Caring for Your Patient with Cancer

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Cecelia Koetting Financial Disclosures

"All relevant relationships have been mitigated."

- Horizon-C
- Ivantis-C
- Orasis-C, S, R
- Trukera (B+L) -C
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- PRN-C,S
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- Tarsus-C,S,R
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- Myze- C
- MOVU- C
- Vital Tears- C
- Oyster Point/Viatris-C,R
- Allergan/Abbvie –C, S, R
- Alcon-C, S, R
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Prevalence of Cancer 2023

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2023 Statistics: MALE

Male		
Estimated New Cases		
Prostate	288,300	29%
Lung & bronchus	117,550	12%
Colon & rectum	81,860	8%
Urinary bladder	62,420	6%
Melanoma of the skin	58,120	6%
Kidney & renal pelvis	52,360	5%
Non-Hodgkin lymphoma	44,880	4%
Oral cavity & pharynx	39,290	4%
Leukemia	35,670	4%
Pancreas	33,130	3%
All sites	1,010,310	

Male		
Estimated Deaths		
Lung & bronchus	67,160	21%
Prostate	34,700	11%
Colon & rectum	28,470	9%
Pancreas	26,620	8%
Liver & intrahepatic bile duct	19,000	6%
Leukemia	13,900	4%
Esophagus	12,920	4%
Urinary bladder	12,160	4%
Non-Hodgkin lymphoma	11,780	4%
Brain & other nervous system	11,020	3%
All sites	322,040	

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2023 Statistics: FEMALE

Estimated New Cases

Female		
Breast	297,790	31%
Lung & bronchus	120,790	13%
Colon & rectum	71,160	8%
Uterine corpus	66,200	7%
Melanoma of the skin	39,490	4%
Non-Hodgkin lymphoma	35,670	4%
Thyroid	31,180	3%
Pancreas	30,920	3%
Kidney & renal pelvis	29,440	3%
Leukemia	23,940	3%
All sites	948,000	

Estimated Deaths

Female		
Lung & bronchus	59,910	21%
Breast	43,170	15%
Colon & rectum	24,080	8%
Pancreas	23,930	8%
Ovary	13,270	5%
Uterine corpus	13,030	5%
Liver & intrahepatic bile duct	10,380	4%
Leukemia	9,810	3%
Non-Hodgkin lymphoma	8,400	3%
Brain & other nervous system	7,970	3%
All sites	287,740	

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"In the United States, 1 in 3 people will be diagnosed with cancer during their lifetime"

– American Cancer Society

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Understanding the Journey of Diagnosis

- Physical Exam
- Laboratory testing
- Imaging
- Biopsy

- CT
- MRI
- PET
- Ultrasound
- Mammogram
- X ray
- Endoscopy
- Colonoscopy

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Often next step is port implantation

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TNM Classification System

Primary Tumor (T)	TX	Primary tumor cannot be measured
	T0	No evidence of primary tumor
	Tis	Carcinoma in situ (has not spread to neighboring tissue)
	T1, T2, T3, T4	Size and/or extent of primary tumor
Regional Lymph Nodes (N)	NX	Regional lymph nodes cannot be measured
	N0	No regional lymph node involvement
	N1, N2, N3	Involvement of regional lymph nodes (number and/or extent of spread)
Metastasis (M)	MX	Distant metastasis cannot be measured
	M0	No distant metastasis
	M1	Distant metastasis (cancer has spread to distant parts of the body)

Adapted from: What is cancer staging? American Joint Committee on Cancer. www.cancerstaging.org/references-tools/Pages/What-is-Cancer-Staging.aspx. Accessed September 9, 2020.

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Discussing the Diagnosis with Patients

- Patients may not understand why you are asking so many questions regarding their diagnosis.
- It can feel invasive to have so many doctors continue to prod.

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Being Empathetic/Sympathetic

- Can you relate to your patient?
- Is now a good time to try to lend an ear?
- Remember, your patients ARE NOT statistics
- Don't ask about prognosis unless it is offered

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Treatments for Cancer

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Options

- **Surgery**
- **Chemotherapy.**
- **Radiation therapy.**
- **Bone marrow transplant.** Bone marrow transplant is also known as a stem cell transplant.
  - Donor or from self
  - Allows your doctor to use higher doses of chemotherapy to treat your cancer
  - It may also be used to replace diseased bone marrow.
- **Immunotherapy aka Biologic therapy**
- **Hormone therapy.**
  - Some types of cancer are fueled by your body's hormones.
  - Removing those hormones from the body or blocking their effects may cause the cancer cells to stop growing.
- **Targeted drug therapy.**
  - Focuses on specific abnormalities within cancer cells that allow them to survive.
- **Clinical trials.**

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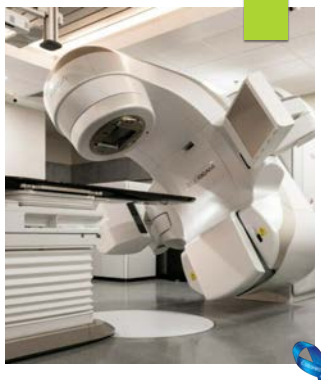
Radiation

- *Radiation* is an area-targeted treatment
- Uses high-powered energy beams, such as X-rays and protons, to kill cancer cells
- Radiation treatment can come from a machine outside your body (external beam radiation), or it can be placed inside your body (brachytherapy).
- Unless the area treated is near the eye, it is unlikely there will be ocular effects.
  - Pigmentation changes, peeling of the skin, blisters, and skin photosensitivity



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Interferon treatment

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Interferon

- A natural substance made by our white blood cells that helps our body's immune system fight infection and disease.
- Interferon can also be made in a lab
- It is used to help control the growth of cancer or to kill cancer cells
- Considered a type of immunomodulatory agent.

