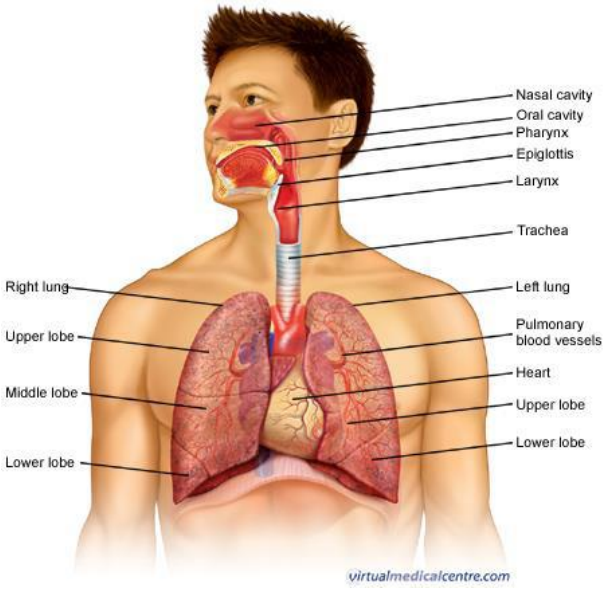
Cancer Association of South Africa (CANSA)

CANSA Fact Sheet on Lung Cancer

Introduction

The chest contains two lungs, one lung on the right side of the chest, and the other on the left side of the chest. Each lung is made up of sections called lobes – the right lung consists of three lobes and the left lung consists of two lobes. The lung is soft and protected by the ribcage. The purposes of the lungs are to absorb oxygen (O_2), into the bloodstream for distribution throughout the body and to remove carbon dioxide (CO_2), a waste product, from the body.



[Picture Credit – Anatomy of the Lungs]

Thai, A.A., Solomon, B.J., Sequist, L.V., Gainor, J.F. & Heist, R.S. 2021.

"Lung cancer is one of the most frequently diagnosed cancers and the leading cause of cancer-related deaths worldwide with an estimated 2 million new cases and 1·76 million deaths per year. Substantial improvements in our understanding of disease biology, application of predictive biomarkers, and refinements in treatment have led to remarkable progress in the past two decades and transformed outcomes for many patients. This seminar provides an overview of advances in the screening, diagnosis, and treatment of non-small-cell lung cancer and small-cell lung cancer, with a particular focus on targeted therapies and immune checkpoint inhibitors."

Lung Cancer

Lung cancer is a disease characterised by uncontrolled cell growth in tissues of the lung. If left untreated, this growth can spread beyond the lung in a process called metastasis into nearby tissue and, eventually, into other parts of the body. Most cancers that start in lung, known as primary lung cancers, are carcinomas that arise from epithelial cells.

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Tumour Grade and Tumour Stage

Tumour grade and stage are terms used to describe the severity of a tumour, while tumour grade describes the appearance of cancerous cells in the tissue by examining them under a microscope.

Tumour stage encompasses:

- The location of the tumour.
- The size and/or extent of the original tumour.
- Whether cancer cells have spread to lymph nodes or anywhere else in the body.
- The number of tumours present.

Doctors use tumour grade, cancer stage, and a patient's age and general health to decide the course of treatment for the patient and determine prognosis. Prognosis describes all factors including the disease course, cure rate, chances of survival, and risk of recurrence of cancer.

What are the cancer stages?

Different systems of cancer staging are used to describe the types of cancer. Below is a common method in which stages are ranged from 0 to IV.

- Stage 0: The tumour is confined to its place of origin (in situ) and has not spread to nearby tissue.
- Stage I: The tumour is located only in the original organ, is small, and has not spread.
- Stage II: The size of the tumour is large but has not spread.
- Stage III: The tumour has become larger and may have spread to surrounding tissues and/or lymph nodes.
- Stage IV: The tumour has spread to other distant organs of the body, which is known as the metastasis stage.

TNM staging

Another common staging method used for cancer is the TNM system, which stands for tumour, node (which means spread of the tumour to lymph nodes), and metastasis. When a patient's cancer is staged using the TNM system, a number will be present along with the letter. This number signifies the extent of the disease in each category - tumour, node, and metastases.

