
	P.O. di Ponente, Ospedale di Pietra Ligure	Anna Ponzanelli
	PO San Giovanni Di Dio, Frattamaggiore	Marilena Laterza
	Policlinico S.Orsola-Malpighi, Bologna	Andrea Ardizzoni
	Policlinico Universitario Agostino Gemelli, Roma	Emilio Bria

	Policlinico Universitario Campus Biomedico, Roma	Sara Ramella Daniele Santini
	University of Pisa	Marcello Carlo Ambrogi
	SOC Oncologia - Ospedale degli Infermi. Biella	Lisa Pietrogiovanna
	Azienda Sanitaria Universitaria Friuli Centrale	Gianpiero Fasola
	Santa Chiara Hospital, Oncology Dept, Trento	Antonello Veccia
	University of L'Aquila	Alessio Cortellini
	USL Toscana Nord Ovest	Irene Stasi
Japan	Kindai University Faculty of Medicine, Osaka-Sayama	Tetsuya Mitsudomi
	Shizuoka Cancer Centre, Shizuoka	Takehito Shukuya
Mexico	Instituto Nacional de Cancerología de México	Oscar Arrieta
Netherlands	Amphia Zielenhuis, Breda	Nico van Walree
	Catherina Hospital, Eindovhen	Ben van der Borne
	Groene Hart Ziekenhuis, Gouda	Erica Geraedts
	Laurentius Hospital, Roermond	Cordula Pitz
	Rabdoud University, Nijmegen	Olga Schuurbiers
	Streekziekenhuis Koningin Beatrix, Winterswijk	Dirk Nijmeijer
	University Medical Center, Groningen	Jeroen Hiltermann
	Zuyderland MC, Heerlen	Franchette van Berkmortel
	Antonius Hospital, Nieuwegein	Lisanne Kastelijn
	Medical Center Leeuwarden	Wouter van Geffen
	Maxima Medical Center, Veldhoven	Maggy Youssef
	Tergooi Hospital	Jan Maarten van Haarst
	University Medical Center, Maastricht	Lizza Hendriks Anne-Marie C. Dingemans
Poland	National Institute of Tuberculosis and Lung Diseases, Warsaw	Joanna Chorostowska
Serbia	Institute for Oncology and Radiology of Serbia; Belgrade	Jelena Spasic
Singapore	National Cancer Center, Singapore	Daniel S W Tan
	National University Cancer Institute, Singapore	Ross Soo
Spain	Hospital Universitario 12 de Octubre, Madrid	Javier Baena Espinar
	Hospital Universitario Ramon y Cajal, Madrid	Pilar Garrido-López
	Catalan Institute of Oncology, L'Hospitalet	Ernest Nadal
	Universidad de Alcalá, Madrid	Jacobo Rogado
	Hospital Clinic Barcelona	Noemi Reguart
	Vall d'Hebron Institute of Oncology, Barcellona	Enriqueta Felip
Switzerland	CHUV, Lausanne	Solange Peters
Taiwan	National Taiwan University Hospital, Taipei City	Emily Lin
UK	Christie NHS Foundation Trust, Manchester	Raffaele Califano
	Royal Marsden Hospital, London	Sanjay Popat
	Chelsea & Westminster Hospital	Abhijit S Gill Tom Newsom-Davis
	Greater Manchester (The Christie Hospital and Wythenshawe Hospital)	Fabio Gomes
	Northern Centre for Cancer Care; Newcastle Upon Tyne	Abigail Gault
	Guy's & St Thomas' NHSFT	Daniel Smith
	Arrowe Park Hospital	Maria Parsonage
	United Lincolnshire Hospitals NHS Trust, Lincoln	Giuseppe Banna
USA	Cedars-Sinei Medical Center, Los Angeles	Karen Reckamp
	City of Hope, Duarte	Jack West
	Emory University School of Medicine, Atlanta	Suresh S Ramalingam
	Fox Chase Cancer Center, Philadelphia	Hossein Borghaei

