



Module 1A

Please select the answer(s) that apply:

Questions for Hyaluronic Science

1. Hyaluronic acid:

- A. exists naturally in all living organisms
- B. is a naturally occurring glucosaminoglycan biopolymer
- C. is a universal component of extracellular space
- D. is commonly derived from rooster combs, umbilical cord, vitreous humor, tendons, skin, and bacterial cultures
- E. all of the above

2. Cross-linked hyaluronic acids including Restylane® and Perlane®:

- A. are molecularly similar to fillers such as ArteFill® and Radiesse®
- B. are more resistant to the constant mechanical action and enzymatic degradation in the in vivo environment
- C. have significantly decreased biocompatibility and viscoelastic properties as compared to naturally occurring hyaluronic acids
- D. have increased mutagenic, genotoxic and cytotoxic potential

3. Restylane® and Perlane® are hyaluronic acid dermal fillers which:

- A. are derived from bacterial fermentation in cultures of a streptococcus species
- B. pose negligible risk of contamination with animal allergens, pathogens, or xenogeneic disease
- C. have a high potential for allergic or immunogenic reactions
- D. none of the above

4. Naturally occurring hyaluronic acid:

- A. does not occur in vertebrate animals
- B. has a long tissue half-life due to extensive cross-linking
- C. elicits intense humoral and cell-mediated immune reactions
- D. is highly hydrophobic
- E. none of the above

5. The chemical and molecular composition of natural hyaluronic acid:

- A. is conserved throughout all living organisms
- B. makes it extremely brittle and rigid
- C. commonly elicits humoral or cell-mediated immune reactions
- D. possesses species and tissue specificity

6. Isovolumetric degradation of hyaluronic acid:

- A. is based on the hydrophilic nature of the compound
- B. describes the process whereby more water is bound to the product as its concentration decreases
- C. provides natural appearing volume correction and cosmetic persistence until the product is almost completely degraded
- D. all of the above

7. Restylane®:

- A. was approved by the U.S. Food and Drug Administration in mid 2007
- B. has a larger particle size than Perlane®
- C. has been shown to stimulate de novo collagen formation
- D. was found to be inferior to Zyplast® in 60% of patients, in the major United States study on Restylane® by Narins and colleagues

8. FDA-approved hyaluronic acid skin fillers available in the United States include:

- A. Juvéderm®
- B. Botox® Cosmetic
- C. ArteFill®
- D. Zyplast®

9. Hyaluronic acid is:

- A. composed of polyanionic disaccharide units of D-glucuronic acid and n-acetyl-d-glycosamine
- B. present as approximately 15 g of dry weight in an average sized human of 70 kg
- C. ultimately degraded in the liver to carbon dioxide and water
- D. an effective extracellular matrix component to maintain proper hydration, tissue volume, support, stability, and elasticity
- E. all of the above

10. Restylane®'s hyaluronic acid molecules:

- A. form a rigid two-dimensional network of cross-linked hyaluronic acid molecules allowing the free flow of nutrients, oxygen, and hormones, which helps maintain the vitality and health of the skin
- B. are cross-linked by 1,4-butanediol diglycidyl ether (BDDE)
- C. contain more than 200 parts per million of BDDE
- D. none of the above

**Questions for Complications of Hyaluronic Acid Injections:
Restylane® and Perlane®**

1. The most commonly reported side effects of hyaluronic acid products including Restylane® and Perlane® do NOT include:

- A. edema
- B. erythema
- C. ecchymosis
- D. fistula formation

2. Mild discomfort associated with Restylane® injections can be effectively treated with:

- A. acetaminophen (Tylenol®)
- B. Aspirin®
- C. non-steroidal anti-inflammatory products (NSAIDS)
- D. Ginkgo biloba

3. Adverse allergic and hypersensitivity reactions to Restylane® and Perlane® are:

- A. due to hyaluronic acid fillers possessing species and tissue specificity
- B. extremely common
- C. derived secondary to animal allergens or pathogens acquired during manufacturing
- D. more likely in patients with multiple severe allergies or anaphylaxis, or allergies to gram-positive bacterial proteins