Another system of cancer staging divides cancer into five stages, which include:

- In situ: Abnormal cells are present but have not spread to nearby tissue.
- Localized: Cancer is located only in the original organ and shows no sign of its spread.
- Regional: Cancer has spread to nearby lymph nodes, tissues, or organs.
- Distant: Cancer has spread to distant parts of the body.
- Unknown: The stage cannot be figured out due to a lack of enough information.

What are the cancer grades?

Cancer grades are based on examination of the suspected tissue sample under a microscope. This involves surgically removing a piece of the suspected cancerous tissue and sending it to the lab for analysis. The entire procedure is known as a biopsy.

A doctor who specializes in diagnostic tests (pathologist) examines the cells of the tissue and determines whether they are harmless (benign or noncancerous) or harmful (malignant or

cancerous). They describe the microscopic appearance of the cells and assign a numerical "grade" to most cancers.
Generally, a lower grade indicates slow-growing cancer and a higher grade indicates fast-growing cancer.

The most commonly used grading system is as follows:

- Grade I: Cancer cells that look like normal cells but are not growing rapidly.
- Grade II: Cancer cells that don't look like normal cells with their growth being faster than normal cells.
- Grade III: Cancer cells that look abnormal and have the potential to grow rapidly or spread more aggressively.

Sometimes, the following system can be used:

- GX: Grade cannot be assessed (undetermined grade)
- G1: Well-differentiated (low grade)
- G2: Moderately differentiated (intermediate grade)
- G3: Poorly differentiated (high grade)
- G4: Undifferentiated (high grade)

Incidence of Lung Cancer in South Africa

According to the outdated National Cancer Registry (2019), known for under reporting, the following number of lung cancer cases was histologically diagnosed in South Africa during 2019:

Group - Males 2019	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All males	1 664	1:98	4,01%
Asian males	100	1:64	9,26%
Black males	631	1:166	4,33%
Coloured males	270	1:73	5,62%
White males	663	1:54	3,08%

Group - Females 2019	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All females	962	1:241	2,19%
Asian females	34	1:243	2,41%
Black females	271	1:626	1,32%
Coloured females	188	1:120	3,85%
White females	469	1:86	2,60%

The frequency of histologically diagnosed cases of lung cancer in South Africa for 2019 was as follows (National Cancer Registry, 2019):

Group - Males 2019	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All males	2	3	29	120	422	601	388	99
Asian males	0	0	1	5	15	47	26	6
Black males	2	1	20	61	201	243	86	17
Coloured males	0	0	4	27	91	78	57	13
White males	0	2	4	27	115	233	219	63

Group - Females 2019	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All females	0	1	28	58	185	331	275	84
Asian females	0	1	0	2	5	11	12	3
Black females	0	0	20	27	69	87	45	23
Coloured females	0	0	2	11	41	77	51	6
White females	0	0	6	18	70	156	167	52

N.B. In the event that the totals in any of the above tables do not tally, this may be the result of uncertainties as to the age, race or sex of the individual. The totals for 'all males' and 'all females', however, always reflect the correct totals.

Types of Lung Cancer

There are two main types of lung cancer, non-small cell lung cancer and small cell lung cancer. These names refer to how the cancers look under a microscope to a pathologist (a person specifically qualified to make a diagnosis by looking at items under a microscope. Most lung cancers are non-small cell. There are also some subtypes of non-small cell lung cancer.

Causes of Lung Cancer

The main cause of lung cancer (internationally) is smoking of tobacco products. Lung cancer has always been – and still is – more common among men. As more women have started smoking, the number of women developing lung cancer has been on the increase.

People who do not smoke can also develop lung cancer. Approximately 10–15% of people who get lung cancer have never smoked.

Other risk factors include the effects of past cancer treatment and exposure to asbestos, radon gas and – in very rare cases – substances such as uranium, chromium and nickel. Lung cancer is not infectious and can't be passed on to other people.

Smoking - The more one smokes, the greater the risk of developing lung cancer. It is also more likely to develop in people who start smoking at a young age. If someone stops smoking, their risk of developing lung cancer reduces over time. After about 15 years, the chance of developing the disease is similar to that of a non-smoker.

In a recent study by Alexandrov, *et al*., (2016) their analysis shows a direct link between the number of cigarettes smoked in a lifetime and the number of mutations in tumour DNA.

