The Specialty Pharmacist’s Role in Supportive Care for Patients with Lung Cancer and the Management of Toxicities, Adverse Events and Side Effects
DISCLAIMER

The information within this CME/CE activity is for continuing education purposes only, and is not intended to substitute for the medical judgment of the healthcare provider. Recommendations for use of any particular therapeutic agents or methods are based upon the best available scientific evidence and clinical guidelines. Reference in this activity to any specific commercial products, process, service, manufacturer, or company does not constitute its endorsement or recommendation.
Faculty Biography

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Doctor of Pharmacy: Duquesne University
PGY1 Residency: Medical College of Virginia (VCU)
PGY2 Oncology Residency: University of North Carolina
Oncology Academic Fellowship: University of North Carolina School of Pharmacy

- Assistant Professor at UNC in the Division of Pharmacotherapy and Experimental Therapeutics, Clinical Pharmacist in the outpatient thoracic oncology and melanoma clinics at the NC Cancer Hospital until January 2014

- Clinical Pharmacogenomics Scientist at Moffitt Cancer Center in the Personalized Medicine Institute
  - Clinical Pharmacogenomics Action Committee Co-Chair
  - Developing Pharmacogenomics Consult Service for both germline and somatic variants
DISCLOSURES

• I do intend to discuss an off-label use of a product during this activity and will highlight this when I do so.

• I currently have or have had the following relevant financial relations to disclose:

  • Myriad Genetics, Investigator Initiated Research, Research Funding while at the University of North Carolina
OBJECTIVES

1. List the common adverse events and side effects of various Lung Cancer treatments

2. Identify opportunities to recommend supportive care measures for the patient

2. Discuss and assess toxicities associated with radiation and chemotherapy
Lung Cancer Epidemiology

Second most commonly diagnosed cancer

Estimated 221,130 new cases expected in 2011
Representing approximately 14% of all cases for both men and women

Most deadly cancer

Estimated 156,940 deaths expected in 2011
Representing approximately 27% of all cancer deaths for both men and women

Not just a smoker’s disease

Approximately 50% are not current smokers
10-15% are never smokers
Other environmental factors

Types of Lung Cancer

- Adeno-carcinoma
  - Platinum + pemetrexed (or paclitaxel) + bevacizumab
- Squamous Cell Carcinoma
  - (Doublet chemo) Platinum + Gemcitabine
- Large Cell Carcinoma
  - Platinum + pemetrexed (or paclitaxel) + bevacizumab

Non-small cell lung cancer
### Treatment of NSCLC

<table>
<thead>
<tr>
<th>Stage</th>
<th>Primary Treatment</th>
<th>Adjuvant Treatment</th>
<th>5 yr survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Surgical Resection</td>
<td>Chemotherapy in high risk patients</td>
<td>60-70%</td>
</tr>
<tr>
<td>II</td>
<td>Surgical Resection</td>
<td>Chemotherapy</td>
<td>40-50%</td>
</tr>
<tr>
<td>IIIA</td>
<td>Mulitmodality therapy that may include surgery, radiation and/or chemotherapy</td>
<td>15-30%</td>
<td></td>
</tr>
<tr>
<td>IIIB</td>
<td>Concurrent chemoradiation</td>
<td>Chemotherapy</td>
<td>10%</td>
</tr>
<tr>
<td>IV</td>
<td>Chemotherapy</td>
<td>Palliative radiation</td>
<td>&lt; 5%</td>
</tr>
</tbody>
</table>

Most “advanced” therapy trials enrolled IIIB (not amenable to curative treatment) and IV patients

Principles of Chemotherapy

Chemotherapy for Stage IV disease in patients with Eastern Cooperative Oncology Group (ECOG) Performance Status (PS) 0 and 1

- Two drug combination therapy containing a platinum improves OS and QoL over best supportive care alone
- Platinum-based therapy: cisplatin (Cis) or carboplatin (Carbo)
  - No specific platinum-based combination is superior
  - Paclitaxel, docetaxel, gemcitabine (gem), vinorelbine, irinotecan, etoposide, vinblastine, and pemetrexed (pem)
- 4-6 cycles of first line chemotherapy are recommended

ECOG 1594: Overall Survival

Survival by Treatment Group
All Randomized Cases

How can we improve outcomes?