	Fred Hutchinson Cancer Research Center, Seattle	Renato G Martins
	Georgetown Lombardi Comprehensive Cancer Center, Washington DC	Stephen V Liu
	Greenebaum Comprehensive Cancer Center, Baltimore	Christian Rolfo
	Hospital of the University of Pennsylvania	Melina E Marmarelis
	Huntsman Cancer Center, Utah	Sonam Puri
	Karmanos Cancer Institute, Detroit	Hirva Mamdani
	Lurie Comprehensive Cancer Center, Chicago	Jyoti D Patel
	Massachusetts General Hospital Cancer Center, Boston	Lecia V Sequist
	Mayo Clinic Arizona, Scottsdale	Alan H. Bryce
	Mayo Clinic, Rochester	Narjust Duma
	Memorial Health Care System, Pembroke Pines Florida	Luis E. Raez
	Mount Sinai Hospital, New York	Fred Hirsch
	National Cancer Institute	Abdul Rafeh Naqash
	Rush Medical College, Chicago	Mary J Fidler
	Stanford University	Heather Wakelee
	The Ohio State University Wexner Medical Center, Columbus	Carolyn J. Presley
	The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins, Baltimore	Julie R. Brahmer Jarushka Naidoo
	The University of Chicago	Christine Bestvina
	UC Davis Comprehensive Cancer Center, Sacramento	Jonathan W Riess
	University of Alabama, Birmingham	Aparna Hedge
	University of Pittsburgh Medical Center Hillman Cancer Centre, Pittsburgh	Liza Villaruz
	Vanderbilt University Medical Center, Nashville	Leora Horn
	Yale School of medicine, New Haven	Sarah Goldberg
	Hackensack Meridian	Martin Gutierrez
	Penn Medicine Virtua Cancer Program	Susan Van Loon
	Montefiore, New York	Balazs Halmos

Supplementary Table 4:
List of patients recruited for each site

Site Name	Principal Investigator	N° patients recruited
Medical Oncology Department, Thoracic Cancer and Early Drug Development Unit, Hospital Universitario 12 de Octubre, Madrid, Spain	Javier Baena	18
Lung Cancer Unit, IRCCS Ospedale Policlinico San Martino, Genova, Italy	Carlo Genova	12
Gustave Roussy Institute, Villejuif, France	Fabrice Barlesi	11
Service de Pneumologie, Hopital Tenon, Paris, France	Jaques Cadranel	11
Medical Oncology Department, IRYCIS, Hospital Universitario Ramón y Cajal, Madrid, Spain	Pilar Garrido	10
Medical Oncology Unit, University Hospital of Parma, Parma, Italy	Marcello Tiseo	10
Oncology Unit, ASST Papa Giovanni XXIII, Bergamo, Italy	Anna Cecilia Bettini	9
Medical Oncology Unit, Ospedale "Guglielmo da Saliceto", Piacenza, Italy	Elisa Stroppa	9
Oncology Department, Lausanne University Hospital, Lausanne University, Lausanne, Switzerland	Solange Peters	8
Department of Oncology and Hematology, AUSL della Romagna, Ravenna, Italy	Gabriele Minuti	8
Vall d'Hebron University Hospital, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain	Enriqueta Felip	8
Department of Oncology, IRCCS Ospedale San Raffaele, Milan, Italy	Vanesa Grecorc	8
Division of Thoracic Oncology, IEO, European Institute of Oncology IRCCS, Milan, Italy	Antonio Passaro	8
Medical Oncology 2, Istituto Oncologico Veneto IRCCS, Padova, Italy	Giulia Pasello	7
Department of Pulmonology, Erasmus University Medical Center, Rotterdam, The Netherlands	Anne-Marie Dingemans	6
Thoracic Oncology Unit, Medical Oncology Department, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy	Marina Chiara Garassino	5
Thoracic Surgery Unit, Azienda Ospedaliero Universitaria Careggi, Firenze, Italy	Luca Voltolini	5
Medical Oncology Unit, Sant'Andrea Hospital, Rome, Italy	Raffaele Giusti	5
Radiotherapy Unit, Department of Oncology, Azienda Ospedaliero Universitaria Careggi, Firenze, Italy	Vieri Scotti	4
Medical Oncology, Fondazione IRCCS Policlinico "San Matteo", Pavia, Italy	Francesco Agustoni	4
Service de Pneumologie, CHU, Toulouse, France	Julien Mazieres	3
Mesothelioma Unit, Azienda Ospedaliera Nazionale Santi Antonio e Biagio e Cesare Arrigo, Alessandria, Italy	Federica Grosso	3
Thoracic Surgery Unit, Experimental Clinical Oncology Department, IRCCS Regina Elena National Cancer Institute, Rome, Italy	Edoardo Mercadante	3
Medical Oncology, AOU Ospedali Riuniti di Ancona, Università Politecnica delle Marche, Ancona, Italy	Rossana Berardi	3