4. Herpes simplex virus infections following a tissue filler treatment can:

- A. occur in patients with no known history of herpes virus infections in the mouth area
- B. occur in individuals with a past history of herpes simplex virus infections
- C. be suppressed by prophylactic anti-viral medication taken both prior to and following tissue filler treatment
- D. all of the above

5. Accidental intra-arterial injection:

- A. is common during the course of Restylane® injections
- B. has never been reported during treatment of glabellar frown lines
- C. can be avoided by a detailed understanding of facial anatomy and slow, cautious injection techniques
- D. all of the above

6. Dissatisfaction with the cosmetic outcome of Restylane® treatment:

- A. can be decreased with pre-procedural photodocumentation and discussion of any intrinsic facial asymmetry
- B. include under-correction, asymmetries, and/or over-correction
- C. can sometimes be alleviated by gentle massage or addition of more filler material to level any contour irregularity
- D. all of the above

7. Skin sensitivity from Restylane® injections:

- A. includes symptoms such as rash, itching, tenderness and swelling
- B. is minimized if injections are performed immediately after laser treatments or deep chemical peels
- C. never occurs with post-injection UV exposure
- D. is minimized by administration of clopidogrel (Plavix®)

8. Regarding bruising following Restylane® injections:

- A. it occurs in an estimated 45% of patients
- B. firm direct pressure should be immediately applied if the development of a bruise is suspected
- C. rarely occurs in patients taking vitamin E, Ginkgo biloba, ginger, ginseng, garlic, and other herbal or homeopathic remedies
- D. it is more common in patients who ice the intended treatment area both immediately before and after the injections

9. Infections following injection of hyaluronic acid fillers:

- A. occur in a majority of patients
- B. occur because Restylane® and Perlane® are derived from bacterial fermentation
- C. are minimized by good sterile technique, including pre-injection antiseptic facial cleansing
- D. are minimized if hyaluronic acid injections are performed during an active herpes outbreak

10. Hyaluronidase:

- A. is commonly used to minimize irregularities following hyaluronic acid injections
- B. breaks down glycolic acid
- C. has been shown to effectively reverse the augmentation created by the hyaluronic acid fillers
- D. does not require a skin test to exclude allergy to hyaluronidase prior to injection

Module 1B

Please select the answer(s) that apply:

Questions for Botulinum Toxin A Science

1. Botulinum neurotoxins:

- A. are derived from clostridia tetani bacterial species
- B. enhance acetylcholine exocytosis at the neuromuscular junction
- C. are synthesized as single chain polypeptide protoxins
- D. all of the above

2. Botulinum toxin A:

- A. one unit represents the glabellar injected dose required to kill 50% of a group (LD50) of 18-20gm female Swiss-Webster mice.
- B. lacks effect on *Rana pipiens* frog species as they lack receptors for this serotype
- C. is available for commercial use in the form of Myobloc®
- D. differs in biosynthesis, size, structure, pharmacologic properties and specific cellular site of action from the other clostridial neuro toxin serotypes

3. Acetylcholine is:

- A. synthesized from acetyl coenzyme A and proline
- B. formed by acetylcholinesterase in the synaptic cleft
- C. packaged into vesicles and docked at the cell membrane with the SNARE complex
- D. all of the above

4. Neurotransmission:

- A. is controlled by potassium flux in the final stages
- B. is a multi-stage process requiring neurotransmitter synthesis, packaging, transport to the nerve terminal, vesicle docking and finally, vesicle fusion with resultant release of neurotransmitter into the synaptic cleft
- C. is enhanced by botulinum toxin A
- D. none of the above