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Possible Ocular Side Effects

Interferons	Cancer Type	Ocular Side Effects
Interferon-alpha Interferon-beta Interferon-gamma	Haematological malignancies Chronic myeloid leukemia Bladder cancer, melanoma, multiple myeloma, hairy cell leukemia, Kaposi sarcoma, follicular non-Hodgkins lymphoma, condyloma acuminate, kidney, carcinoid syndrome, islet cell	• Alopecia • Trichiasis • Corneal allograft rejection • Retinopathy • Retinal vein/artery occlusions • Anterior ischemic optic neuropathy • Myastnenia gravis • Cranial nerve palsy

Ho WL, Wong H, Yau T. The ophthalmological complications of targeted agents in cancer therapy: what do we need to know as ophthalmologists? Acta Ophthalmol. 2013;91(7):604-609.

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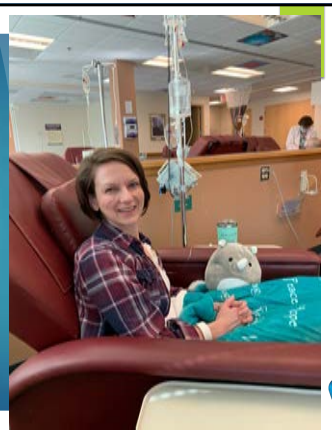
Chemotherapy



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Chemo Overview

- Chemotherapy is a drug treatment that uses powerful chemicals to kill fast-growing cells in your body.
  - Cancer cells grow and multiply much more quickly than most cells in the body.
- Many times chemotherapy drugs are not used alone
  - multiple drugs are used at the same time and are coupled with steroids.
- Delivered either intravenously or orally in pill form
  - May or may not be used in conjunction with radiation

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Chemotherapy Agents

Alkylating Agent

	Cancer Type	Ocular Side Effects
Cisplatin	Head and neck, lung, cervical, ovarian, testicular, upper gastrointestinal, osteogenic sarcoma, neuroblastoma, brain tumor in children, bladder cancer	• Optic Neuritis • Papilledema • Transient cortical blindness • Homonymous hemianopsia • Central scotoma • Macular pigment changes • CRAO
Carboplatin	Lung cancer, head and neck, ovarian, breast, gastro-intestinal, and osteogenic sarcoma	• Optic neuropathy • Maculopathy • Limitation of ocular motility
Oxaliplatin	Colon cancer, esophageal, pancreatic, epithelial ovarian, non-hodgkin's lymphoma, testicular cancer	• Blurred vision • Eye pain • Epiphora • Conjunctivitis • Visual field defects
Chlorambucil	Hodgkin's and non-hodgkin's disease, adult chronic lymphocytic leukemia	• Keratitis • Diplopia • Papilledema • Retinal hemorrhages
Cyclophosphamide	Breast cancer, lymphomas, leukemias, retinoblastoma, small cell lung cancer, ovarian, sarcoma, multiple myeloma	• Blurred vision • Keratoconjunctivis sicca • Blepharoconjunctivitis • Epiphora
Ifosphamide	Soft tissue sarcoma, osteosarcoma, non-hodgkin's lymphoma, small cell lung cancer, ovarian, testicular, cervical	• Blurred vision • Conjunctivitis
Busulfan	Chronic myeloid leukemia	• Posterior sub-capsular cataract • Blurred vision • Keratoconjunctivitis sicca
Carmustine	Brain neoplasms, multiple myeloma, hodgkin's and non hodgkin's lymphoma, cutaneous T-cell lymphoma, malignant melanoma	• Optic neuro-retinitis • Optic neuritis • Blurred vision • Diplopia • Optic Atrophy • Retinopatlhy

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Adjunct Medications Commonly Used

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Antimetabolites

	Cancer Type	Ocular Side Effects
Cytosine arabinoside	Acute myeloid leukemia, lymphocytic leukemia, lyphomatous meningitis, chronic myeloid leukemia	• Ocular pain • Epiphora • Foreign body sensation • Photophobia • Blurred vision • Conjunctival hyperemia • Corneal punctate opacities • Optic neuropathy
5-Flourouracil and Capecitabine	Skin, head and neck, breast, gastrointestinal, colorectal, cervical cancer	• Blurred vision • Ocular pain • Photophobia • Epiphora • Conjunctivitis • Periorbital edema • Ectropion • Keratitis
Methotrexate	Breast cancer, choriocarcinoma, osteogenic sarcoma, acute leukemia, cutaneous lymphoma, head and neck	• Peri-orbital edema • Ocular pain • Blurred vision • Photophobia • Conjunctivitis • Blepharitis • Optic neuropathy • INO • Macular edema* • RPE changes*
Pemetrexed	Pleural mesothelioma, small cell lung cancer	• Epiphora • Conjunctivitis
Fludarabine	B cell chronic lymphocytic leukemia, non-hodgkins lymphoma, acute leukemias, mycosis fungoides	• Diplopia • Photophobia • Optic neuritis • Blurred vision
Pentostatin	Hairy cell leukemia, cutaneous T-cell lymphoma, chronic lymphocytic leukemia	• Blurred vision • Conjunctivitis • Epiphora • Dry eye • Photophobia • Retinopathy