Medical Oncology, ASST Cremona, Cremona, Italy	Matteo Brighenti	3
Medical Oncology, ASST Spedali Civili di Brescia, Brescia, Italy	Salvatore Intagliata	2
Portsmouth Hospitals NHS Trust, Portsmouth, UK	Giuseppe Banna	2
Department of Biotechnology and Applied Clinical Science, University of L'Aquila, L'Aquila, Italy	Alessio Cortellini	2
Comprehensive Cancer Center, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy	Emilio Bria	2
Thoracic Surgery, Policlinico S.Orsola, Alma Mater Studiorum University, Bologna, Italty	Piergiorgio Solli	2
Department of Oncology and Hematology, Humanitas Clinical and Research Center IRCCS, Rozzano, Italy	Giovanna Finocchiaro	2
Department of Hematology and Oncology, Vanderbilt Ingram Cancer Center, Vanderbilt University, Nashville, Tennessee, USA	Leora Horn	1
Medical Oncology, ASST Fatebenefratelli Sacco, Milan, Italy	Nicla La Verde	1
Guangdong Lung Cancer, Guangdong General Hospital, Guangzhou, China	Yi-Long Wu	1
Medical Oncology, Azienda Ospedaliera Nazionale Santi Antonio e Biagio e Cesare Arrigo, Alessandria, Italy	Silvia Zai	1
Georgetown Lombardi Comprehensive Cancer Center, Georgetown University, Washington, DC	Stephen Liu	1
Oncology Unit, ASST dei Sette Laghi, Varese, Italy	Claudio Chini	1
Thoracic Oncology Unit, SHUPP, CHU Grenoble-Alpes, Grenoble France	Denis Moro-Sibilot	1

Protocol

International registry on thoracic cancer patients with COVID-19

TERAVOLT

(Thoracic cancERs international coVid 19 cOLlaboraTion)

Number of versions: Version 1.2

Date: March 19th, 2020

Type of the study: observational retro-prospective

Coordinator centre: Fondazione IRCCS Istituto Nazionale Tumori, Milano.

Principal Investigator: Marina Chiara Garassino

Italian Sponsor/Promoter: Fondazione IRCCS Istituto Nazionale Tumori, Milano.

Organizational Committee: Solange Peters, Leora Horn, Fabrice Barlesi, Anna Marie Dingenmans, Alessio Cortellini, Alessandro De Toma, Giuseppe Viscardi, Vera Pancaldi, Juliene Mazieres, Annalisa Trama, Olivier Michelin, Jeremy Warner, Valter Torri.

RATIONALE

China first, and the rest of the world subsequently, have been experiencing the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARSCoV-2), namely coronavirus disease (COVID-19), since the end of 2019 [1]. Clinical pictures of COVID-19 can vary a lot, from mild flu-like forms, to severe multiple organ dysfunction syndromes rather than

respiratory failure [2], which might be related to the multiple organs distribution of angiotensin converting enzyme 2, the functional receptor for SARS-CoV-2 [3, 4].

To date, the spread of COVID-19 has already reached the epidemiological criteria to be declared pandemic [5], and on March 11th, 2020, with more than 118,000 cases in 114 countries, and 4,291 deaths, the WHO have officially confirmed the pandemic [6].

By the end of February 2020 COVID-19 have already hit Europe hardly, particularly Italy, with 12462 confirmed cases according to the Istituto Superiore di Sanità as of March 11th, and 827 deaths [7]. Considering the infection rapid spread, which can affect a high percentage of each community in a short time, the mortality rate and the death risk estimation are surely related with the breakdown of the healthcare systems. In China the estimated risk of death varied indeed from the 12% in the epicentre of the epidemic, to ≈1% in less affected regions [8] including Europe, USA, Australia, Latin America, Iran, Canada and many others.

It is well known that cancer patients are more susceptible to infection compared to healthy people and non-cancer patients; that predisposition have been historically related to the systemic malignancy-related immunosuppressive state and to active disease-oriented treatments, such as chemotherapy, radiotherapy and surgery [9-12]. Things might be different for cancer patients undergoing immune checkpoint blockade, who represents an exception from the immunological point of view. A kind of paradoxical immunological response to influenza infection/vaccination during immune checkpoint inhibitors have been already described, even suggesting improved oncological outcomes for these patients [13-15].

The first Chinese report described 18 (≈1%) out of 1590 COVID-19 cases with a history of cancer (mostly lung cancer). Despite the small sample size, the authors observed that the cohort of cancer patients had had an increased risk of developing severe COVID-19-related events compared to non-cancer population [16]. Surely the sample size and high variability of the cancer population might have affected the reliability of their results, however cancer care professionals are now called to cautiously manage this emergency and cannot fail to consider that cancer patients have to be carefully monitored and prevented from COVID-19 development risk.

Considering this background, we propose a global registry to describe and monitor thoracic cancer patients (NSCLC, SCLC, Malignant Pleural Mesothelioma [MPM] and

thymic epithelial tumours [TETs]) with COVID-19, factor associated to severe events, develop a tailored risk assessment strategy for thoracic cancer patients, develop treatment recommendations for thoracic cancer patients .

STUDY DESIGN and ENDPOINTS

This is a longitudinal multi-centre study on thoracic cancer patients (any age, sex, histology, stage, in active treatment as well as in clinical follow-up) which, experienced COVID-19. Information on clinical features, clinical course, management and outcomes will be collected for both, thoracic cancers and COVID-19 infection (see Appendix 1 including the list of data to collect). Considering the limited data available about COVID-19 evolution, the sample size will be not anticipated. However, with about 150 centres and a median of 5 patients at every centre, a sample size of 750 patients approximately can produce a confidence interval for the categorical estimate of +/-2%. Clinical data will be extracted from medical records of consecutive patients from January 1st, 2020 until the end of pandemic declared by WHO.