The researchers found that, on average, smoking a packet of cigarettes a day led to:

- 150 mutations in each lung cell every year
- 97 in the larynx or voice box
- 23 in the mouth
- 18 in the bladder
- six in the liver

According to the researchers, the more mutations there are, the higher the chance that these will occur in the key genes that are called cancer genes, which convert a normal cell into a cancer cell.

Passive smoking- breathing in other people's cigarette smoke (passive smoking) increases the risk of lung disease and cancer

Pipes and cigars - although many believe that pipe and cigar smokers have a lower risk of lung cancer than cigarette smokers, there remains a risk of cancer.

Cannabis - Cannabis smoke contains a similar profile of carcinogenic (cancer causing) chemicals as tobacco smoke and is usually inhaled more deeply. Although cannabis smoke is known to contain similar harmful and carcinogenic substances to tobacco smoke, relatively little is understood regarding the respiratory health effects from cannabis smoking (Gates, *et al*.).

Vaping – There is increasing concern over vaping as a cause of lung cancer.
Bracken-Clarke, D., Kapoor, D., Baird, A.M., Buchanan, P.J., Gately, K., Cuffe, S. & Finn, S.P. 2021.
Objectives: Lung cancer is the most common cause of cancer mortality worldwide and, while tobacco smoke remains the primary cause, there is increasing concern that vaping and E-cigarette use may also increase lung cancer risk. This review concentrates on the current data, scholarship and active foci of research regarding potential cancer risk and oncogenic mechanisms of vaping and lung cancer.
Materials and methods: We performed a literature review of current and historical publications on lung cancer oncogenesis, vaping device/e-liquid contents and daughter products, molecular oncogenic mechanisms and the fundamental, potentially oncogenic, effects of electronic cigarette smoke/e-liquid products.
Results: E-cigarette devices and vaping fluids demonstrably contain a series of both definite and probable oncogens including nicotine derivatives (e.g. nitrosnornicotine, nitrosamine ketone), polycyclic aromatic hydrocarbons, heavy metals (including organometal compounds) and aldehydes/other complex organic compounds. These arise both as constituents of the e-liquid (with many aldehydes and other complex organics used as flavourings) and as a result of pyrolysis/complex organic reactions in the electronic cigarette device (including unequivocal carcinogens such as formaldehyde - formed from pyrolysis of glycerol). Various studies demonstrate in vitro transforming and cytotoxic activity of these derivatives. E-cigarette device use has been significantly increasing - particularly amongst the younger cohort and non-smokers; thus, this is an area of significant concern for the future.
Conclusion: Although research remains somewhat equivocal, there is clear reason for concern regarding the potential oncogenicity of E-Cigarettes/E-Liquids with a strong basic and molecular science basis. Given lag times (extrapolating from tobacco smoke data) of perhaps 20 years, this may have significant future public health implications. Thus, the authors feel further study in this field is strongly warranted and consideration should be made for tighter control and regulation of these products.

Radon gas – radon is a colourless, odourless radioactive gas that forms from the decay of radioactive elements such as uranium. Radon gas given off by soil and rock can enter homes and buildings through cracks in floors and walls, pipes, wires and pumps. Radon concentrations are usually highest in basements or in underground mining environments. Radon is the number one cause of lung

cancer among non-smokers, according to estimates from the Environmental Protection Agency (EPA). Overall, radon is the second leading cause of lung cancer

Age - like most types of cancer, lung cancer is more common in older people. About 80% of lung cancers are diagnosed in people over 60. Lung cancer rarely affects people under 40

Genetic risk - some people with a close relative who has had lung cancer may be at an increased risk of it themselves, although the increase in risk is very small. The risk is slightly greater if a relative is a non-smoker and developed lung cancer at an early age, or if more than one relative on the same side of the family developed lung cancer

Asbestos - people who have been in contact with asbestos have a higher risk of developing lung cancer, especially smokers. Asbestos and tobacco smoke act together to increase the risk..

