Manufacturing and Quality as Competitive Advantages and Opportunities for Innovation

Keith O. Webber, Ph.D.
Director (acting)
Office of Pharmaceutical Science
CDER/FDA

NIPTE Research Conference
June 18, 2013

Competitive Advantages

- Increased market share
  - More desirable products
- Increased profits
  - Decreased cost of production

Market Forces Impacting Market Share

- New, novel products
  - no direct competition
- Post-patent expiry
  - Brand vs. generic
    - Price
    - Physician-directed (“dispense as written”)
  - Generic vs. generic
    - Distributor-based selection
    - Little or no patient selectivity
    - How can quality be made apparent?

Pharmaceutical Quality

- What is pharmaceutical quality?
- How is it measured?
- Is it apparent to the customer?

Pharmaceutical Quality

- How do you define quality for drugs?
  - Clinical performance
    - Public expects that pharmaceutical quality is guaranteed by FDA
    - However, skepticism exists
  - Other characteristics
    - Ease of use
    - Appearance
    - Taste & smell

Two Types of Quality

- The suitability of either a drug substance or drug product for its intended use.
  - *ICH Q6A Specifications Guideline*

- The state of having an acceptably low risk of failing to achieve the desired clinical attributes.
  - *J. Woodcock, M.D.*
    - *Amer. Pharm. Rev. (November–December 2004)*

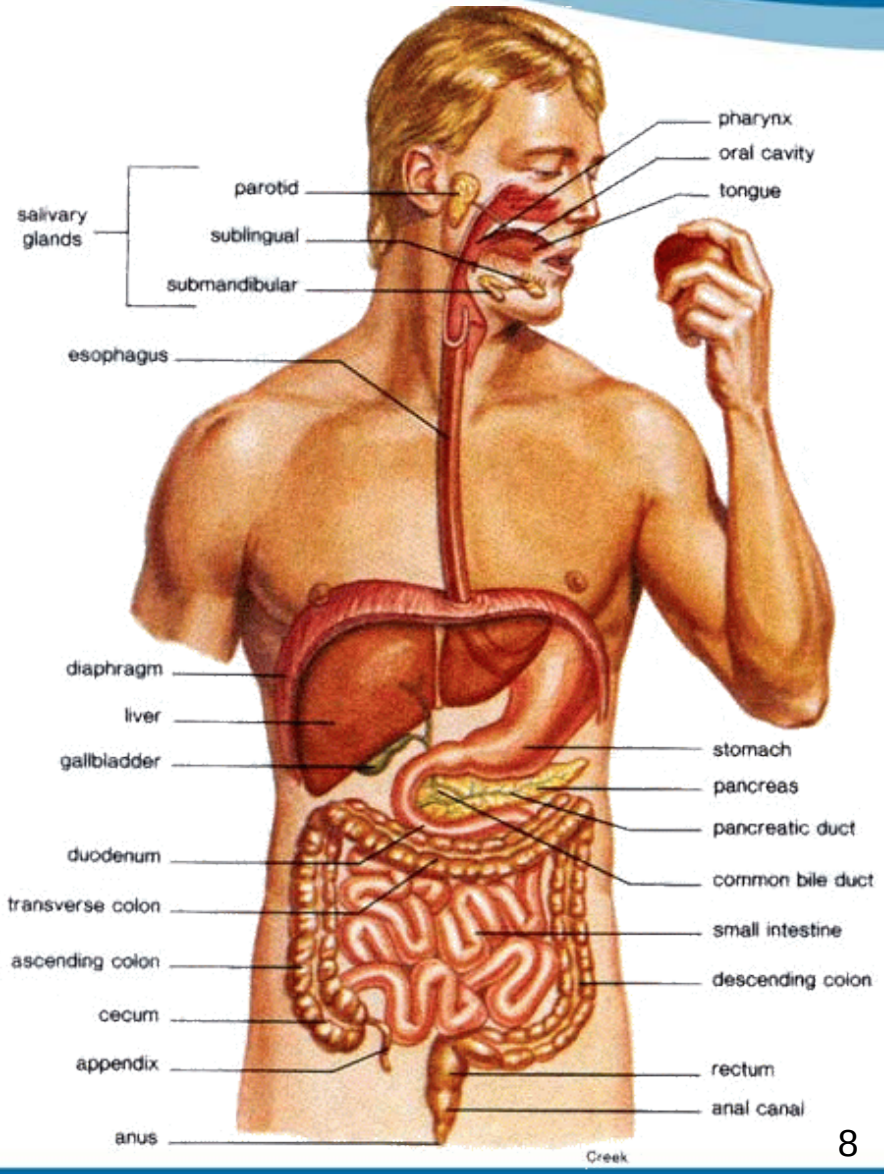
"Desired State"

