

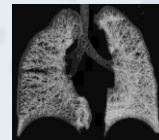
Nuovi orizzonti in chirurgia toracica : dallo Screening alla chirurgia minivasiva

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SICT
Roma, 6-8 ottobre 2016

Lung cancer screening

- 1) Stop smoking!
- 2) Chemoprevention
- 3) Early detection



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Lung cancer screening.....a long story:

- 1970: Chest XRay and sputum
- 1990: observational studies with low dose CT scan
- 2000: ELCAP study publication → superiority of CT scan compare to chest Xray

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PILOT STUDIES

Table 1 Results of selected modern lung cancer screening trials

Study	Started	N ^a	Age	Baseline LDCT screen			N ^a of rounds	Overall (with incidence screens)			
				Percentage abnormal ^b	LC	Percentage		Total LC	Percentage	Stage I	Percentage
Shinshu Uni [8]	1996	5483	40-74	5	23	0.42	3	63	1.1	51	81
Hiroshi [9]	1998	7985	50-69	26	36	0.44	2	40	0.05	31	78
Milan [12]	2000	1035	50-84	21	11	1.06	2	22	2.1	16	73
Pamplona [13]	2000	911	>40	48	12	1.32	2	14	1.5	13	93
Mayo Clinic [14]	1998	1520	50-85	51	27	1.78	5	66	4.5	36	55
ELCAP [10]	1994	31567	40-85	13	405	41.28	2	484	1.5	412	485
Milan Uni [15]	2004	5189	>50	10	55	1.04	2	92	1.8	61	66
PLUSS [16]	2002	3642	50-79	40	53	1.45	2	80	2.2	40	50
Toronto [17]	2003	3352	50-83	18	56	1.67	2	65	1.9	42	65

LC, patients diagnosed with lung cancer; LDCT, low-dose spiral computed tomography. Total lung cancer, all cases detected throughout the study period, including interval cases.
^a Patients with any abnormality in their baseline CT scan.

Many studies have already demonstrated how CT scan is high sensitive to diagnose small nodules (few mm in diameter), with low radiation exposure, limited costs, few seconds of execution and no contrast medium.

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Lung cancer story:

- 1970: Chest XRay and s
- 1990: observational stud
- 2000: ELCAP study publ
- 2004: randomized studi

del 26 Novembre 2010 **CORRIERE DELLA SERA** estratto da pag. 29

Ricerca Lo studio condotto allo IEO di Milano su 6.200 forti fumatori è durato dieci anni

Tac a spirale per i polmoni

«Salvi sette pazienti su dieci»

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The New York Times
The Opinion Pages

WORLD U.S. N.Y. REGION BUSINESS TECHNOLOGY SCIENCE HEALTH

TH DNA AN PROJ

EDITORIAL
CT Scans for Lung Cancer

Published: November 5, 2010

A government-sponsored study has found that annual CT scans could reduce the mortality rate from lung cancer in very heavy smokers and former smokers by 20 percent. Its leaders suggest that many thousands of lives could be saved annually. This exciting advance still raises serious questions for individuals and their doctors and for the economics of the health care system.

NLST The National Lung Cancer Screening Trial

“On Nov 4th, 2010, the NLST reported initial trial results, showing **20 percent fewer lung cancer deaths** among trial participants screened with low-dose helical CT (also known as spiral CT) compared to those who got screened with chest X-rays.”

- 5 year OS 96%
- 5 year OS for lung cancer:

LD-TC	60%
chest XRay	40%



COSMOS trial

Continuous Observation of Smoking Subjects

5203 subjects

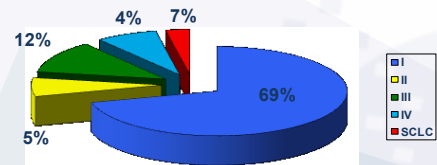
Arruolamento 2004-2005
 Sesso 3439 male (66%) – 1764 female (34%)
 Età median 57 aa (range 50-84 aa)
 Smoking status → smoker (80%); former smoker (20%)
 Pack-year median 44 pack-years (range 20-260)

266 pts with lung cancer → 238 (89%) surgery and 28 (11%) not surgery

5-year survival = 97%
 (NSLT Trial 96%)



Stage of the 266 lung cancer identified during COSMOS



Screened lung cancer stage I-II: 74%
 Not screened lung cancer I-II: 17%



What is the future in lung cancer screening?

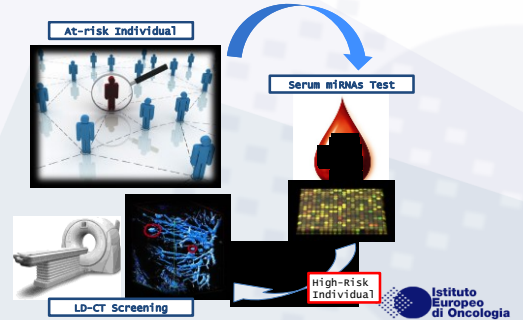
• MOLECULAR MARKERS

- Bigger population
- Easier to perform
- Higher compliance
- Less radiation

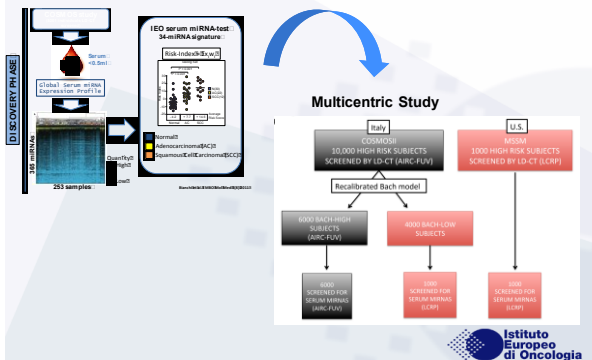
miR-Test: A Blood Test for Lung Cancer Early Detection