Cisplatin + Gemcitabine versus Cisplatin + Pemetrexed

N = 1725
Chemotherapy naïve, Stage IIIB or IV NSCLC patients with ECOG PS of 0 or 1

- Non-inferiority design
- Primary endpoint: overall survival
- All patients received dexamethasone 4 mg PO BID day before, of, and after treatment, folic acid 350 to 1000 mcg PO daily and a vitamin B12 injection 1000 mcg IM every 9 weeks

Adenocarcinoma and large cell carcinoma

10.8 v 9.4 months, favors Cisplatin + Gemcitabine

10.4 v 11.8 months, favors Cisplatin + Pemetrexed

## Cisplatin + Gemcitabine versus Cisplatin + Pemetrexed

<table>
<thead>
<tr>
<th>Grade 3 or 4 toxicity</th>
<th>CG (n=830)</th>
<th>CP (n=839)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutropenia</td>
<td>26.7%</td>
<td>15.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>12.7%</td>
<td>4.1%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Anemia</td>
<td>9.9%</td>
<td>5.6%</td>
<td>0.001</td>
</tr>
<tr>
<td>Febrile neutropenia</td>
<td>3.7%</td>
<td>1.3%</td>
<td>0.002</td>
</tr>
<tr>
<td>Alopecia (any grade)</td>
<td>21.4%</td>
<td>11.9%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Nausea</td>
<td>3.9%</td>
<td>7.2%</td>
<td>0.004</td>
</tr>
<tr>
<td>Vomiting</td>
<td>6.1%</td>
<td>6.1%</td>
<td>1.000</td>
</tr>
<tr>
<td>Dehydration (any grade)</td>
<td>2.0%</td>
<td>3.6%</td>
<td>0.075</td>
</tr>
<tr>
<td>Fatigue</td>
<td>4.9%</td>
<td>6.7%</td>
<td>0.143</td>
</tr>
</tbody>
</table>

Variation in Thymidylate Synthetase

- Pemetrexed mechanism of action
  - Multitargeted antifolate
  - Inhibits thymidylate synthase (TS), dihydrofolate reductase, and glycinamide ribonucleotide formyltransferase
- Overexpression of TS correlates with reduced pemetrexed sensitivity
- Squamous cell tumors had 1.7-fold greater TS compared with adenocarcinomas

Thymidylate synthetase mRNA relative concentrations

Paclitaxel + Carboplatin +/- Bevacizumab

N = 878
Chemotherapy naïve, Stage IIIIB or IV NSCLC patients with ECOG PS of 0 or 1

- Excluded patients with predominant squamous cell carcinoma, significant hemoptysis, CNS metastases, therapeutic anticoagulation, and regular use of aspirin or NSAIDS
- Primary endpoint: overall survival

Advanced NSCLC: Role of Bevacizumab

- Paclitaxel + carboplatin + bevacizumab
  - Improved overall survival (12.3 v 10.3 months, p=0.003)
  - Improved response rate and progression-free survival
  - Associated with a small increase in serious bleeding, including hemoptysis (4.4% v 0.7%)
  - Now the ECOG reference standard for the first-line treatment of advanced non-squamous cell NSCLC
  - NCCN supports combination with other platinum doublets and should be continued until disease progression

- Bevacizumab **NOT** recommended:
  - Squamous cell etiology
  - Presence of hemoptysis prior to drug
  - Caution in patients at risk for bleeding

Cisplatin + Gemcitabine versus Cisplatin + Pemtrexeded

10.8 v 9.4 months, favors Cisplatin + Gemcitabine

Survival Probability

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Survival Time (months) in Patients With Squamous Cell Carcinoma

CP 9.4; 8.4, 10.2
CG 10.8; 9.5, 12.1
CP v CG Adjusted HR; 95% CI 1.23; 1.00, 1.51

v 11.8 months, favors Cisplatin + Pemtrexeded

Survival Probability

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Survival Time (months) in Patients With Nonsquamous Histology

CP 11.8; 10.4, 13.2
CG 10.4; 9.6, 11.2
CP v CG Adjusted HR; 95% CI 0.81; 0.70, 0.94