- Product specifications based on mechanistic understanding of how formulation and process factors impact product performance

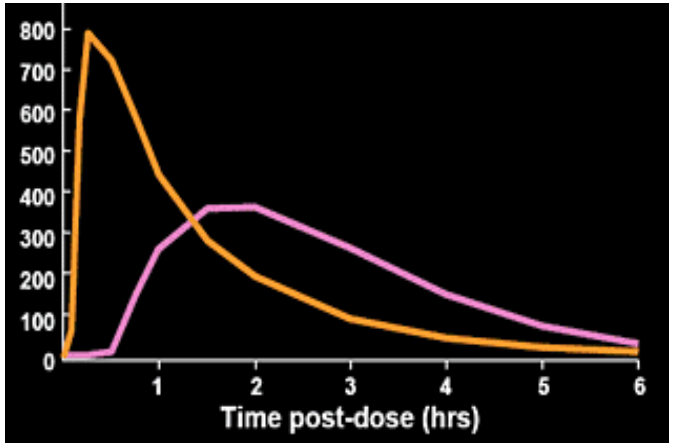
- Product quality and performance achieved and assured by design of effective and efficient manufacturing processes

Product Design (e.g., Oral dosage)

- Site of Action?
- Site of Release?
- Immediate Release?
- Delayed Release?
- Extended Release?
- Taste/Odor-masking?
- Patient/caregiver needs?

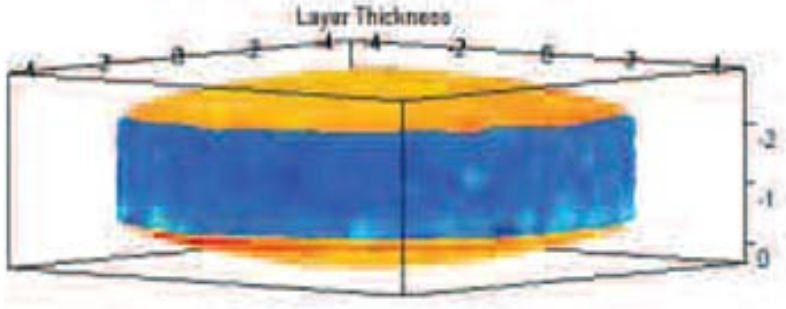


Product Design



http://www.medscape.org/viewarticle/540104_4

Tablet Coating Design



From: *Pharmaceutical Formulation & Quality*
TABLET COATINGS: Tune into Terahertz
L Ho, KC Gordon, T Rades, & P Taday