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Miotic Inhibitors		
	Cancer Type	Ocular Side Effects
Paclitaxel	Breast cancer, ovarian cancer	• Scintillating scotoma • Visual field impairment • Photopsia • Ischemic optic neuropathy
Docetaxel	Breast cancer, gastric, gastro-espophageal adenocarcinoma, head and neck, prostate cancer, non small cell lung carcinoma	• Erosive conjunctivitis • Punctual stenosis • Canalicular narrowing • Naso-lacrimal duct obstruction
Vincristine	Lymphoblastic leukemia, ewing's sarcoma, hodgkin's disease, non-hodgkin's disease, lung, breast, soft tissue sarcomas	• Cranial nerve palsies (ptosis, lagophthalmos, INO, corneal hyperesthesia) • Optic neuropathy • Optic atrophy • Cortical blindness • Night blindness
Topoisomerase Inhibitor II	Retinoblastoma	• CRAO • Retinal toxicity

*in conjunction with cyclophosphamide when administered intra-carotid

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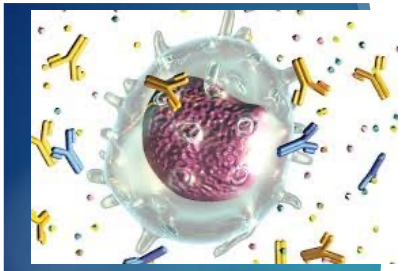

Biologics

- Adoptive cell transfer
- Angiogenesis inhibitors
- Bacillus Calmette-Guerin therapy
- Biochemotherapy
- Cancer vaccines
- Chimeric antigen receptor (CAR) T-cell therapy
- Cytokine therapy
- Gene therapy
- Immune checkpoint modulators
- Immunoconjugates
- Monoclonal antibodies
- Oncolytic virus therapy
- Targeted drug therapy

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Biologics for Cancer

Biologicals as a category

- a diverse group of medicines which includes vaccines, growth factors, immune modulators, monoclonal antibodies, as well as products derived from human blood and plasma.

In general, biological therapies work by:

1. **Getting the immune system to attack cancer cells.**
2. **Making cancer cells easier for the immune system to see.**

Benefit: Possibly fewer side effects

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Biologic Agents Inhibitor of Epidermal Growth Factor Receptor		
	Cancer Type	Ocular Side Effects
Gefitinib	Non-small cell lung cancer	• Corneal erosion • Corneal perforation • Trichiasis • Dry eye syndrome • Blepharitis • conjunctivitis
Erlotinib	Non-small cell lung cancer, pancreatic	• Corneal erosion • Corneal perforation • Infectious keratitis • Trichiasis • Periorbital rash • Periorbital swelling • Ectropion • Conjunctivitis
Cetuximab	Colorectal, head and neck squamous cell carcinoma	• Corneal epithelium toxicity • Corneal erosion • Corneal perforation • Trichiasis • Dry eye syndrome • Mebomian gland dysfunction • Blepharitis • conjunctivitis
Panitumumab		• Corneal perforation • Conjunctivitis • Hyperemia • Epiphora • Trichiasis

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Inhibitors of Vascular Endothelial Growth Factor Receptor		
Sunitinib	Renal cell carcinoma, gastrointestinal stromal tumors	• Central visual field defect • Cortical blindness • Retinal detachment/tear
Pazopanib	Renal cancer	• Blurred vision • Periocular edema • Ptosis • Corneal toxicity • Retinal detachment/tear • Retinal artery/vein occlusion • Papilledema • Optic neuropathy • Uveitis • Macular edema • Conjunctival hemorrhage • Retinal/vitreous hemorrhage
Bevacizumab	Colorectal, non small cell lung cancer, renal cell carcinoma, glioblastoma, cutaneous melanoma	• Cortical blindness • Optic neuritis • Optic neuropathy

Fraunfelder FT, Fraunfelder FW. Oral anti-vascular endothelial growth factor drugs and ocular adverse events. J Ocul Pharmacol Ther. 2018;34(6):432-435.

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Inhibitors of tumor specific proteins		
Crizotinib	Non-small cell lung cancer	• Flashes • Light trails • Image persistence • Light Dark adaptation abnormality
Imatinib	Chronic myeloid leukemia, Gastrointestinal stromal tumors	• Periorbital edema Subconjunctival hemorrhage • Conjunctival chemosis • Epiphora • Ulcerative keratitis • Dry eye syndrome • Blurred vision • Optic neuruis • Optic disc edema • Retinal edema • Cystoid macular edema
Vandetanib	Melanoma	• Uveitis • Iritis • Retinal vein occlusion
Ipilimumab	Malignant melanoma	• Dry eye syndrome • Proptosis • Swelling of EOM • Diplopia • Iridocyclitis
Ganglioside GD2	Neuroblastoma	• Photophobia • Accommodative deficiency • Mydriasis

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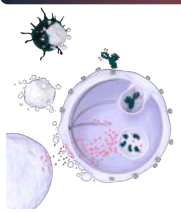
Mirvetuximab Soravtansine

Mirvetuximab soravtansine (MIRV) is the first biomarker-directed agent showing antitumor activity in patients with FRα-positive[a] platinum-resistant ovarian cancer (PROC)[1]



- MIRV is an antibody-drug conjugate (ADC) comprising an FRα-binding antibody, cleavable linker, and maytansinoid DM4 payload[1]
- A phase 3 clinical study, SORAYA, evaluated MIRV in patients with FRα-high PROC who had received 1 to 3 prior therapies, including required bevacizumab[1-3]

AEs, adverse events; DM4, N2′-[4-[(3-carboxypropyl)dithio]-4-methyl-1-oxo-2-sulfopentyl]-N2′-deacetylmaytansine; FRα, folate receptor alpha.
[a]Anti-tumor activity with MIRV has been demonstrated with single-agent MIRV in FRα-high PROC (≥75% tumor cells FRα-positive by PS2+)[1] and in combination with other agents in FRα low-to-high PROC (≥25% tumor cells FRα-positive by PS2+).[4]
1. Matulonis UA, et al. Presented at: 2022 American Society of Clinical Oncology Annual Meeting; June 3-7, 2022; Chicago, IL. Poster 391. 2. Matulonis UA, et al. *Clin Cancer Res*. 2019;25(6):1727-1736. 3. ClinicalTrials.gov identifier: NCT04296890. Updated April 21, 2022. Accessed August 5, 2022. https://clinicaltrials.gov/ct2/show/NCT04296890. 4. Matulonis UA, et al. Presented at: 2018 European Society for Medical Oncology Congress; October 19-23, 2018; Munich, Germany. Abstract 949P.

