# TABLETS

## Methods Tablet Preparations •

*Dr. Nawal Ayash*

# General methods of tablet preparation:

- **Wet Granulation**
- **The most widely used and most general method.**
- **This due to the greater probability that the granulation will meet all the physical requirements for the compression of good tablets.**
- **Its chief disadvantages are the number of separate steps involved, as well as the time and labor necessary to carry out the procedure, especially on a large scale.**
- **The steps in the wet method are:**

  **1-weighing, 2-mixing, 3-granulation, 4-screening the damp mass**

  **5- drying, 6-dry screening, 7-lubrication and 8-compression.**

- The active ingredient, diluent and disintegrant are mixed or blended well.
- The powder blend may be sifted through a screen to remove or break up lumps, this screening affords additional mixing.
- The screen selected always should not affect the potency of the ingredients through interaction. For example, the stability of ascorbic acid is affected deleteriously by even small amounts of copper, thus care must be taken to avoid contact with copper or copper-containing alloys

- Solutions of the binding agent are added to the mixed powders with stirring.
- The powder mass is wetted with the binding solution until the mass has the consistency of damp snow o r brown sugar.
- If the granulation is  over wetted, the granules will be hard, requiring considerable pressure to form the tablets, and the resultant tablets may have a mottled appearance. If the powder mixture is not wetted sufficiently, the resulting granules will be too soft, breaking down during lubrication and causing difficulty during compression.

- Tray drying was the most widely used method of drying tablet granulations in the past, Notable among the newer methods being introduced are the fluid-bed dryers.

- In fluidization, the material is suspended and agitated in a warm air stream while the granulation is maintained in motion.

- Comparing the fluidized bed and a tray dryer indicated that the former was 15 times faster than the conventional method of tray drying. In addition to the decreased drying time, the fluidization method have advantages such as better control of drying temperatures, decreased handling costs and the opportunity to blend lubricants and other materials into the dry granulation directly in the fluidized bed.

- In drying, it is desirable to maintain a residual amount of moisture in the granulation. This is necessary to maintain the various granulation ingredients such as gums in a hydrated state.
- Also, the residual moisture contributes to the reduction of the static electric charges on the particles.
- In the selection of any drying process, an effort is made to obtain a uniform moisture content. In addition to the importance of moisture content of the granulation in its handling during the manufacturing steps, the stability of the products containing moisture-sensitive active ingredients may be related to the moisture content of the products.

- Previously it was indicated that water-soluble colorants can migrate toward the surface of the granulation during the drying process, resulting in mottled tablets after compression.

- This is also true for water-soluble drug substances, resulting in tablets unsatisfactory as to content uniformity.

- Migration can be reduced by drying the granulation slowly at low temperatures or using a granulation in which the major diluent is present as granules of large particle size. The presence of microcrystalline cellulose in wet granulations also reduces migration tendencies.

- After drying, the granulation is reduced in size by passing through screen.
- After dry granulation, the lubricant is added as a fine powder.
- It usually is screened through 60- or 100-mesh nylon cloth to eliminate small lumps as well as to increase the covering power of the lubricant.
- The presence of some fines is necessary for the proper filling of the die cavity.

- # Dry Granulation

- **When tablet ingredients are sensitive to moisture or are unable to withstand elevated temperatures during drying, and when the tablet ingredients have sufficient inherent binding or cohesive properties, slugging may be used to form granules.**

- **This method is referred to as dry granulation, pre compression or double-compression. It eliminates a number of steps but still includes weighing, mixing, slugging, dry screening, lubrication and compression.**

- **The active ingredient, diluent (if one is required) and part of the lubricant are blended. One of the constituents, either the active ingredient or the diluent, must have cohesive properties. Powdered material contains a considerable amount of air; under pressure this air is expelled and a fairly dense piece is formed. The more time allowed for this air to escape, the better the tablet or slug**

- **The compressed slugs are comminuted through the desirable mesh screen either by hand, or for larger quantities through the comminuting mill.**
- **The lubricant remaining is added to the granulation, blended gently and the material is compressed into tablets.**
- **Aspirin is a good example where slugging is satisfactory.**

# Direct Compression

- **Direct compression consists of compressing tablets directly from powdered material without modifying the physical nature of the material itself.**

- **Reserved for a small group of crystalline chemicals having all the physical characteristics required for the formation of a good tablet. This group includes chemicals such as potassium salts (chlorate, chloride, bromide, iodide, nitrate, permanganate), ammonium chloride.**

- For tablets in which the drug itself constitutes a major portion of the total tablet weight, it is necessary that the drug possess those physical characteristics required for the formulation to be compressed directly.
- Direct compression for tablets containing 25% or less of drug substances frequently can be used by formulating with a suitable diluent which acts as a carrier or vehicle for the drug.

- These properties are imparted to them by a preprocessing step such as wet granulation, slugging, spray drying, or crystallization.
- These vehicles include processed forms of most of the common diluents including dicalcium phosphate dihydrate, tricalcium phosphate, calcium sulfate, anhydrous lactose, spray-dried lactose, pregelatinized starch, compressible sugar, mannitol and microcrystalline cellulose.