Types of Lung Cancer

- Adeno-carcinoma
- Squamous Cell Carcinoma
- Large Cell Carcinoma

Non-small cell lung cancer:
- Platinum + pemetrexed (or paclitaxel) + bevacizumab

Squamous Cell Carcinoma:
- (Doublet chemo) Platinum + Gemcitabine

Large Cell Carcinoma:
- Platinum + pemetrexed (or paclitaxel) + bevacizumab
Types and Mutations in Lung Cancer

Adenocarcinoma
- KRAS
- EGFR
- BRAF
- PIK3CA

Squamous Cell Carcinoma
- EML4-ALK
- HER
- PIK3CA

Non-small cell lung cancer

Large Cell Carcinoma

Treatment:
- EGFR: Erlotinib (and gefitinib)
- EML4-ALK: Crizotinib

Lung Cancer Symptom Management

- Chemotherapy related toxicities
- Dyspnea and cough
- Pain management
  - Somatic from metastatic disease (bone common)
  - Neuropathy from chemotherapy (taxanes)
- Anorexia and cachexia
- Hypercalcemia
Early Palliative Care in Metastatic Lung Cancer

N = 151
Newly diagnosed metastatic NSCLC patients with ECOG performance status < 2

• Palliative care focus: physical and psychosocial symptoms, establishing goals of care assisting with decision making regarding treatment and coordinating care

• Primary endpoint: change in the on the Trial Outcomes Index (TOI: sum of several QOL scales including FACT-L, physical and functional well being)

• Also assessed Mood using the Hospital Anxiety and Depression Scale (HADS) and Patient Health Questionnaire 9 (PHQ-9)

## Early Palliative Care: Quality of Life

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Care (n=47)</th>
<th>Early Palliative Care (n=60)</th>
<th>Difference (Early – Standard)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACT-L</td>
<td>91.5 ± 15.8</td>
<td>98.0 ± 15.1</td>
<td>6.5</td>
<td>0.03</td>
</tr>
<tr>
<td>LCS</td>
<td>19.3 ± 4.2</td>
<td>21.0 ± 3.9</td>
<td>1.7</td>
<td>0.04</td>
</tr>
<tr>
<td>TOI</td>
<td>53.0 ± 11.5</td>
<td>59.0 ± 11.6</td>
<td>6.0</td>
<td>0.009</td>
</tr>
</tbody>
</table>

- Analysis performed after 12 weeks

- **FACT-L** (Functional Assessment of Cancer Therapy-Lung): assesses physical, functional, emotional and social well being
- **LCS** (Lung Cancer Subscale): part of the FACT-L that assesses 7 symptoms specific to lung cancer
- **TOI** (Trial Outcome Index): sum of the scores on the LCS and the physical well-being and function well-being subscales of the FACT-L

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Early Palliative Care: Overall Survival

Median Overall Survival:
- **Early Palliative Care:** 11.6 months
- **Standard Care:** 8.9 months

HR: 1.70 (1.14-2.54), p=0.01
Early Palliative Care: Conclusions

• Early palliative care in patients with metastatic lung cancer resulted in:
  • Improved quality of life and mood
  • Less aggressive care at the end of life
  • Longer survival

• Opportunities for pharmacists to focus on supportive care therapy and education
Patient Case: HT

- HT is a 48-year-old female nonsmoker who initially presented to the ED with difficulty breathing and persistent cough. Her ECOG Performance Status is 0.
  - Chest CT scan revealed a right sided lung mass
  - PET revealed hypermetabolic right hilar mass, numerous hypermetabolic lymph nodes and one lesion in the thoracic spine
  - Biopsy was positive for adenocarcinoma indicative of metastatic NSCLC
  - MRI of the brain was negative for metastasis
  - **EGFR testing revealed an exon 21 L858R point mutation**
  - Normal renal function, no hearing problems or neuropathy
NCCN Guidelines

- EGFR mutation testing recommended for patients with non-squamous NSCLC (category 1)
- Erlotinib is recommended as first line therapy for EGFR mutation positive patients (category 1)
- If a patient has a known KRAS mutation, therapy other than erlotinib should be considered first (category 2A)