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Ocular AEs and Grading

Eye Disorders

CTCAE term	Grade 1	Grade 2	Grade 3	Grade 4
Blurred vision	Intervention not indicated	Symptomatic; moderate decrease in visual acuity; limiting instrumental ADL[a]	Symptomatic, with marked decrease in visual acuity; limiting self-care ADL[b]	Best corrected visual acuity of 20/200 or worse in the affected eye
Keratitis[c]	Asymptomatic; clinical or diagnostic observations only; intervention not indicated	Symptomatic; moderate decrease in visual acuity	Symptomatic, with marked decrease in visual acuity; corneal ulcer; limiting self-care ADL[b]	Perforation; best corrected visual acuity of 20/200 or worse in the affected eye
Dry eye[e]	Asymptomatic; clinical or diagnostic observations only; symptoms relieved by lubricants	Symptomatic; moderate decrease in visual acuity	Symptomatic, with marked decrease in visual acuity; limiting self-care ADL[b]	NA
Photophobia[f]	Symptomatic but not limiting ADL	Limiting instrumental ADL[a]	Limiting self-care ADL[b]	NA

Best corrected visual acuity 20/40 and better or ≤3 lines of decreased vision from known baseline ← Moderate decrease in visual acuity | Marked decrease in visual acuity → Best corrected visual acuity worse than 20/40 or >3 lines of decreased vision from known baseline, up to 20/200

ADL, activities of daily living; AEs, adverse events; CTCAE, Common Terminology Criteria for Adverse Events; NA, not available.
[a]Instrumental ADL refers to preparing meals, shopping for groceries or clothes, using the telephone, managing money, etc. [b]Self-care ADL refers to bathing, dressing and undressing, feeding self, using the toilet, taking medications, and not bedridden. [c]Disorder characterized by inflammation to the cornea of the eye. [e]Disorder characterized by dryness of the cornea and conjunctiva. [f]Disorder characterized by fear and avoidance of light.
National Cancer Institute. *Common Terminology Criteria for Adverse Events (CTCAE)*. Version 5. US Department of Health and Human Services; 2017. Published November 27, 2017. Accessed July 30, 2022. https://ctep.cancer.gov/protocoldevelopment/electronic_applications/docs/ctcae_v5_quick_reference_5x7.pdf

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Most common Anterior segment and Adnexal Side Effects

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Ocular Surface Disease

- Ocular Surface disease
  - Dry eye Disease
  - Conjunctivitis
  - Blepharitis
    - Demodex
  - Meibomian gland damage
  - Limbal stem cell deficiency
  - Neurotrophic keratitis
- Epiphora
  - 2/2 lacrimal gland stenosis or OSD?
    - Surgical Tx

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Limbal Stem Cell Deficiency

- When limbal stem cells begin to struggle and poorly function, the epithelial cell layer and its reproduction becomes compromised
- Loss or deficiency of stem cells in the limbus which are vital for re-population of the corneal epithelium and to the barrier function of the limbus
- Once limbal stem cells are damaged the epithelium will be replaced by conjunctival goblet cells

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Symptoms

- Decreased vision
- Photophobia
- Tearing
- Blepharospasm
- Recurrent pain

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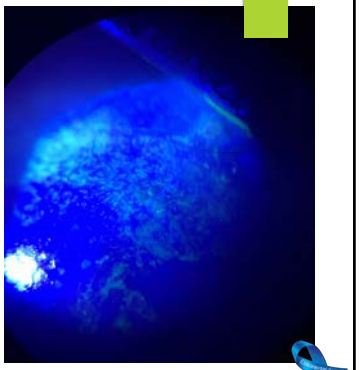
Signs

- Stippled superficial punctate late flourescein staining
  - Stained cells are more elongated and pill shaped than in SPK from DED
  - Early LSCD staining more concentrated peripheral near limbal area
  - More progressed LSCD staining spread central and becomes more diffuse
    - Natural migration of epithelial cells
    - Whorl like pattern staining
- Ingrowth of opaque epithelium
- Superficial neovascularization



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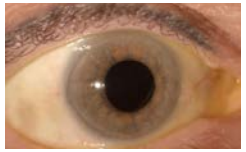
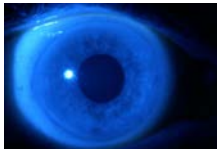
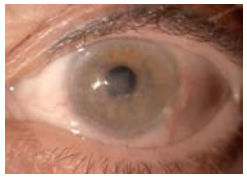
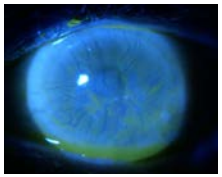
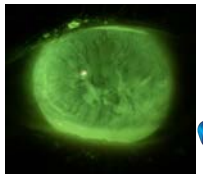
NORMAL EYE


