



# Fundamental Differences in Lyophilization of Nutritionals vs. Pharmaceuticals

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Presented to  
ISLFD Midwest Chapter Annual Meeting  
April 16, 2009

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# Introduction to Anteco Pharma

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- Contract manufacturer for the pharmaceutical, medical device and nutritional ingredient industries
- Focus on lyophilization and associated formulation and packaging operations
- Established in Lodi, Wisconsin in 2003
- FDA drug and medical device registration
- ISO 9001 / ISO 13485



# Pharmaceuticals vs. Nutritionals

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## **Summary**

- Nature of materials to be lyophilized
- Product / packaging characteristics
- Facility, equipment and control
- Regulatory issues
- Company standards
- Economic considerations



# Pharmaceuticals vs. Nutritionals

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## **Except**

- There is a wide range of materials, products, manufacturing and control processes and standards within the nutritional market
- Nutritional standards are changing with implementation of 21 CFR Part 111 and incident inspired regulatory actions



# Materials

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## **DRUG**

- Chemically defined / purified
- Small molecule or GMP fermentation
- Sterile
- Low volume
- High value

## **NUTRITIONAL**

- Mixture / minimal purification
- Natural source
- Frequently contaminated
- High volume
- Relative low cost



# Products & Packaging

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## **DRUG**

- Sterile vials
- Tablets & Capsules
  - API a minor component of granulation
  - Sterile or low count
  - "Pharmaceutical" packaging
- High value / cost

## **NUTRITIONAL**

- Oral or topical preparation
- Lyophilized material major part of granulation
- Range of specs. for contamination
- Packaging varies
- Cost limits



# Facilities, Equipment & Control

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## **DRUG**

- Facility (clean suite) design well defined
- Lyophilizers are small to mid-sized
- Sophisticated control systems
- Validation requirements well defined

## **NUTRITIONAL**

- Variability in facility requirements
- Large lyophilization chambers common
- Control systems typically basic
- Validation requirements vary



# Lyophilizer Characteristics

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## DRUG

- Fabrication and finish mandated
- CIP / SIP
- External condenser – cleaning validated
- Stoppering / loading systems
- PAT design / components / control
- *Etc*

## NUTRITIONAL

Variable



Older

Simpler

Cheaper



# Facilities, Equipment & Control

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## Special Considerations

- Nutritionals are often dried in higher volumes and at lower purity than API's
  - End point determination (pressure rise or vapor temp. to augment temperature probes)
  - Fillers and non-actives have significant (and often undefined) effects on phase transition point(s) and cycle design



# Regulatory Issues

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## **DRUG**

- 21 CFR Part 210 & 211

## **NUTRITIONAL**

- 21 CFR Part 111  
(GMP "light")
- Food Regulations 21  
CFR Part 110
  - HACCP
  - Sanitation
  - Security
  - Safety



# Company Standards

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- Pharmaceutical process, regulatory and quality standards are consistent and product based
- Nutritional products' standards are highly dependent upon particular companies and industries



# Company Standards (II)

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- Drug Companies and Contractors  
(*e.g.* Anteco Pharma)

Generally follow drug processes & standards

- Food Companies

Focus on safety & security (HACCP)

- “Health Food” Companies

Highly variable standards - changing



# Economic Considerations

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- Nutritional margins are much lower – equipment, facilities, and systems costs must be viable
- Nutritional volumes are typically higher – some volume benefit
- Easier market entry – less preparation cost



# Conclusions

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## **DRUG**

- Low volume – high value
- Consistent product & process standards
- Highly regulated
- High risk – high ROI

## **NUTRITIONAL**

- High volume – low value
- Variable product & process standards
- Less regulation but increasing
- Moderate risk – lower ROI



# THANK YOU

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## ANTECO