5. Botox® Cosmetic is derived from which clostridia botulinum neurotoxin serotype?

- A. A
- B. B
- C. C2
- D. F
- E. G

6. Commercially available preparations of clostridia botulinum neurotoxins do NOT include:

- A. Dysport®
- B. Myobloc®
- C. Botox® Cosmetic
- D. Restylane®

7. The three principal steps involved in toxin-mediated paralysis include:

- A. binding—where the botulinum toxin A is bound to adrenergic nerve terminals.
- B. externalization—where receptor-mediated exocytosis results in extrusion of the botulinum protoxin
- C. inhibition—where the botulinum toxin A light-chain enzymatically cleaves SNARE proteins to inhibit exocytosis
- D. recovery—where the primary nerve terminal recovers full activity

8. The neuromuscular junction recovery from botulinum neurotoxin entails:

- A. a 50% increase in acetylcholinesterase
- B. a decrease in extrajunctional acetylcholine receptors
- C. recovered ability to synthesize SNARE proteins
- D. development of irreversible atrophic changes at the neuromuscular junction

9. Botulinum neurotoxins are:

- A. enzymatically activated by endogenous bacterial proteases prior to secretion into the environment as an active neurotoxin
- B. synthesized as a single chain polypeptide protoxin with a molecular weight of approximately 150kDa
- C. coated with neurotoxin-associated proteins (NAPs) which stabilize the toxin in the environment
- D. all of the above

10. Immunologic considerations:

- A. botulinum toxin A usually evokes a weak response from the human immune system, leading to its utility as an effective injectable treatment
- B. the development of clinically important neutralizing antibodies to botulinum toxin A is a common occurrence.
- C. the development of antibodies to botulinum toxin A occurs in 40-60% of patients
- D. are unlikely the culprit in patients who become refractory to botulinum toxin A treatment.

Instructional DVD (included with book)

Please select the answer(s) that apply:

Questions for Injection Workshop DVDs

1. Botulinum toxin A is FDA approved for cosmetic use in:

- A. forehead area
- B. glabellar area
- C. crow's feet area
- D. perioral area
- E. perinasal area

2. Eyelid ptosis can be prevented by:

- A. pre-treating with naphazoline ophthalmic drops
- B. by preventing the botulinum toxin A from dripping onto the cornea
- C. avoiding injections into a 1 square centimeter area over the brow in the midpupillary line
- D. by increasing the dilution and decreasing the concentration of the botulinum toxin A in solution

3. The lower facial muscle least likely treated cosmetically with botulinum toxin is:

- A. the masseter
- B. depressor anguli oris (DAO)
- C. the mentalis
- D. the platysma
- E. the levator labii

4. An overly curled snarling upper lip exhibiting excesses "gummy show" with a smile can be reduced with injections into which two muscles?

- A. depressor septi nasi
- B. risorius
- C. zygomaticus major
- D. levator alaeque nasii
- E. zygomaticus minor

5. Botulinum toxin A diluted with 4 cc of saline will _____ than if diluted with 1 cc of saline.

- A. have a greater duration of effect
- B. hurt less on injection.
- C. diffuse the toxin further from the site of injection
- D. decrease your profit margin

6. Hyaluronic acid is placed into all the areas except:

- A. mid dermis
- B. deep dermis
- C. subcutaneous
- D. subermal
- E. superficial dermis

7. The three most common methods for injecting hyaluronic acid include:

- A. fanning
- B. serial droplet
- C. threading
- D. raking
- E. kneading

8. Hyaluronic acid volumizing effects can be reversed by:

- A. treating with oral prednisone
- B. treating with high does NSAIDS
- C. injecting hyaluronidase
- D. vigorous massage
- E. topical nitropaste

9. For the best results hyaluronic acid should be injected until the intended area is treated to complete correction in all areas except?

- A. nasolabial folds
- B. lips
- C. prejowl
- D. periorbital
- E. cheeks

10. For patient comfort, lip injections of hyaluronic acid frequently follow regional nerve block anesthesia. Which two paired nerves are targeted?

- A. infraorbital and mental
- B. nasolabial and mental
- C. labial mental and superficial buccal
- D. superior and inferior labial
- E. intra buccal and infraorbital