Developemnt of automated capsule production for hospital pharmacies

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INTRODUCTION

Context: Increasing demand, recourse to preparations during stock-outs, possibility of increasing batch sizes following the publication of new BPP: three factors leading to the automation of our preparation processes. **--> Acquisition by Lille University Hospital of an automatic capsule filler (INCAP SE, Bonapace)**

Objectives: Test the excipients used in the pharmaceutical industry and validate the most suitable for the capsule filler.

MATERIALS - METHODS

Selection of excipients specific to automated production from the pharmaceutical industry:

- Microcrystalline cellulose MC (1,2)
- Silicified microcrystalline cellulose SMCC (3,4)
- Mannitol with Sorbitol (6)
- Pre-gelatinised starch APG (7,8,9)

→ CM for manual production reference (10)

Selection criteria :
Particle size, density, hygroscopicity, presence of flow agent

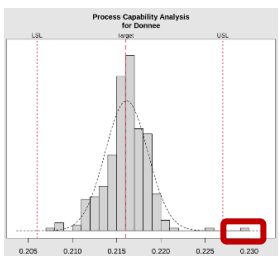
Production protocol :
300 g of excipient
Production of 300 capsules machine
Humidity (54+/-4%)
Temperature (18+/2 °C)

Parameters studied:
Flow of powder in the hopper, clogging of the capsule filler
Capsule mass and standard deviations
→ Calculation of the capability index using R software (qcc library, version 2.7)

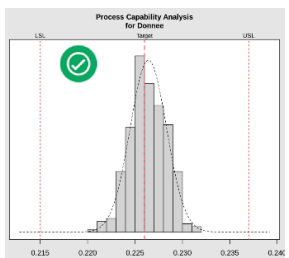
RESULTS

- **10 excipients tested**

	1	2	3	4	5	6	7	8	9	10
Composition	CM	CM	SMCC	**SMCC**	SMCC	Mannitol + sorbitol	APG	APG	APG	CM
Particule size (µm)	130	130	125	**125**	65	150	100	80	90	40
Density (g/mL)	0,33	0,39	0,45	0,44	0,3	0,5	0,62	0,63	0,67	1,5
Sensitive to humidity	Non	Non	Oui	**Non**	Non	Non	Non	Non	Oui	Non
Bulk (mg)	193,1	231,6	216	**226,4**	179,5	194,6	258,4	247,6	268,2	151,1
Standard error (mg)	2,25	2,78	2,42	**1,91**	10,34	35,8	3,48	4,36	4,82	8,2
Capability	**1,4**	**1,41**	**1,45**	**1,91**	0,28	0,08	1,23	0,9	0,9	0,32



Excipient (4) normal distribution centred on the mean, with no values outside the tolerance limits



- ✓ **According to capability indicators Cp > 1.33: satisfactory situation, process under control**
- ✓ **Excipients (1), (2), (3) and (4) obtain capability indices > 1.33**
- ✓ **Unsatisfactory flow and fouling of excipients (1) and (2) compared with (3) and (4)**

CONCLUSION/DISCUSSION

The formulation containing moisture-insensitive silicified microcrystalline cellulose appears to be the optimum excipient for production with the capsule filler. This work is a first step towards developing other capsule formulations using the capsule filler, taking into account the characteristics of each active ingredient.