J Natl Cancer Inst 2015

Circulating miRNA screening to select high-risk individuals



High-risk individuals screened by LDCT and miR-Test: the COSMOS-II trial (results expected in 2017)



• BREATH TEST

- Progetto finanziato da Associazione Italiana per la Ricerca sul Cancro (AIRC)

- Da Maggio 2012 a Dicembre 2014

- Popolazione:
 - 70 pazienti con tumore al polmone
 - 76 controlli

- Risultati:
 - Lung cancer vs controls → 81% sensitivity – 91% specificity
 - Stage I vs Stage II/III/IV → 92% sensitivity



IEO Istituto Europeo di Oncologia
SSTI FILIPPO
fondazione c a r i p i o
UNIVERSITÀ DEGLI STUDI DI MILANO
Medical Detection Dogs

Diagnosticare per tempo un tumore polmonare può fare la differenza nelle possibilità di trattamento e cura

Disporre di nuovi, semplici ed efficaci test rappresenta un enorme vantaggio, sia per i medici che per i pazienti

Il cane possiede 225.000.000 recettori olfattivi, l'uomo solo 20.000.000

Insegnare ai cani a percepire mediante l'olfatto, in campioni di urina, la presenza del tumore polmonare nell'uomo, può favorire la diagnosi precoce e l'attuazione di interventi terapeutici tempestivi, migliorando la prognosi dei pazienti

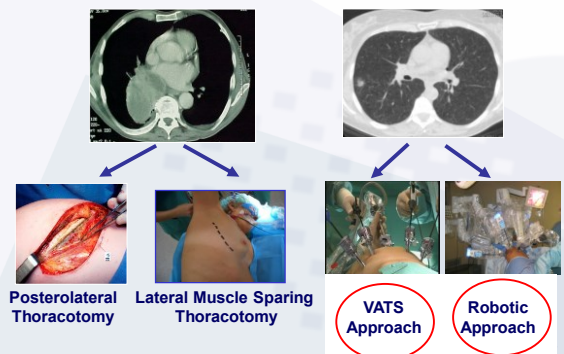
Partecipa come volontario!
Abbiamo bisogno di un semplice campione di urina.
Per ulteriori informazioni contatta la Divisione di Chirurgia Toracica
breath.test@ieo.it oppure chiama lo 02.94371077

AIUTA LA RICERCA!

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Screening programs and to the early detection of lung cancer leads to minimally invasive surgery

Evolution of Surgical Treatment

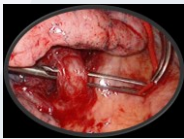


VATS pulmonary resection

"We define VATS pulmonary resection as a video assisted, minimally access approach in which the surgeon operates primarily by watching the television monitor and uses no rib spreading throughout the entire procedure"

Yim AP, Pearson, 2008

- Full Endoscopic Procedure (Monitor-based)
- Individual Dissection & Stapling of Hilar Structures
- No Rib Spreading



VATS LOBECTOMY

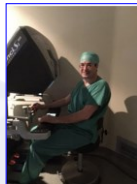


ROBOTIC SURGERY

To overcome vats limitations, micromechanic and robotic technology was introduced in the mid-1990.

Natural movements of the surgeon's hands are traslated into **precise instrument movements** inside the patient with tremor filtration.

Three dimensional view offers a visual magnification that compensate the absence of haptic feedback



- Robotic system can made advanced thoracoscopic surgery accessible to surgeons who do not have advanced videoendoscopic training
- Expand indications
- Advantages for patients




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IEO EXPERIENCE 2007-2016

Pulmonary resection	392
Mediastinal resection	30
• thymomas	14
• thymic carcinomas	3
• Other	13
• esophageal resection	1

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ROBOT DA VINCI SI



ROBOT DA VINCI XI dal 2014

SINGLE PORT ROBOT DA VINCI



Not available for sale



Science Translational Medicine

RESEARCH ARTICLE

Supervised autonomous robotic soft tissue surgery

Axel Kucharski,¹ Peter C. M. Lee,² Justin D. O'Brien,³ Simon Leonard,⁴ Axel Kucharski,¹ Peter C. M. Lee,²

The current paradigm of robot-assisted surgery (RAS) depends entirely on an individual surgeon's manual capability. Autonomous robotic surgery—controlling the surgeon's hands, operations, enhanced efficacy, safety, and improved access to optimized surgical techniques, surgeries involving soft tissue have not been performed autonomously because of technological limitations, including lack of vision systems that can distinguish and track the target tissue in dynamic surgical environments and lack of intelligent algorithms that can execute complex surgical tasks. We demonstrate in this supervised autonomous soft tissue surgery in an open surgical setting, enabled by a pipeline, from preoperative and intraoperative functional (real) imaging system and an autonomous planning algorithm, inspired by the best human surgical practices, a computer program generates a plan to complete complex surgical tasks on deformable soft tissue, such as resection and retrieval of a tumor. We compared metrics of autonomy— including the consistency of achieving intended by the average value (range), the process of achieving the autonomy (number of iterations that required controlling the whole, from the vision, computer, and robot, and from collection to clinical application). Results: our supervised autonomous system, based on supervised surgery and clinically used RAS approaches, despite the more complex design and more complex during surgery, we demonstrate that the autonomy of supervised autonomous procedure is superior to surgery performed by expert surgeons and RAS techniques in six cases (tumor resection and in living pig). These results demonstrate the potential for autonomous robots to improve the efficacy, consistency, functional outcomes, and accessibility of surgical techniques.



Thank you!!!