Specifications

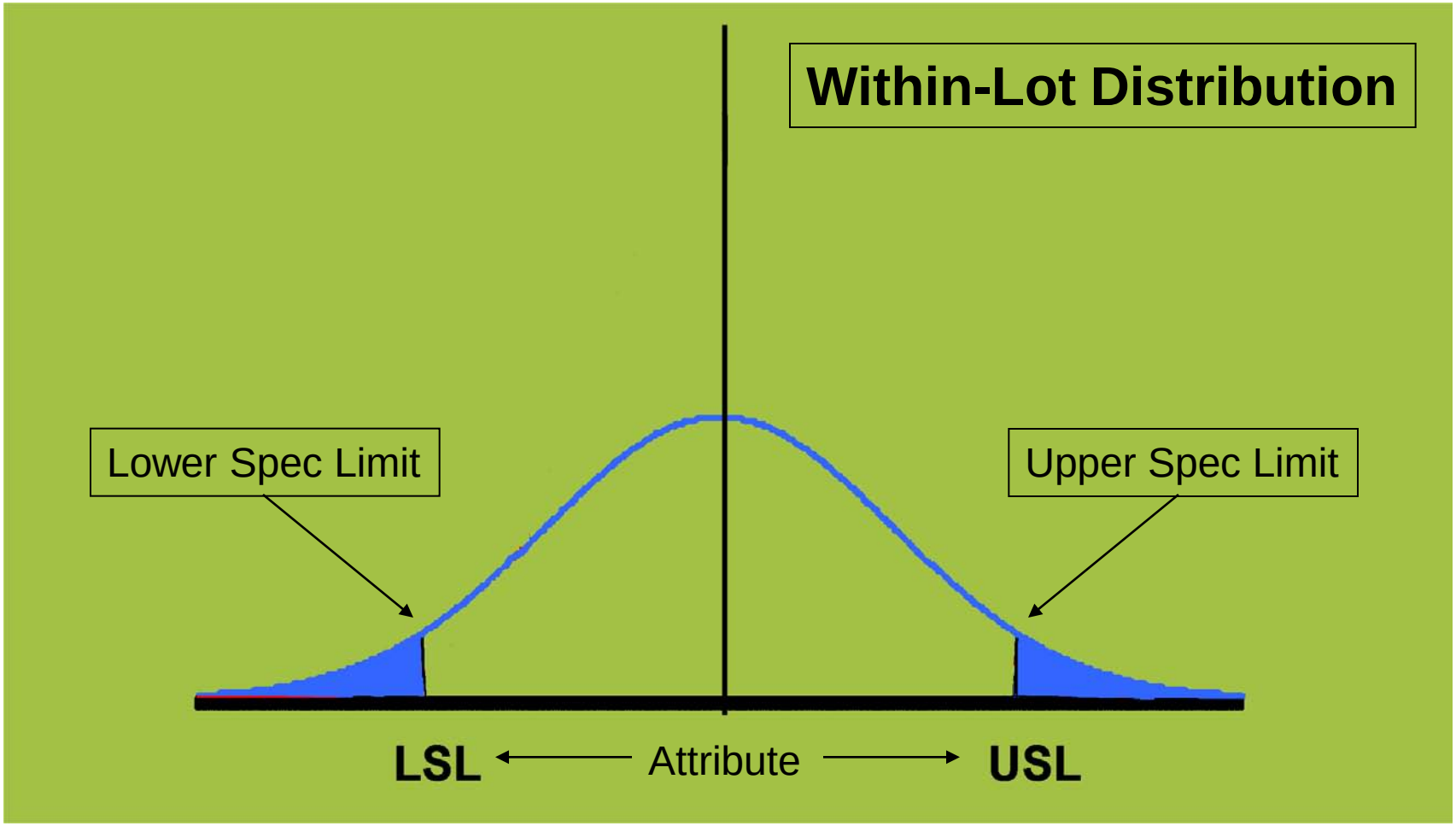
Examples:

- Identity
- Formulation & composition
- Strength (potency)
- Impurities (identity & amount)
- Dissolution (rate & amount)