TOTAL LSCD

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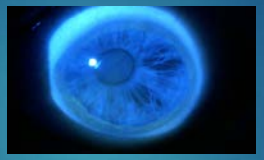
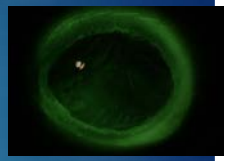
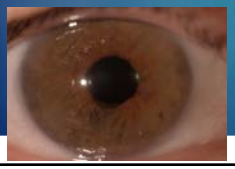
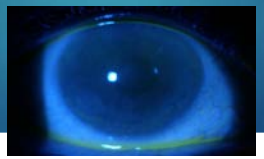
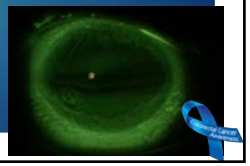
LATE STAINING FLUORESCEIN PATTERN

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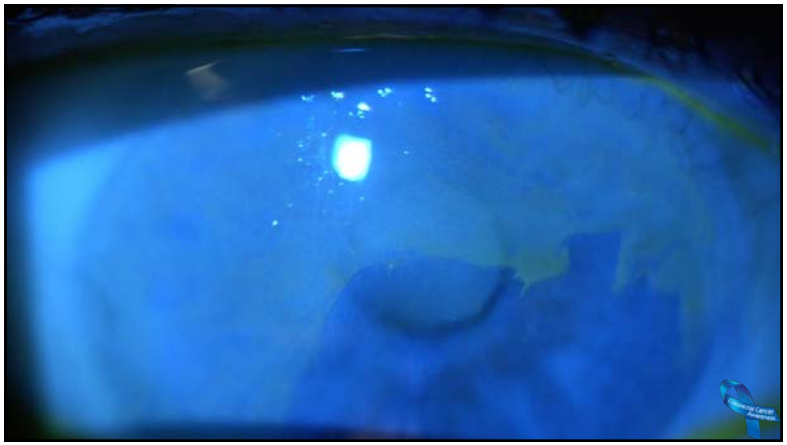

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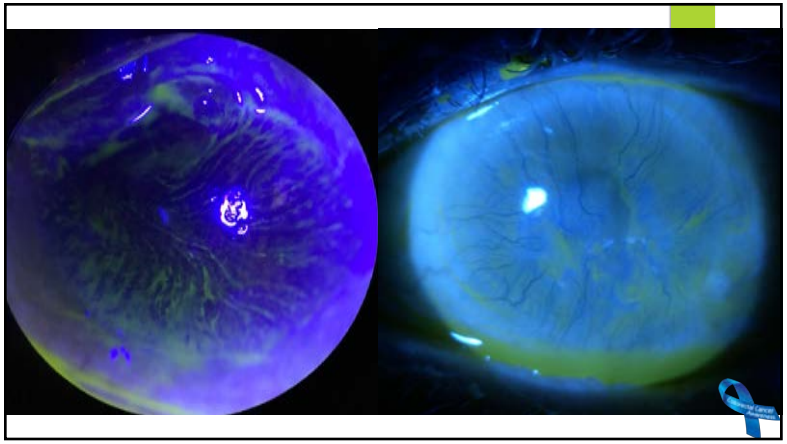

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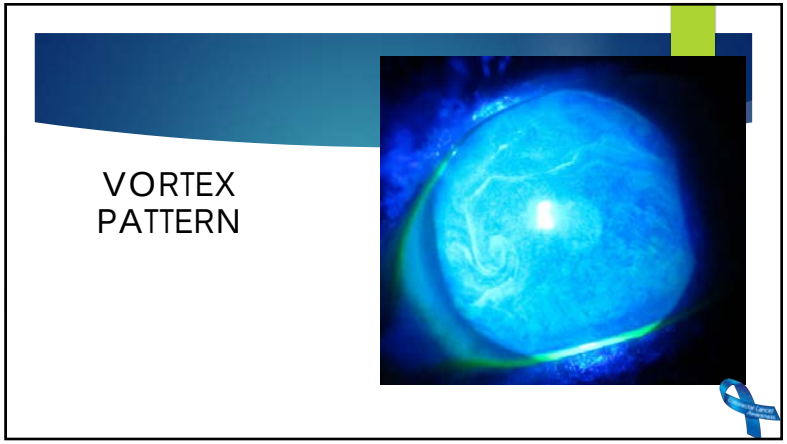

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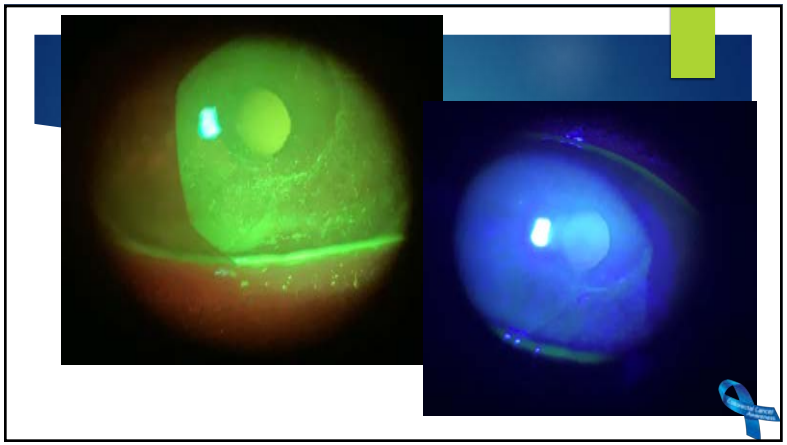