Industrial exposure - several industrial carcinogens, for example, arsenic and polycyclic hydrocarbons as well as some occupations including non-ferrous metal production and painting, have been linked to lung cancer

Exposure to Diesel Exhaust Fumes - diesel exhaust was classified as a cause of lung cancer by the International Agency for Research on Cancer (IARC) in June 2012, following a review of evidence mainly from highly-exposed workers. IARC cited a study of diesel exhaust exposure in miners, which showed risk of lung cancer was increased approximately three times in those most heavily exposed

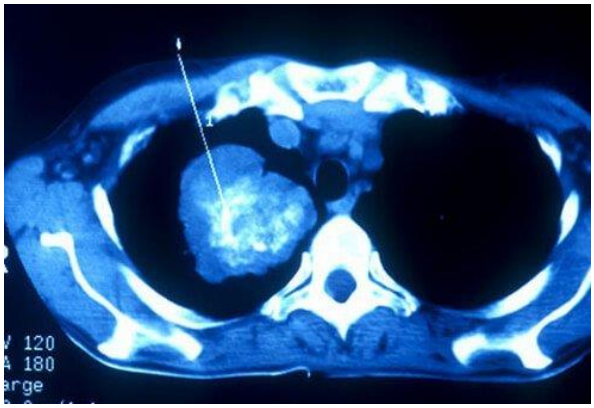
Occupational exposure to silica - silica exposure can result in silicosis with an increased risk for lung cancer, but without silicosis there is no increased risk. The body of evidence supports an increased risk of lung cancer with exposure to asbestos in non-smokers and that risks are especially high in those who smoke, who also have past exposure to asbestos

Family History - a family history of lung cancer in a first-degree relative is associated with a two-fold (double) increased risk, independent of smoking. If both cancers are diagnosed before the age of 60, the risk ratio is almost five-fold. The association between family history and risk may be stronger in black individuals than white

Women and Lung Cancer – a deeper understanding of sex-related differences in lung cancer may lead to improved outcomes for both women and men.
Tanoue, L.T. 2021.
The world is witnessing a global epidemic of lung cancer in women. Cigarette smoking remains the dominant risk factor in both sexes, but multiple observations suggest that important sex-related distinctions in lung cancer exist. These include differences in histologic distribution, prevalence in never-smokers, frequency of activating EGFR mutations, likelihood of DNA adduct accumulation, and survival outcomes. Important questions such as whether women are more susceptible to

carcinogenic effects of smoking or derive more benefit from lung cancer screening merit more study. A deeper understanding of sex-related differences in lung cancer may lead to improved outcomes for both women and men.

Screening for Lung Cancer

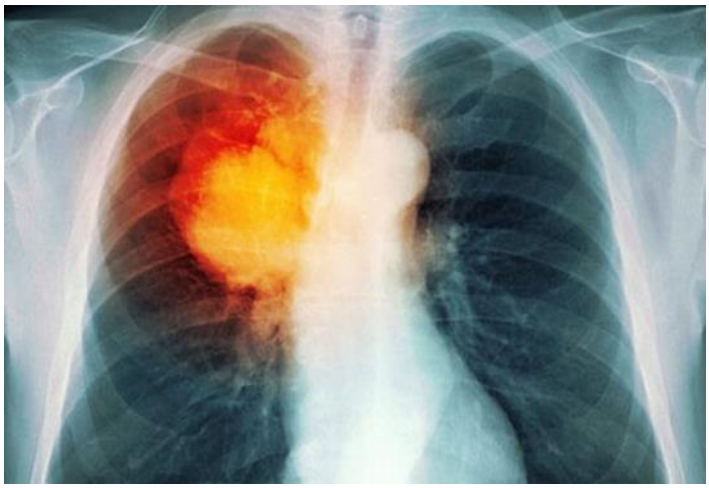


Three Common Lung Cancer Screening Methods
Screening for lung cancer is usually accomplished using three methods.

[Picture Credit: Medicinet]

Physical Examination - a physical exam will look for signs of wheezing, shortness of breath, cough, pain and other possible signs of lung cancer. Depending on the advancement of the cancer, other early signs of lung cancer symptoms may include a lack of sweating, dilated neck veins, face swelling, excessively constricted pupils, and other signs. The physical exam will also include the patient's history of smoking and a chest X-ray.

Sputum Cytology Examination - a sputum cytology exam involves a microscopic examination of a patient's mucus (sputum).