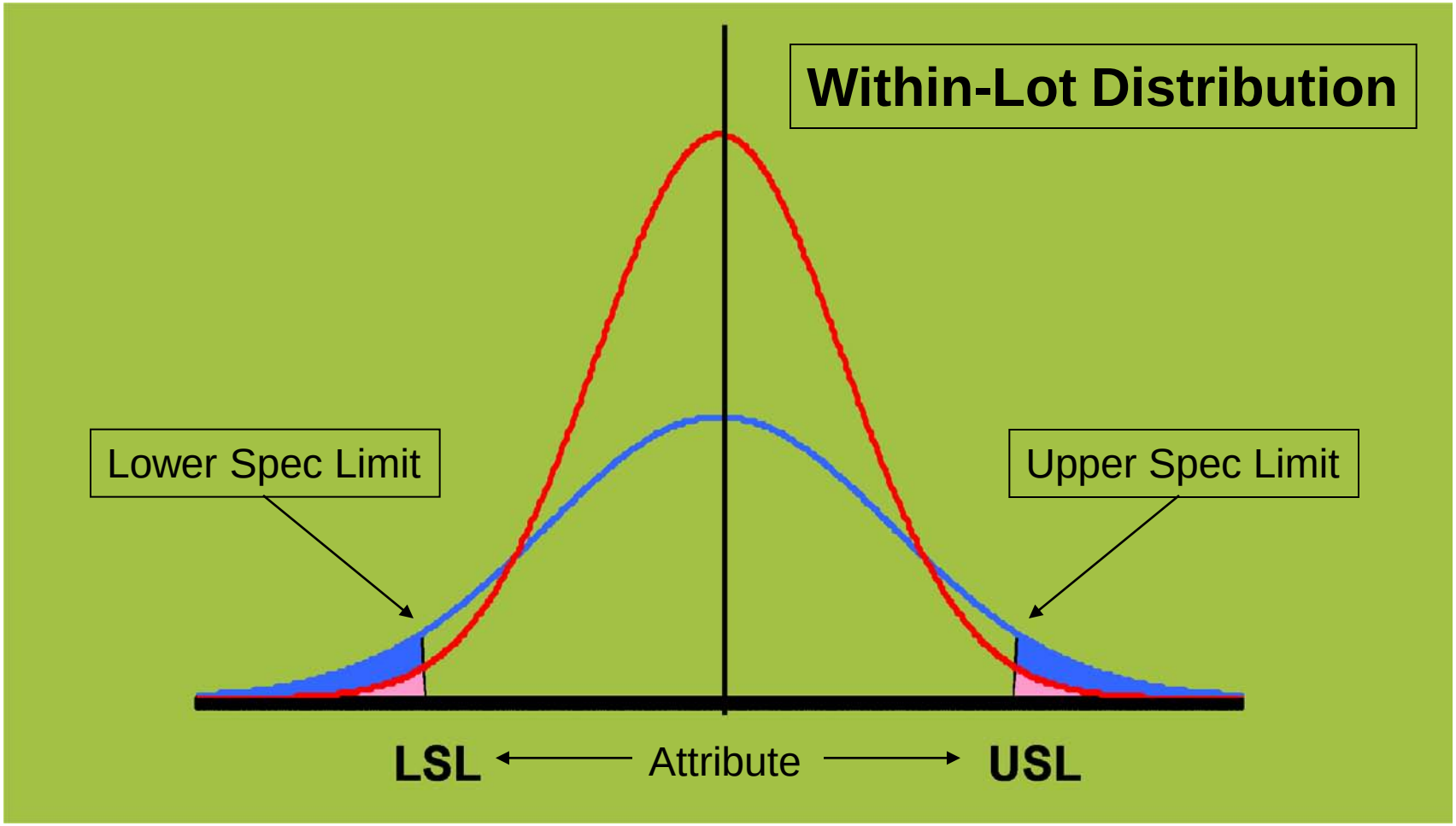
Batch Quality

- Within-Batch Variability
- Conformance to Specifications
- Batch-to-Batch Consistency

Batch/Lot Quality



Batch/Lot Quality



Dosage forms

- Solid orals
  - Tablets, capsules, ODTs, lozenges
  - IR dosages & MR dosages
- Liquid orals
- Inhalationals & nasal sprays
- Topicals
  - Creams, ointments, lotions
  - Patches

secundem artem

- the acronym “S.A.” in physicians’ prescriptions, instructed pharmacists to use their special skills “according to the art” of their profession to compound a medicine;
- it was out of this art, rather than science, that almost all of today's major dosage forms arose. Tablets, capsules, injectables, and oral solutions were all known to pharmacists and physicians a century ago.