- These commercially available direct- compression vehicles may contain small quantities of other ingredients (e.g, starch) as processing aids. Dicalcium phosphate dihydrate (Di-Tab,)
- The chemical is odorless, tasteless and non- hygroscopic. Since it has no inherent lubricating or disintegrating properties, other additives must be present to prepare a satisfactory formulation.

- Compressible sugar consists mainly of sucrose that is processed to have properties suitable for direct compression. It also may contain small quantities of dextrin, starch or invert sugar. It is a white crystalline powder with a sweet taste and complete water solubility. It requires the incorporation of a suitable lubricant at normal levels for lubricity. The sugar is used widely for chewable vitamin tablets because of its natural sweetness.

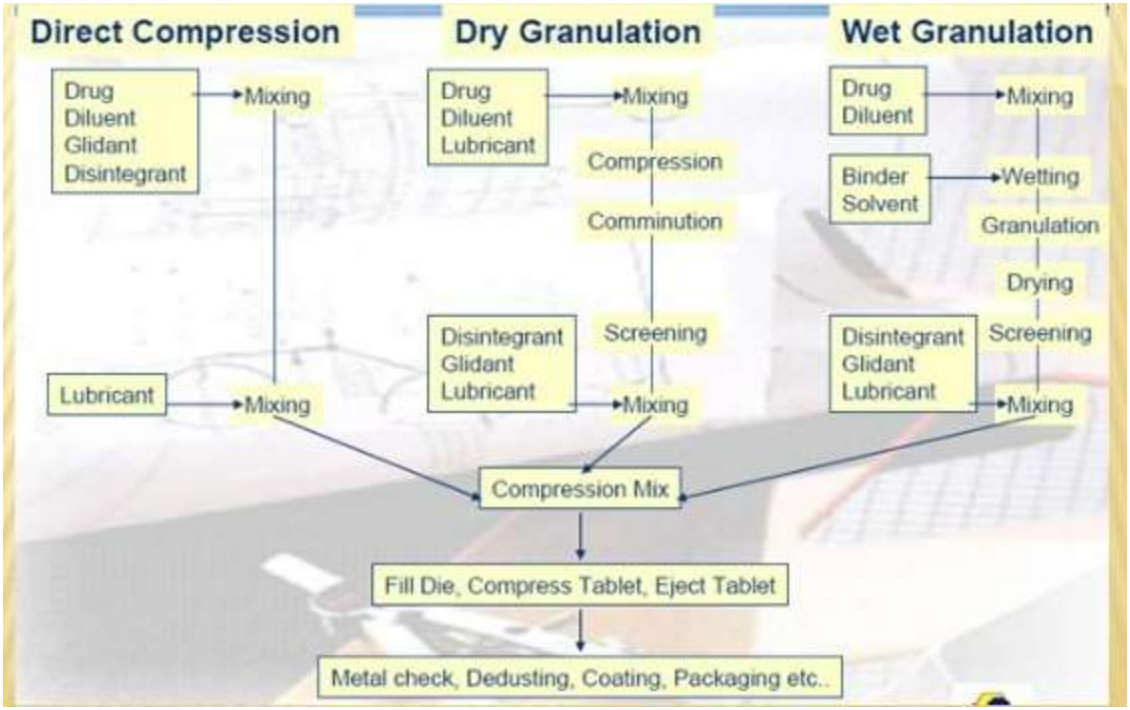
* One commercial source is Di-Pac (Amstar) prepared by the cocrystallization of 97% sucrose and 3% dextrins.

* Some forms of lactose meet the requirements for a direct-compression vehicle. Hydrous lactose does not flow and its use is limited to tablet formulations prepared by the wet granulation method, Both anhydrous lactose and spray dried lactose have good flowability and compressibility and can be used in direct compression provided a suitable disintegrant and lubricant are present.

- microcrystalline cellulose (Avicel, FMC).

This non fibrous form of cellulose is obtained by spray-drying washed, acid-treated cellulose and is available in several grades which range in average particle size from 20 to 100 um. It is water insoluble but the material has the ability to draw fluid into a tablet by capillary action;

It swells on contact and thus acts as a disintegrating agent. The material flows well and has a degree of self-lubricating qualities, thus requiring a lower level of lubricant as compared to other excipients.


Direct Compression
Drug
Diluent
Glidant
Disintegrant
Mixing
Lubricant
Mixing
Dry Granulation
Drug
Diluent
Lubricant
Mixing
Compression
Comminution
Disintegrant
Glidant
Lubricant
Screening
Mixing
Wet Granulation
Drug
Diluent
Mixing
Binder
Solvent
Wetting
Granulation
Drying
Disintegrant
Glidant
Lubricant
Screening
Mixing
Compression Mix
Fill Die, Compress Tablet, Eject Tablet
Metal check, Dedusting, Coating, Packaging etc..

# THANK YOU