Stage IIIB or IV Adenocarcinoma or Large cell NSCLC

EGFR mutation testing

POSITIVE: erlotinib

NEGATIVE or T790M: chemotherapy or clinical trial

EGFR Signaling Pathway

EGFR-specific ligands (e.g., epiregulin and transforming growth factor α)

HER1 (EGFR)

HER1 (EGFR), HER2, HER3, or HER4

Cell membrane

HER2

HER3

HER4

Tyrosine kinase domains

Cytoplasm

Nucleus

Cell proliferation, cell survival, metastasis, and angiogenesis

SOS

PI3K

AKT

MTOR

MAPK

MEK

RAS

RAF

Gefitinib vs. Carboplatin + Paclitaxel (IPASS)

N = 1217

- Chemotherapy naïve
- East Asian
- Stage IIIB or IV NSCLC adenocarcinoma
- Non- or former light smokers

- Non-inferiority design
- Primary endpoint: PFS
- Crossover not restricted
- EGFR mutation not required for entry though was assessed in patients
  who consented to have biomarker analysis (85.3%)

Gefitinib vs. Carboplatin + Paclitaxel (IPASS)

**EGFR mutation positive**
- Gefitinib mPFS: 9.5 months
- Carbo/paclitaxel mPFS 6.3 months

**EGFR mutation negative**
- Gefitinib mPFS: 1.5 months
- Carbo/paclitaxel mPFS 5.5 months

Erlotinib Acquisition

First we have to get the drug to the patient!

- Pharmacy benefit counselors

Cost of therapy (bottle contains 30 tablets):

- 100 mg tablets = $2228 USD per month
- 150 mg tablets = $2532 USD per month

Reimbursement differs based on patient’s insurance plans and can range significantly

Company offers:

- Patient assistance plans
- Co-pay assistance plans
Erlotinib Basics

• Pharmacy considerations
  • 150 mg PO daily
  • Lower doses may be effective for EGFR activating mutations Dosed one hour prior to or two hours after since food can increase bioavailability

• Drug Interactions
  • CYP3A4 (and minor CYP1A2) substrate
  • Interaction with H2 and proton pump inhibitors
  • Herbal supplements

• Common Toxicities
  • Rash, diarrhea, nail toxicities, increased hair growth

Erlotinib: Herbal Interactions

Patient question: Can I continue to take my curcumin and ginger?

Memorial Sloan Kettering Herbal Database

Google “MSK herbs”

Erlotinib Toxicity Timeline

Erlotinib Rash

• Daily routine:
  • Mild soap to wash area daily plus alcohol-free moisturizer
  • Avoid sun exposure and use SPF $\geq 15$ sunscreen when avoiding the sun is not possible
  • Avoid OTC acne creams and drying agents

• Prescription management:
  • Hydrocortisone 1-2.5% topical cream and clindamycin gel is used for mild reactions
  • Doxycycline 100 mg PO bid may be started for moderate reactions or to prevent rash
  • Steroids (Medrol dose pack) are used for severe reactions
Erlotinib Diarrhea

- Diarrhea usually occurs within the first 2 weeks of beginning the drug
- Loperamide (Immodium®)
  - Take 2 capsules after the first loose stool, then 1 capsule after each loose stool thereafter
  - Continue to take 1 capsule tid until diarrhea free for 12 hours
  - May take before bedtime or going out to prevent diarrhea episodes
  - Disregard daily maximum of 16 mg/day
- Stay hydrated!!
  - Gatorade, Pedialyte, Vitamin water, etc

Patient Case: SM

- SM is a 54-year-old female former smoker with 30 pack year history, quit 2 years ago, who was ultimately diagnosed with metastatic NSCLC (adenocarcinoma)
  - Initially treated with 4 cycles of carboplatin, pemetrexed, and bevacizumab followed by 7 cycles of maintenance pemetrexed and bevacizumab
  - CT showed progressive disease and single agent docetaxel was started
  - Patient presents for cycle #9 of docetaxel
Patient Case: SM

- Interim History:
  - Patient continues to complain of decreased appetite and fatigue, is only able to work about 4-5 hours per day before napping
  - Nail discoloration and ridging evident
  - Numbness and tingling reported in balls of feet and finger pads when typing on phone
  - Cough stable
  - Mood is better after starting citalopram 2 months prior, she is continuing to see CCSP
Lung Cancer Symptom Management