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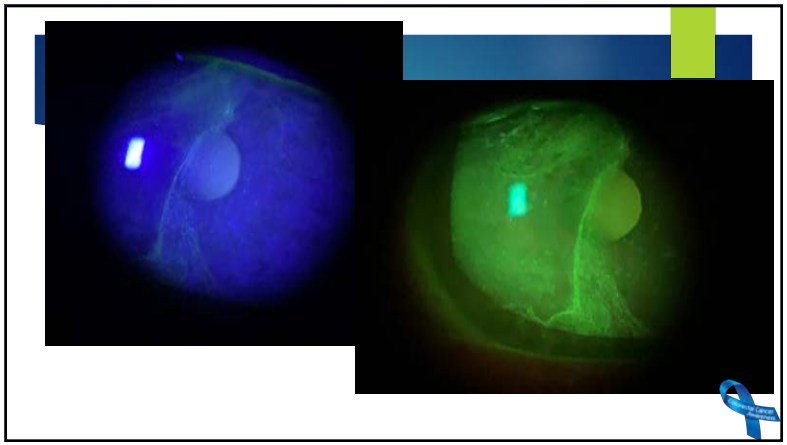

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Non-Surgical Treatment

- Remove traumatic or toxic insults that may be the cause
  - Discontinue contact lens wear
    - Possible refit in scleral
    - Bandage CL?
  - Discontinue or switch topical medications
    - Glaucoma medications
    - Preservative sensitivity
      - BAK
- Treating underlying systemic causes
  - Autoimmune control
- Improve tear film and control inflammation
  - Vitamin A ointment QHS
  - Topical steroids
    - Compounded Preservative Free option
  - Topical cyclosporine
  - Preservative free AT
  - Punctal Plugs

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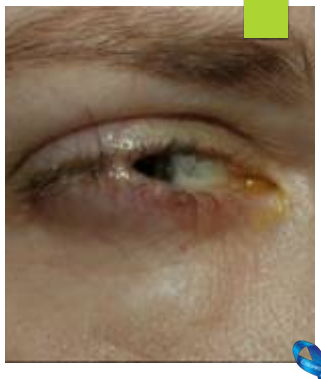
Next Step Treatments?

- Amniotic membrane
  - Dehydrated vs cryopreserved
- Amniotic membrane drops
  - Can be costly and not covered by insurance currently
- Serum Tears
  - Can be costly and inconvenient
- Oxervate
  - Neurotrophic keratitis
- Surgical
  - LS transplant
  - Tarsorrhaphy



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Neurotrophic Keratitis

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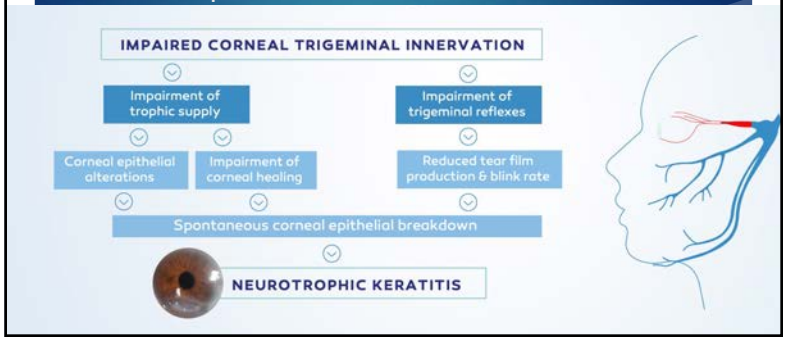
Neurotrophic Keratitis



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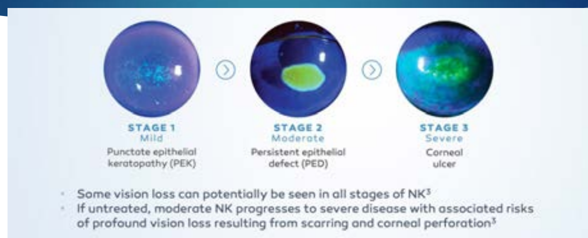
Mackie classification



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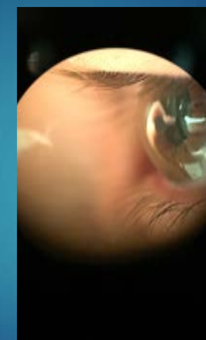
Corneal Sensitivity Testing: Esthesiometry

- Qualitative
  - Cotton tip applicator
  - Dental floss
- Quantitative
  - Cochet-Bonnet
  - Brill esthesiometer



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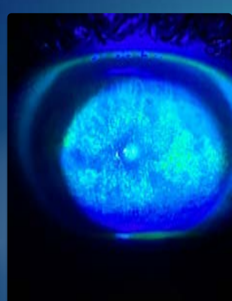

Persistent Epithelial Defect: Stage 2 NK Post Chemotherapy (finished 8 months prior)

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Stage 1 +2 +3 Treatment

- Remove any ocular medication that may be associated with toxicity
  - Preservative free options, tears and ointments
- Treat other associated ocular problems
  - LSCD
  - OSD/DED
  - Exposure keratitis
- Vitamin A ointment
- Amniotic membranes
- Autologous serum eye drops
  - Growth factors, neuromediators, cytokines, vitamins
  - Steroids

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Stage 2

- Promote healing of epithelial defect and prevent corneal ulcer
- Monitor patient frequently
- Topical antibiotics
- Bandage contact lens

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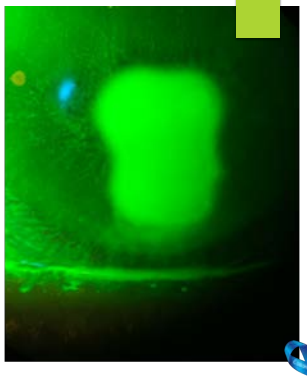
Stage 3

