Background: Little is known about secondhand electronic cigarette vapor (ECV) exposure in children. **Aims:** To detect biomarkers of exposure and downstream effects, comparing less invasive biomatrices to blood sampling, describe parental use behaviors associated with child cotinine levels, and identify parental beliefs. **Methods:** We used a 2-group comparative design with follow up focus groups. Parent/child dyads were recruited through flyers and social media for 2 groups: children with/without exposure. Parents completed a questionnaire and participated in follow-up focus groups. We obtained blood, urine, saliva, and exhaled breath condensate (EBC) from the children. The study was approved by an IRB. We conducted pair-wise correlations between biomatrices and used GLM to note relationships between parent behaviors and child cotinine. Biological data were analyzed using untargeted high-resolution metabolomics with feature annotation for between group comparisons. Parental beliefs were described and expanded upon with focus groups. **Results:** Forty-eight dyads participated in the primary study with 6 parents participating in follow-up focus groups. Metabolites found in saliva and EBC were moderately to highly correlated with those found in blood. Metabolites with known association to chemicals in electronic cigarette cartridges were detected in exposed children. Additionally, metabolites associated with oxidative stress and dopamine production were altered. Of behaviors considered, only higher concentrations of nicotine in electronic cigarette cartridges were associated with elevated cotinine in exposed children. Most parents had not stopped smoking but were dual users (smoking and vaping), many indicated that they thought secondhand vapor exposure was not harmful for their children, and parents struggled with nicotine addiction. **Conclusion:** We have demonstrated that exposures and downstream effects of secondhand ECV can be detected using less invasive biomatrices. Encouraging parents to decrease the concentration of nicotine in their devices may minimize secondhand exposure. Education is needed for parents about nicotine use cessation and secondhand exposure.