- Chemotherapy related toxicities
- Dyspnea and cough
- Pain management
  - Somatic from metastatic disease (bone common)
  - Neuropathy from chemotherapy (taxanes)
- Anorexia and cachexia
- Hypercalcemia
Dyspnea and Cough

- **Dyspnea**: subjective experience of breathing discomfort
  - Seen in up to 90% of patients at the end of life
  - Highest prevalence in patients with lung cancer
  - Causes anxiety for patient and family

- Pathophysiology in cancer patients
  - Lung or upper airway involvement of the tumor
  - Pleural effusions
  - Complications (pneumonia, anemia, etc.)
  - Comorbidities, especially COPD

Dyspnea and Cough Treatment

- Treatment of complication or comorbidity
- Oxygen therapy minorly beneficial
- Opioid therapy
  - Immediate release opioids
  - Inhaled opioids (morphine or fentanyl)
- Benzodiazepines (anxiety)
- Tessalon pearls (benzonatate)
- Steroids may have efficacy, especially with radiation pneumonitis
Pain Management: Neuropathy

- Commonly reported in 30-40% of patients undergoing cancer treatment
  - Taxanes, platinum agents, and vinca alkaloids
  - Thalidomide, bortezomib and ixabepilone
- Symptoms
  - Paresthesias and pain
  - “Stocking and glove” distribution (fingers and toes)
  - Can occur weeks to months after treatment starts
  - Reversibility varies

Neuropathic Pain Pathophysiology

- Sensitization and spontaneous activity of myelinated A-delta fibers and unmyelinated C-fibers
  - Increase in voltage-gated sodium channels
  - Upregulation of receptor proteins
- Hyperexcitability in dorsal column of spinal cord
  - Overexpression of voltage-gated calcium channels
  - Release of substance P and glutamate (propagates pain)
  - Activation of N-methyl-D-aspartate receptors
- Loss of GABA-releasing neurons and other inhibitory pathways (serotonin and neurepinephrine)

Neuropathic Pain Treatment

- Selective serotonin norepinephrine reuptake inhibitors (SNRI)
  - Venlafaxine
  - Duloxetine
- Antiepileptic agents
  - Gabapentin
  - Pregabalin
- Tricyclic antidepressants
- Acetyl ester of L-carnitine: ongoing trials
- Acupuncture
Duloxetine (Cymbalta®)

- **Mechanism of Action**
  - Inhibits reuptake of NE and 5HT3 in CNS
  - Benefits as early as 1 week after starting
- **Pharmacy Concerns**
  - Ideally given on empty stomach in AM
  - Metabolized by CYP2D6, 1A2, and glucuronidated
  - Side effects mostly GI and CNS
  - Recommended dose is 60 mg PO daily
- **CALGB placebo controlled trial compared with placebo underway in cancer patients**
Gabapentin (Neurontin®)

- Mechanism of Action
  - Decreases influx of Ca on the presynaptic neuron resulting in decreased release of excitatory neurotransmitters
- Conflicting evidence in terms of efficacy
- Pharmacy Concerns
  - Bioavailability is dose dependent
  - Eliminated unchanged in the urine: dose reductions in renal dysfunction
  - Side effects mostly dizziness, somnolence, peripheral edema
  - Recommended starting dose is 100 mg tid with goal of 1800 – 3600 mg/day
Pregabalin (Lyrica®)

- **Mechanism of Action**
  - Decreases influx of Ca on the presynaptic neuron resulting in decreased release of excitatory neurotransmitters
  - More potent than gabapentin
  - One trial showed efficacy

- **Pharmacy Concerns**
  - Bioavailability is 90%
  - Eliminated unchanged in the urine: renal adjustment
  - Recommended starting dose is 50 mg BID with goal of 300 mg/day
  - Max daily dose is 300-600 mg per day
Anorexia and Cachexia

- **Anorexia**: loss of appetite associated with chronic illness in cancer patients and is associated with weight loss
- Affects the majority of cancer patients
  - Over 50% reported some degree of weight loss
  - Lack of consistent relationship between degree of weight loss, survival, tumor types, extent of tumor burden, and performance status
- Pathophysiology – proposed mechanisms:
  - Likely more than just energy requirement of tumor
  - Disturbances in neurohormonal mechanisms for controlling food intake (i.e. leptin, ghrelin)
  - Pro-inflammatory cytokine expression

