Plasticization and Anti-plasticization of Maltodextrin Fast-Dissolving Films
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Purpose
The reliability of fast-dissolving films made of maltodextrin (MDX) and glycerin (GLY) has been demonstrated. The MDX/GLY ratio modulated the film mechanical properties: the higher GLY content, the more flexible the films and the lower the tensile strength.
The current work aimed to improve the tensile properties of MDX films without affecting flexibility. Hence, some aminoacids, known to plasticize starch, or PVA-acetate, a water insoluble polymer, acting as filler were added in MDX films and their impact on film mechanical properties was investigated.

Methods
Glycine, proline, lysine or PVA-acetate in the concentration of 5% w/w was added to placebo formulations constituted by MDX and GLY in the 80/20 ratio. Films were prepared by a cast method. The mechanical properties were determined according to ASTM procedure.
The possible interactions among plasticizers and MDX were investigated by ATR-FTIR spectroscopy.

Results
All films disintegrated within 30 seconds. The addition of aminoacids caused a significant softening of MDX films. Indeed, the elastic modulus decreased from about 100 KPa to 40 KPa (glycine and lysine) or 10 KPa (proline). On the contrary, the presence of a water insoluble additive, such as PVA-acetate, determined an increase of the elastic modulus (150 KPa) as well as tensile strength of MDX/GLY films of about 50%.
These features were attributed to interactions among MDX and the adjuvant. As an example, the stiffening of the films due to the addition of PVA-acetate was due to the formation of an H-bond between the carbonyl moiety of such polymer and OH group of MDX since in the ATR-FTIR spectrum the carbonyl stretching band shifted from 1731 to 1713 cm⁻¹.

Conclusion
PVA-acetate can be advantageously added to MDX films to improve tensile strength without affecting their flexibility.