Fig S1: In vivo experimental timeline for A) Trans-nasal mucosal rat graft model and B) rat 6-hydroxydopamine (6-OHDA) heterotopic mucosal graft model of Parkinson’s disease. Rats were dosed with 0.15 mg/kg of either BDNF AT saline or liposomal formulations.
**Fig S2:** Upregulation of BDNF in rat schwannoma cell line RT4-D6P2T after treatment with 20 nM of BDNF-AT compared to inactive control oligonucleotide (real time PCR data, n=6, *** - t-test p<0.001).

| Sample                  | Average size (nm) | Average Polydispersity index | Average charge (mV) | % Encapsulation efficiency |
|-------------------------|------------------|------------------------------|---------------------|----------------------------|
| Blank cationic Liposomes| 206.5            | 0.208                        | 33.4                | NA                         |
| BDNF AT cationic liposomes| 229.44 ± 17.6    | 0.235 ± 0.04                 | 37.28 ± 3.3         | ~100%                      |

**Fig S3:** TEM (uranyl acetate) images and characterization data (average size, PDI and charge) for the blank (no BDNF AT) (n=3) and BDNF-AT Liposomes (n=3).
**Fig S4:** A-C. Live/dead assay in RT4-D6P2T rat schwannoma cells after exposure to 50-300nM of vehicle control (NEG), liposome encapsulated BDNF-AT (AT-LIPO), and BDNF-AT in saline (AT-SALINE) for 24-48 hours demonstrating greater than 80% viability at the doses and time-points studied. (Data presented as mean ± SD, Student’s t-test).
Fig S5. Bar graphs quantifying BDNF protein upregulation in ipsilateral and contralateral cortical regions of rat brain among the liposomal (AT-LIPO, n=4) and saline (AT-SALINE, n=4) groups as compared to negative control (NEG, * p<0.05, ** p<0.01; two-tailed unpaired Student’s t-test). Data are presented as mean ± SD.