Spiral CT Scan Examination - this method of CT scanning builds a detailed image of the body's internal workings. Inside a spiral CT machine, detailed images are taken of the relevant parts of the patient's body. Those images are then linked to an X-ray machine to create 3D images of the patient's internal organs. These images may reveal potentially cancerous tumours.

[Picture Credit: Medicinet]

A study by researchers suggested that people aged 55 to 74 years old who had smoked at least one pack of cigarettes a day for 30 or more years may benefit from a spiral CT study of the lungs.

Oudkerk, M., Liu, S.Y., Heuvelmans, M.A., Walter, J.E. & Field, J.K. 2021.
"In the past decade, the introduction of molecularly targeted agents and immune-checkpoint inhibitors has led to improved survival outcomes for patients with advanced-stage lung cancer; however, this disease remains the leading cause of cancer-related mortality worldwide. Two large randomized controlled trials of low-dose CT (LDCT)-based lung cancer screening in high-risk populations - the US National Lung Screening Trial (NLST) and NELSON - have provided evidence of a statistically significant mortality reduction in patients. LDCT-based screening programmes for individuals at a high risk of lung cancer have already been implemented in the USA. Furthermore,

implementation programmes are currently underway in the UK following the success of the UK Lung Cancer Screening (UKLS) trial, which included the Liverpool Health Lung Project, Manchester Lung Health Check, the Lung Screen Uptake Trial, the West London Lung Cancer Screening pilot and the Yorkshire Lung Screening trial. In this Review, we focus on the current evidence on LDCT-based lung cancer screening and discuss the clinical developments in high-risk populations worldwide; additionally, we address aspects such as cost-effectiveness. We present a framework to define the scope of future implementation research on lung cancer screening programmes referred to as Screening Planning and Implementation RAtionale for Lung cancer (SPIRAL)."

Signs and Symptoms of Lung Cancer

Lung cancer typically doesn't cause signs and symptoms in its earliest stages. Signs and symptoms of lung cancer typically occur only when the disease is advanced. Signs and symptoms of lung cancer may include:

- a new cough that does not go away
- changes in a chronic cough or 'smoker's cough'
- a cough that gets worse or does not go away
- coughing up blood, even a small amount
- shortness of breath or wheezing
- constant chest pain – especially when coughing
- frequent chest infections, such as pneumonia, or an infection that does not go away
- wheezing
- hoarseness
- swelling of the neck and face
- fatigue (feeling very tired all the time)
- loss of appetite
- losing weight without trying

Diagnosis of Lung Cancer

The following may be used to diagnose cancer of the lung:

Medical history - to find out if lung cancer may be present, the doctor evaluates a person's medical history, smoking history, his/her exposure to environmental and occupational substances, and family history of cancer.

Physical examination - the doctor also performs a physical exam and may order a test to take an image of the chest or other tests. Seeing a spot on an image is usually how a doctor first suspects that lung cancer may be present.

Sputum cytology - if lung cancer is suspected, the doctor may order a test called 'sputum cytology'. This is a simple test where a doctor examines a sample of mucous cells coughed up from the lungs under a microscope to see if cancer is present.

Bronchoscopy – a procedure to observe the bronchi of the lungs. During a bronchoscopy the doctor can collect cells or small samples of tissues from the airways and lungs.

Imaging tests - doctors may use imaging methods such as a spiral Computerised Tomography (CT) scan or a Positron Emission Tomography (PET) scan to look for signs of cancer. A CT scan is a series of detailed pictures of areas inside the body. A PET scan is a computerised image of the metabolic activity of body tissues.

Xu, K., Zhang, C., Du, T., Gabriel, A.N.A., Wang, X., Li, X., Sun, L., Wang, N., Jiang, X. & Zhang, Y. 2021.
"The incidence and mortality of lung cancer account for first place all over the world. Lung cancer lacks early diagnostic biomarkers; lung cancer patients are usually diagnosed in both middle and advanced stages and have poor treatment outcomes. It is more important to find the first diagnostic tools for lung cancer with high specificity and sensitivity. Besides, exosomes are usually nanometer-sized bi-layered lipid vesicles formed and produced by various types of cells. As one of the main modes of intercellular communication, they can deliver multiple functional biomolecules, such as DNA, microRNAs, messenger RNA (mRNA), long non-coding RNA, and proteins, and the events as mentioned above affects different physiological processes of recipient cells. It has been reported that exosomes are involved in different types of cancer, including lung cancer. Various studies proved that exosomes are involved in multiple cancer processes such as cell proliferation, metastasis, epithelial-mesenchymal transition (EMT), angiogenesis, and the tumor microenvironment in lung cancer. Tumor-derived exosomes (TEX) contain a variety of stimulatory and inhibitory factors involved in regulating immune response, which can affect the tumor microenvironment (TME) and thus participate in the formation and progression of lung cancer. This review's primary purpose to review the latest research progress of exosomes in diagnosing and treating lung cancer."