Read More:
http://informahealthcare.com/doi/abs/10.3109/9780849393983.064

Distributed Memory

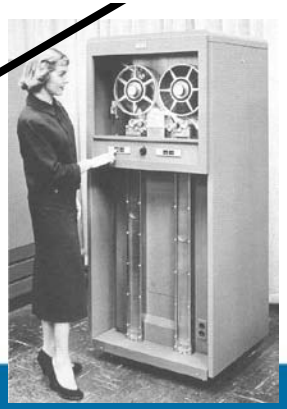
2010s

2000s

1990s

1980s

1970s

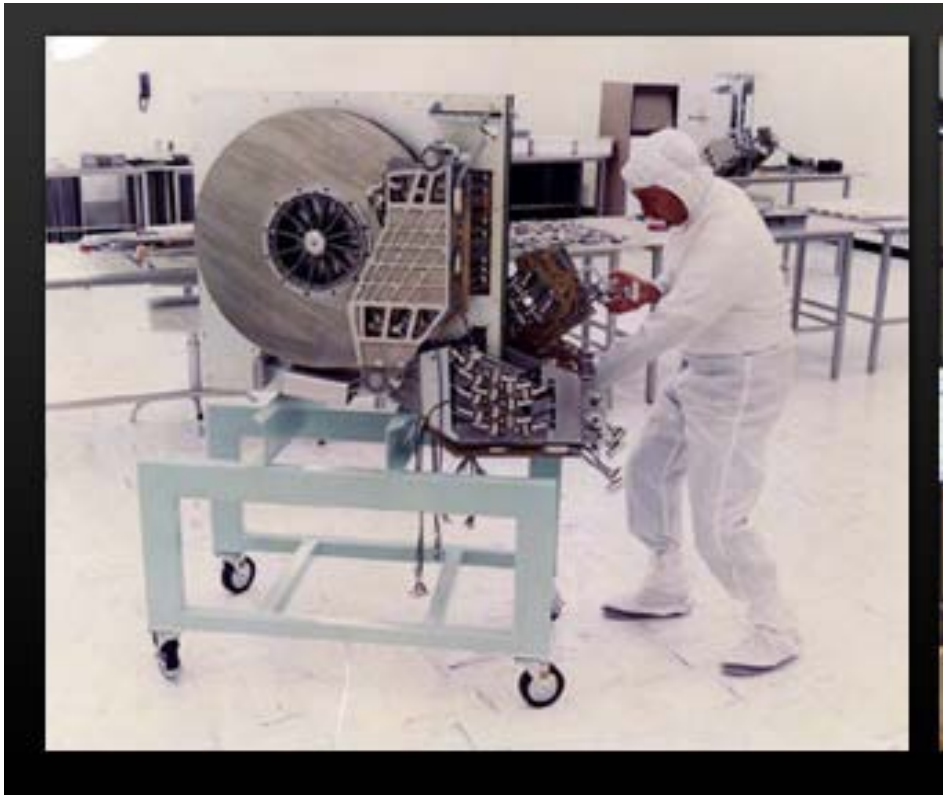


1960s

1950s

Physical & Magnetic

Optical & Solid State



A 250 MB hard drive from 1979

256 x 250 MB
(34 years later)

Standards

- Consistency
- Common understanding
- Predictability
- Transportability
- Efficiency
- Supports innovation
- Progress

Standard-Developing Organizations

Opportunities for Innovation

- Improved dosage-form development
- Improved dosage-form manufacturing
- Continuous manufacturing methods
- Advanced analytical methods
- Advanced process control methods
- Process Analytical Technologies
- Nanotechnology applications

FDA's Roles & Goals

- Drug safety & efficacy
- Drug availability
- Encourage innovation
- Use performance-based standards
- Audit industry against those standards
- Support Manufacturing Modernization
  - U01 Grant to NIPTE for Critical Path Manufacturing Sector Research Initiative

FDA's Roles & Goals

- Ensure that regulatory requirements do not impede:
  - the development of improved dosage forms or
  - implementation of innovative manufacturing methods
  - as long as the drug products are safe & efficacious

NIPTE's Role

Support development of:

- Innovative manufacturing methods,
- Advanced quality control methods,
- Advanced analytical methods, and
- Quality standards

through research and training.

Thank-you!