Early stages of chemotherapy-induced peripheral neurotoxicity (CIPN) are poorly investigated due to the lack of simple tool. SUDOSCAN is a simple, quick (<3 minutes), non-invasive and quantitative method to assess small fiber neuropathy, based on an electrochemical reaction between sweat chlorides and stainless-steel electrodes. This study aimed to evaluate SUDOSCAN in the detection and follow-up of early CIPN. 15 patients receiving Oxaliplatin (12 males, mean age: 60 ± 10 years) and 16 Paclitaxel (6 males, mean age: 64 ± 15 years) were involved in the study. At each chemotherapy infusion cumulative dose of chemotherapy was calculated, Total Neuropathy Score (TNSc) was performed and Electrochemical Skin Conductances (ESC) of hands and feet expressed in microSiemens (µS) were assessed by SUDOSCAN. For patients receiving Oxaliplatin hands ESC changed from 78 ± 9 to 68 ± 14 µS (p < 0.0001) and feet ESC from 82 ± 10 to 75 ± 14 µS (p = 0.0005) while TNSc changed from 3.3 ± 4.3 to 3.6 ± 2.6 (p = 0.001) for mean cumulative dose changing from 250 ± 264 to 429 ± 248 (mg/m²). In patients receiving Paclitaxel hands ESC changed from 62 ± 20 to 44 ± 18 µS (p < 0.0001) and feet ESC from 72 ± 18 to 60 ± 20 µS (p = 0.0005) while TNSc changed from 5.8 ± 2.2 to 6.3 ± 2.4 (p = 0.001) for mean cumulative dose changing from 1180 ± 1255 to 1307 ± 1380 (mg/m²). When looking at asymptomatic patients mean TNSc changed from 3 ± 3 to 4 ± 3 (p = 0.0002). Mean hands ESC changed from 66 ± 20 µS to 55 ± 21 µS (p < 0.0001), while mean feet ESC changed from 71 ± 21 µS to 64 ± 23 µS (p < 0.0001), suggesting that SUDOSCAN could help detect and quantify CIPN even in asymptomatic patients. This preliminary study demonstrated that small fiber neuropathy can be followed using SUDOSCAN in patients receiving chemotherapy. These preliminary results observed during on-going chemotherapy must be confirmed in a larger population with measurements performed before the initiation of chemotherapy and during its follow-up.