Where Lung Cancer May Spread to in the Body
In the event of lung cancer spreading to other parts of the body, it may spread as indicated in the **bold section** below:

Cancer Type:	**Main Sites of Metastasis (Spread)**
Bladder	Bone, liver, lung
Breast	Bone, brain, liver, lung
Colon	Liver, lung
Colorectal	Liver, lung, peritoneum (lining of abdomen)
Kidney	Adrenal gland, bone, brain, liver, lung
Lung	**Adrenal gland, bone, brain, liver, other lung**
Melanoma	Bone, brain, liver, lung, skin, muscle
Ovary	Liver, lung, peritoneum (lining of abdomen)
Pancreas	Liver lung, peritoneum (lining of abdomen)
Prostate	Adrenal gland, bone, liver, lung
Stomach	Liver, lung, peritoneum (lining of abdomen), ovaries
Thyroid	Bone, liver, lung
Uterus	Boner, liver, lung, peritoneum (lining of abdomen), vagina
Non-melanoma skin cancer	Very rare: lymph nodes, lung, bone (if in head/neck region)

Treatment of Lung Cancer
The type of treatment a patient may receive for lung cancer depends on several factors, including:

- the type of lung cancer (non-small cell or small cell)
- the size and position of the cancer
- how far advanced the cancer is (the stage)
- patient's overall health

Treatment options may include:

Surgery – surgical removal of cancerous tissue.

Radiation therapy - radiation therapy is a cancer treatment that uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing. There are two types of radiation therapy. External radiation therapy uses a machine outside the body to send radiation toward the cancer. Internal radiation therapy uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer.

Radiosurgery - is a method of delivering radiation directly to the tumour with little damage to healthy tissue. It does not involve surgery and may be used to treat certain tumours in patients who cannot have surgery.

Chemotherapy - chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing.

Targeted therapy - targeted therapy is a type of treatment that uses drugs or other substances to identify and attack specific cancer cells without harming normal cells.

Immunotherapy – use is made of medicines to stimulate the immune system of the body to fight the cancer.

Watchful waiting - watchful waiting is closely monitoring a patient's condition without giving any treatment until symptoms appear or change.

Chun, S.G., Liao, Z., Jeter, M.D., Chang, J.Y., Lin, S.H., Komaki, R.U., Guerrero, T.M., Mayo, R.C., Korah, B.M., Koshy, S.M., Heymach, J.V., Koong, A.C. & Skinner, H.D. 2020.
BACKGROUND: Metformin reduces glucose uptake in physiologic tissues and has been shown to affect non-small cell lung cancer (NSCLC) metabolism. We hypothesized that positron emission tomography (PET) scans could detect the impact of metformin on glucose uptake in NSCLC and we sought to redundant test this hypothesis in a prospective clinical trial.
MATERIALS AND METHODS: A single-blinded phase II clinical trial was performed with subjects randomized 6:1 to 3 to 4 weeks of metformin versus placebo for inoperable early-stage NSCLC. PET scans were performed at baseline, mid-treatment (after 2 wk study medication), and 6 months postradiation. The primary endpoint of the trial was tumor metabolic response to metformin by PERCIST before definitive radiation. Stereotactic body radiotherapy to 50 Gy in 4 fractions was used for peripheral tumors and 70 Gy in 10 fractions for central tumors.
RESULTS: There were 14 subjects randomized to the metformin and 1 to placebo. Histologies were 60% adenocarcinoma, 33.3% squamous cell carcinoma, and 6.7% poorly differentiated carcinoma.

