

**Coextruded layered materials appeared to have a lower plasticizer release than PVC alone. As a conclusion, PVC/PE and thermoplastic elastomers alone or coextruded with PVC could be interesting alternatives to PVC tubings with regards to sorption phenomena and plasticizer release” Tokhadze et al (2019).**

Abstract:

Medical tubings in plasticized polyvinylchloride (PVC) are widely used for the infusion of medications but are known in some cases to cause content-container interactions (drug sorption and plasticizer release). The aim of this study was to assess interactions between drugs and five alternative materials to a reference plasticized PVC intravenous (IV) infusion tubing: three were PVC coextruded with polyethylene (PE), polyurethane (PU) or a thermoplastic elastomer (Styrene-EthyleneButadiene-Styrene (SEBS)) and two were SEBS or thermoplastic olefin (TPO) monolayer tubings. Diazepam and insulin were chosen as respective reference of absorption and adsorption while paracetamol acted as a negative control. The concentration of each drug was quantified with liquid chromatography to evaluate a potential loss after a static contact condition and simulated infusion at 1 mL/h and 10 mL/h dynamic condition by an electric syringe pump. A characterization of each material's surface was performed by Fourier transform infrared spectroscopy in attenuated total reflection mode (ATR-FTIR) and by measurement of surface zeta potential. Plasticizer release was quantified by gas chromatography coupled with mass spectrometry (GC-MS). For all tubings except PVC/PU, no loss of paracetamol was observed in any condition. Diazepam sorption appeared to be less important with PVC/PE, PVC/SEBS, SEBS and TPO tubings than with PVC, but was more important when using PVC/PU tubings. PVC tubings induced the least loss of insulin amongst all the studied materials. Surface analysis by ATR-FTIR highlighted the presence of a plasticizer (that could be attributed to Tris (2-Ethylhexyl) Trimellitate (TOTM)) in the coextruded SEBS layer of PVC/SEBS, which could have influenced drug sorption, probably as a consequence of a migration from the PVC layer. Coextruded PVC/SEBS and PVC/PE presented the lowest zeta potential of all studied materials with respective values of -39 mV and -36 mV and were related to the highest sorption of insulin while PVC/PU with the highest zeta potential (about -9 mV) presented the highest absorption of diazepam. Coextruded layered materials appeared to have a lower plasticizer release than PVC alone. As a conclusion, PVC/PE and thermoplastic elastomers

alone or coextruded with PVC could be interesting alternatives to PVC tubings with regards to sorption phenomena and plasticizer release.

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### Reference:

Tokhadze, N., Chennell, P., Bernard, L., Lambert, C., Pereira, B., Mailhot-Jensen, B. and Sautou, V. (2019) Impact of alternative materials to plasticized PVC infusion tubings on drug sorption and plasticizer release. *Scientific Reports*. 9(1), p.18917. doi: 10.1038/s41598-019-55113-x.