- All the above
- Heavy antibiotics
  - Consider fortified
- Will need surgery if perforation



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Autologous Serum tears for NK

- Matsumoto et al 2004
- Complete healing of all the 14 eyes with NK treated with autologous serum drops and an increase in corneal sensitivity in 64.2% of cases
- The study demonstrated that serum harbors neurotrophins and growth factors to the ocular surface.
- More recent studies confirmed that autologous serum eye drops allowed high rates of corneal healing, and also the improvement of corneal nerve morphology with increased number, length, width, and density

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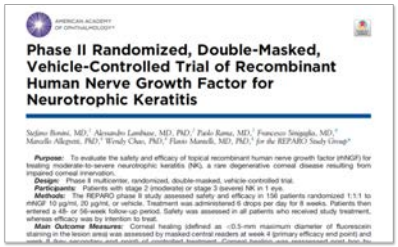
cenegermin-bkbj 20 mcg/ml was approved by FDA in August 2018



Phase II Randomized, Double-Masked, Vehicle-Controlled Trial of Recombinant Human Nerve Growth Factor for Neurotrophic Keratitis

- Approved for the treatment of neurotrophic keratitis in adults and children age 2 and older
- Available for ordering since January 2019
- Developed by Dompé pharmaceuticals, available through specialty pharmacy

Bonini S, Lambiase A, Rama P *et al.* Phase II Randomized, Double-Masked, Vehicle-Controlled Trial of Recombinant Human Nerve Growth Factor for Neurotrophic Keratitis. *Ophthalmology* 2018;125:1332-1343.

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Graft vs Host Disease

- Systemic disorder that occurs when the graft's immune cells recognize the host as foreign and attack the recipient's body cells.
- "Graft" = transplanted, or donated tissue
- "Host" = tissues of the recipient
- Common complication
  - Following allogeneic bone transplantation (most common)
  - Following transplantation of solid organs that are rich in lymphoid cells (eg. liver)
  - Following transfusion of un-irradiated blood

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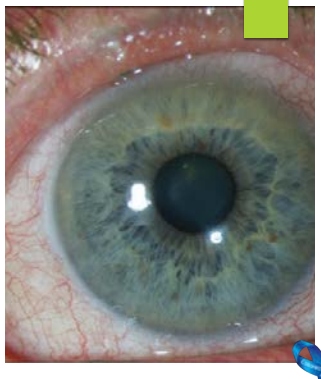
1. Acute classic GVHD: Presents within 100 days of transplantation with classical clinical features of acute GVHD.
2. Persistent, recurrent, or late-onset acute GVHD: Manifests with clinical features of classic acute GvHD but after 100 days of transplantation.
3. Classic chronic GVHD: Presents after 100 days of transplant with classic clinical features of chronic GvHD.
4. Overlap syndrome: May present at any time post-transplant with features of both acute and chronic GvHD [1].



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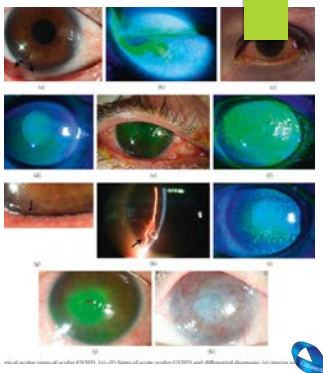
Ocular Presentation

- Lacrimal gland
  - Most affected and most severly affected
  - CD4 and CD8 T cell cause damage on periductal epithelial cells of lacrimal gland leading to permanent stenosis
  - Study found tear turnover rate in GVHD approx. same as Sjo
- Severe MGD
- Conjunctiva
  - Range from erythema to cicatrizing conjunctivitis 2/2 inflammation in approx. 11-12% of acute and chronic GVHD pt
- Cornea
  - LSCD, NK, K sicca, filaments, ulcers perforation
- Cataract development (systemic steroid and radiation)
- Post seg, rare more likely related to radiation or steroid as well



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NIH Ocular Scoring in Chronic GVHD

Score	Definition
0	No dry eye symptoms.
1	Mild dry eye symptoms not affecting daily activities (requiring eye drops ≤3x/day) or asymptomatic signs of keratoconjunctivitis sicca.
2	Moderate dry eye symptoms partially affecting daily activities (requiring drops >3x/day or punctal plugs), without vision impairment.
3	Severe dry eye symptoms significantly affecting daily activities (special eyewear to relieve pain) or unable to work because of ocular symptoms or loss of vision caused by keratoconjunctivitis sicca.

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Treatment

- Cyclosporine
  - Systemic and topical
- Steroids
  - Systemic and topical
- Amniotic membrane
- PRP/autologous serum
- Frequent PF lubrication
- Vitamin A ointment

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Lid/Adnexal changes

Ectropion
- Treatment palliative vs surgical repair?
- Trichiasis
  - Cause ?
  - Epilation, cauterization or surgical treatment

Periorbital cutaneous hyperpigmentation

Periorbital edema
- Cold compresses
- Topical or oral steroids possible treatment

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Cataract formation

- Remember high levels of steroids used in many protocols
- Can cause secondary development of PSC cataracts.
- Possible cataract surgery
  - Age, QOL considerations
  - Timing with treatment

63

Most common Posterior Segment Side Effects

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Retinal Artery Occlusions

- Occurs with Cisiplatin and Topoisomerate inhibitor type II
- Occlusion of the bloodflow in the retinal blood vessel
  - Embolism (hollenhorst plaque), thrombus, inflammatory, traumatic
- Central retinal artery occlusion (CRAO) vs branch retinal artery occlusion (BRAO)