# Anorexia: Treatment

<table>
<thead>
<tr>
<th>Agent</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Megesterol acetate</td>
<td>Positive data with appetite stimulation and weight gain</td>
<td>Risk of blood clots</td>
</tr>
<tr>
<td>Glucocorticoids</td>
<td>Positive but short-lived action, cheap cost</td>
<td>Adverse effects</td>
</tr>
<tr>
<td>Dronabinol</td>
<td>Well tolerated</td>
<td>Inconsistent data likely attributed to doses studied</td>
</tr>
<tr>
<td>Cyproheptadine</td>
<td></td>
<td>Lack of data in cancer patients</td>
</tr>
<tr>
<td>Antidepressants/</td>
<td>Weight gain is a common ADE of mirtazapine and</td>
<td>Not studied in cancer cachexia</td>
</tr>
<tr>
<td>antipsychotics</td>
<td>olanzapine</td>
<td></td>
</tr>
<tr>
<td>Anabolic agents</td>
<td>Stimulates muscle anabolism</td>
<td>Limited data in cancer patients, high cost</td>
</tr>
</tbody>
</table>
Megesterol vs. Dronabinol

N = 469

Advanced cancer patients with self-reported weight loss of ≥ 2.3 kg during preceding 2 months and/or MD estimated caloric intake of ≤ 20 cal/kg

- Excluded patients with brain, breast, ovarian or endometrial cancer
- Mean age was 65 ± 10 years old
- **Primary endpoints** were appetite increase and whether patients gain ≥ 10% of their baseline weight
- Secondary quality of life endpoints: NCCTG questionnaire, QOL Uniscale, and QOL FAACT

Megesterol vs. Dronabinol: Results

- Increase in appetite (per questionnaire)
  - Favored megestrol (75% v. 49%, p=0.0001)
- Weight gain of ≥ 10% of baseline weight
  - Favored megestrol (14% v. 5%, p=0.009)
- No benefit to combination therapy
- Quality of life
  - No statistical difference using Uniscale
  - Significant benefit favoring megestrol using FAACT
- Adverse effects
  - Impotence higher with megestrol (18% v. 4%)
  - All others were similar including thromboembolism
- Benefit of placebo controlled design
Megesterol vs. Dexamethasone

N = 496
Advanced cancer patients with self-reported weight loss of ≥ 2.3 kg during preceding 2 months and/or MD estimated caloric intake of ≤ 20 cal/kg

- Excluded patients with brain, breast, prostate, ovarian or endometrial cancer
- Mean age was 67 yo
- **Primary endpoints** were appetite increase and whether patients gain ≥ 10% of their baseline weight
- Secondary quality of life endpoints: QOL Uniscale and questionnaire assessing appetite, food intake, nausea/vomiting and drug toxicities

Megesterol vs. Dexamethasone: Efficacy

- Fluoxymesterone showed little increase in appetite stimulation and had more adverse effects

- Megestrol and dexamethasone
  - Similar increase in appetite: 30-40% after 1 month
  - Weight gain of ≥ 10% of baseline weight also similar (10% v. 7%, p=0.42)
  - No QOL benefit reported using Uniscale

- Toxicity and tolerability
  - More patients discontinued due to toxicity/patient choice with dexamethasone (25% v. 33%)
  - Megesterol had more thromboembolism (5% v. 1%)
  - Dexamethasone had more myopathy, cushingoid changes, peptic ulcer disease and insomnia

Anorexia Treatment Summary

• If the patient desires treatment...
  • Short term (days-weeks): dexamethasone
  • Long term (weeks-months): megestrol
  • Role of oxandrolone or higher doses of dronabinol?
• Cost of daily treatment
  • Dexamethasone (3-4 mg per day): $0.60
  • Megestrol liquid (800 mg per day): $10
  • Oxandrolone (20 mg per day): $30
• Treatment with does not prolong survival
Final Thoughts...

Lung cancer remains one of the most common and most deadly cancers around the world.

Early supportive care interventions have been shown to improve not only quality of life but overall survival as well.

Pharmacists have a unique knowledge base and place in practice to improve symptom and disease management.
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