Inclusion criteria

Any thoracic cancer patients with a COVID-19 diagnosis defined as follow:

- Laboratory confirmed (RT-PCR techniques) COVID-19.
- Suspected COVID-19 cases; diagnosed clinically based on symptoms (fever >37.5°, decrease of oximeter saturation of at least 5 %, cough, diarrhoea, otitis, dysgeusia, myalgia, arthralgia, conjunctivitis and rhinorrhoea and and exposures).
- Clinically diagnosed cases; suspected cases with lung imaging features consistent with coronavirus pneumonia.
- Asymptomatic cases; diagnosed based on positive viral nucleic acid test results but without any COVID- 19 symptoms.

The following explorative endpoints will be evaluated:

- major demographic features of thoracic cancer patients with COVID-19 (e.g. age, sex, place of residence);

- prevalence of major comorbidities in thoracic cancer patients with COVID-19;
- proportion of thoracic cancer patients experiencing a severe event overall and by severe events including deaths;
- proportion of thoracic cancer patients by COVID-19 clinical course;
- proportion of thoracic cancer patients with COVID-19 who received chemotherapy, surgery, radiotherapy, immune check point inhibitors in the last 2 months before COVID-19 infection;
- predictive factors of severe events in thoracic cancer patients with COVID-19 including cancer-related treatment;
- prognostic factors of thoracic cancer patients with COVID-19 including cancer-related treatment;

Additional outcomes to consider, in a second phase of the registry implementation, could include the follow-up of the thoracic cancer patient survivors in terms of treatment (when cancer-related treatment started again, which treatment) and outcomes. This will allow to assess the impact of the COVID-19 pandemic and the decision taken with regards to thoracic cancer patients treatment on their cancer outcomes (e.g. progression, death).

STATISTICAL ANALYSES

Descriptive statistics of patients demographical (e.g. age, sex,) and clinical characteristics (e.g. comorbidities, severe events, therapy) will be provided together with 95% confidence intervals. Association with baseline factors with continuous outcome will be analysed by generalised linear models, while categorical analyses will be approached with logistical model and time-to event endpoints will be analyzed semiparametric proportional hazard model.

DATABASE MANAGEMENT

Data for this study will be collected in a REDCap® (Research Electronic Data Capture) database. REDCap is a secure web platform for building and managing online databases and surveys. REDCap's streamlined process for rapidly creating and designing projects offers a vast array of tools that can be tailored to virtually any data collection strategy. REDCap provides an intuitive user interface that streamlines project development and improves data entry through real-time validation rules (with automated data type and range checks). REDCap also provides easy data manipulation (with audit trails for reporting, monitoring and querying patient records) and an automated export mechanism to common statistical packages (SPSS, SAS, Stata, R/S-Plus).

Investigators who have received appropriate institutional research approval (i.e., Institutional Review Board or Institutional Ethics Committee) will be given a web link with a survey where they can enter data about their specific patients. Guidelines about the data collection and to properly enter the data will be developed. Investigators at Vanderbilt University Medical Center in Nashville, TN, United States (Leora Horn, MD and Jennifer Whisenant, PhD) will manage the online survey and keep records of all institutional approvals.

REDCap servers are housed in a local data center at Vanderbilt University Medical Center, and all web-based information transmission is encrypted. REDCap was developed specifically around HIPAA-Security guidelines and is recommended to researchers by both our Privacy Office and Institutional Review Board. REDCap has been disseminated for local use at ~3,100 other academic/non-profit consortium partners in 128 countries. Vanderbilt leads the REDCap Consortium, which currently supports more than 614,000 projects and 834,000 users. More information about the consortium and system security can be found at http://www.projectredcap.org/.

To comply with local regulations regarding use and disclosure of protected health information (PHI), patient identifiers (e.g., name, date of birth, medical record number) will not be collected as part of this study. Investigators will access the medical record of their patient, enter required data into the database. The database will be maintained for an infinite amount of time. The protected health information will not be reused or disclosed to any other person or entity, except as required by law, for authorized oversight of the research project. Future research, that is not

defined in this protocol, wishing to access the REDcap database will need institutional review board/ethic review board approval before obtaining access to the REDcap database.

ETHICAL CONSIDERATIONS

All the study procedures will be in accordance with the precepts of Good Clinical Practice and the declaration of Helsinki. According to the regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016, the following requirements regarding personal data will be guaranteed: pseudonymisation and encryption, the confidentiality, integrity, availability and resilience of treatment systems and services, the ability to restore the availability and access of data in the event of a physical or technical accident.

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