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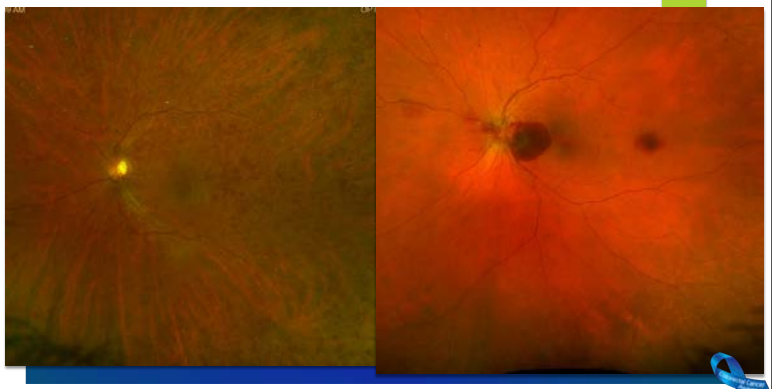

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Treat the complications

Refer to retina

RVO

Neovascularization vs macular edema

Injections

Steroid vs anti-VEGF

Laser photocoagulation

Surgical therapy

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Visual Field defects

- Vary depending on medication
  - Cisplatin – central scotoma or homonymous hemianopsia
  - Paclitaxel and oxaliplatin- general VFD
    - Oxaliplatin tend to be temporary
    - Resolve 3 weeks after medication cessation
- In more extreme cases, transient cortical blindness has been reported in relation to the use of some chemotherapy drugs and biologic agents.

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Treatment?

- Let the oncology team know
- Monitor consistently
- Discussion with patients regarding adaptation to visual changes and prognosis for improvement is important
- Temporary prisms and other low vision devices may be helpful in improving these patients' quality of life.

69

Hormone Modulation

- Tamoxifen
  - Selective Estrogen receptor modulator
  - Used for 5 years after hormone receptor-positive breast cancer to reduce risk of re-occurance
  - Some instances of use as preventative

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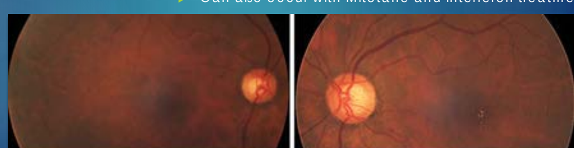
Tamoxifen Retinopathy

- Characterized by crystalline deposits and pseud c foveal cavitations
- Occurs 1.5 to 11.8%
- Monitor patients: (frequency not defined)
  - OCT macula
  - VF 10-2
- In some patients refractile crystalline deposits appear to fade
- Can also occur with Mitotane and interferon treatment



•hding T., Nielsen N.V. **Retinopathy caused by treatment with tamoxifen in low dosage.** *Acta Ophthalmol (Copenh).* 1983; **61**: 45-50
Heier JS, Dragoo R.A. , Enzenauer R.W. **Screening for ocular toxicity in asymptomatic patients treated with tamoxifen.** *Am J Ophthalmol.* 1994; **117**: 772-775

71

Kim et al. 2020

- Retrospective analysis identified 30 of 251 patients with tamoxifen retinopathy, all of which were on a 20mg per day dose for ≥2 years.
- Found that patients with a higher BMI and hyperlipidemia may be at increased risk
- Suggests that patients on a low dose of tamoxifen are still at risk for toxicity
  - may be more likely if they possess these risk factor

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Neuro-Ophthalmic Side Effects/ Neurotoxicity

- Can manifest as papilledema, retinal edema and optic neuritis
  - Both unilateral and bilateral
- High doses or high cumulative doess of chemo
  - Possible retrobulbar optic neuritis

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Other culprits

- Patients receiving chemotherapy via intracarotid injection have presented with more severe ocular and orbital toxicity including ipsilateral retrobulbar neuritis
- Tamoxifen (again)
  - Can cause bilateral optic neuritis leading to optic atrophy and vision loss in high doses

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Take Away

01 Be kind and considerate

02 Remember, we CAN help

03 Work together as a team

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Get yo' self checked

- Diagnosing cancer at its earliest stages often provides the best chance for a cure.
- With this in mind, talk with your doctor about what types of cancer screening
- Advocate for your PATIENTS and YOURSELF

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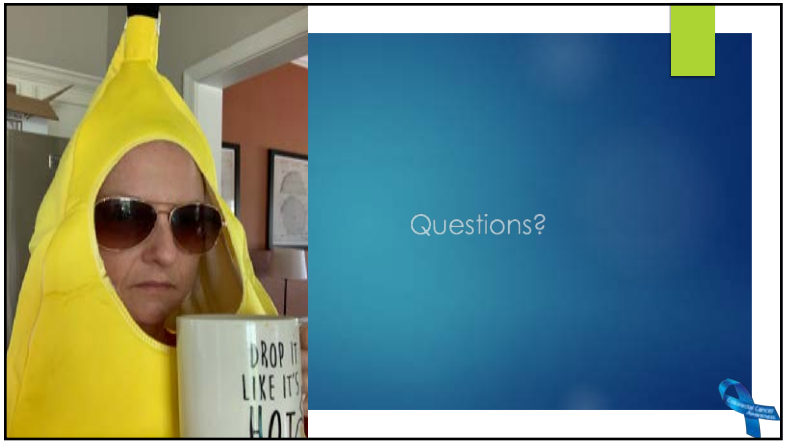

Questions?

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Thank you!
Dr.CeceliaKoetting@gmail.com

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