At mid-treatment PET scan, 57% of subjects randomized to metformin met PERCIST criteria for metabolic response, of which 75% had progressive metabolic disease and 25% had partial metabolic response, whereas the placebo subject had stable metabolic disease. At 6 months, the metformin arm had 69% complete metabolic response, 23% partial metabolic response and 1 progressive metabolic disease, and the subject treated with placebo had a complete metabolic response. There were no CTCAE grade ≥3 toxicities.
CONCLUSIONS: Despite low accrual, majority of subjects treated with metformin had metabolic responses by PERCIST criteria on PET imaging. Contrary to the effect of metformin on most physiologic tissues, most tumors had increased metabolic activity in response to metformin.

Hanna, N.H., Schneider, B.J., Temin, S., Baker, S. (Jr), Brahmer, Jm, Ellis, P.M., Gaspar, L.E., Haddad, R.Y., Hesketh, P.J., Jain, D., Jaiyesimi, I., Johnson, D.H., Leighl, N.B., Phillips, T., Riely, G.J., Robinson, A.G., Rosell, R., Schiller, J.H., Singh, N., Spigel, D.R., Stabler, J.O., Tashbar, J. & Masters, G. 2020.
PURPOSE: The aim of this work is to provide evidence-based recommendations updating the 2017 ASCO guideline on systemic therapy for patients with stage IV non-small-cell lung cancer (NSCLC) without driver alterations. A guideline update for patients with stage IV NSCLC with driver alterations will be published separately.
METHODS: The American Society of Clinical Oncology and Ontario Health (Cancer Care Ontario) NSCLC Expert Panel made updated recommendations based on a systematic review of randomized controlled trials from December 2015 to 2019.
RESULTS: This guideline update reflects changes in evidence since the previous guideline update. Five randomized controlled trials provide the evidence base. Additional literature suggested by the Expert Panel is discussed.
RECOMMENDATIONS: Recommendations apply to patients without driver alterations in epidermal growth factor receptor or ALK. For patients with high programmed death ligand 1 (PD-L1) expression (tumor proportion score [TPS] ≥ 50%) and non-squamous cell carcinoma (non-SCC), the Expert Panel recommends single-agent pembrolizumab. Additional treatment options include pembrolizumab/carboplatin/pemetrexed, atezolizumab/carboplatin/paclitaxel/bevacizumab, or atezolizumab/carboplatin/nab-paclitaxel. For most patients with non-SCC and either negative (0%) or low positive (1% to 49%) PD-L1, the Expert Panel recommends pembrolizumab/carboplatin/pemetrexed. Additional options are atezolizumab/carboplatin/nab-paclitaxel, atezolizumab/carboplatin/paclitaxel/bevacizumab, platinum-based two-drug combination chemotherapy, or non-platinum-based two-drug therapy. Single-agent pembrolizumab is an option for low positive PD-L1. For patients with high PD-L1 expression (TPS ≥ 50%) and SCC, the Expert Panel recommends single-agent pembrolizumab. An additional treatment option is pembrolizumab/carboplatin/(paclitaxel or nab-paclitaxel). For most patients with SCC and either negative (0%) or low positive PD-L1 (TPS 1% to 49%), the Expert Panel recommends pembrolizumab/carboplatin/(paclitaxel or nab-paclitaxel) or chemotherapy. Single-agent pembrolizumab is an option in select cases of low positive PD-L1. Recommendations are conditional on the basis of histology, PD-L1 status, and/or the presence or absence of contraindications. Additional information is available at www.asco.org/lung-cancer-guidelines.

Lowering the Risk for Lung Cancer
Reducing the risk for lung cancer can be achieved by not smoking. Other means include:

Smoking cessation - smoking is responsible for the majority of lung cancers. Quitting all forms of smoking at any time can lower the risk of developing lung cancer and appears to be beneficial after a diagnosis of lung cancer as well.

Preventing exposure to Radon - exposure to radon in the home is the second leading cause of lung cancer overall, and the number one cause in non-smokers. Radon is an invisible radioactive gas that results from the normal decay of radium in the soil.

Not being exposed to secondhand smoke - exposure to second hand smoke increases the risk of lung canc

er in non-smokers two to three fold.

Asbestos - workplace exposure to asbestos increases the risk of lung cancer, and combined with smoking the risk is exponential. Employers should have safety recommendations for those exposed.

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The South African National Clinical Trials Register provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

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Anatomy of Lungs
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