Table 1: Summary of studies on intraductal delivery of chemotherapeutic agent via intraductal route

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| Objective | Formulation | Drug | Animal/cell lines | Outcome | Reference |
| To understand the influence of particle size and formulation on the retention of a breast duct and lymph node. | PLGA nanoparticles.  Microparticles and gels,  Fluorescent-labeled polystyrene (PS) particles | Cy 5.5 dye was used for investigation | Rat | Longer retention in the duct for polystyrene with the size of 1000nm was observed compared to 100 and 500nm nanoparticles. A five-fold increase in ductal retention half-life was observed in polystyrene microparticles compared to nanoparticles. Compared to nanoparticles, longer retention of PLGA in situ gel and microparticles were observed. | [80] |
| To investigate the toxicity of perductal and IV paclitaxel exposure on the chemically-induced breast cancer on female S-D rats | Preductal or intraperitoneal injection | Paclitaxel, | female Sprague-Dawley (SD) rats | No toxic side effect was observed with the administration of periductal paclitaxel. A significant reduction can be observed in rats with periductal administration of paclitaxel compared to intraperitoneal injection of paclitaxel. There was an increase in apoptosis and a decrease in microvessel density observed in periductal administration compared to intraperitoneal injection. | [82] |
| To study the effectiveness of intraductal administration of 4-hydroxytamoxifen (4-OHT) and pegylated liposomal doxorubicin (PLD) in the prevention and the treatment of rat mammary tumors induced by N-methyl-N-nitrosourea (MNU) | Liposomes | 4-hydroxytamoxifen & Doxorubicin | N-methyl-N-nitrosourea caused Sprague-Dawley rats and spontaneous HER-2*/neu* transgenic mouse | The intraductal administration of 4-OHT and PLD effectively prevents and treats non-invasive mammary tumors in rats and mice. Longer serum half-life and reduced toxicity were observed in treatment with PLD compared to free doxorubicin. No toxic side effect is observed in intraductal PLD. | [83] |
| To investigate the chemotherapeutic effects of intraductal administration of ciclopirox loaded nanocarriers. | CPX nanosuspension, CPX-Zn nanosuspension, CPX-Zn PLGA nanoparticle | Ciclopirox (CPX)， ciclopirox and zinc (CPS-Zn) | 13762 Mat B III cell line, F344 rats | The release of CPX was slowed with CPX-Zn nanosuspension and is even slower in CPX-Zn incorporated in PLGA nanoparticles. The mammary tissue persistence is the longest in CPX-Zn nanoparticles and the lowest in CPX nanosuspension. Five-fold dose reduction was observed in CPX-Zn nanoparticles compared to CPX nanosuspension to provide a similar efficacy. | [46] |
| To study the role of Nano Curc in N-methyl-N-nitrosourea (MNU)-induced chemical carcinogenesmodel of rat breast cancer and the effectiveness of intraductal administration | NanoCurc (polymeric nanoparticle encapsulated formulation of curcumin), | Curcumin | 3 to 4 weeks age of female Sprague–Dawley rats | All three chemoprevention modalities observed a significant reduction in mammary tumor incidence. Compared to free curcumin, there is a substantial reduction in mean tumor size in intraductal NanoCurc. | [84] |
| To determine the tolerability of carboplatin and doxorubicin administered by an intraductal route. | Pegylated liposomal | Carboplatin, doxorubicin | Breast cancer women | Chemotherapeutic agents were generally well-tolerated, and the adverse effects observed in treating both chemotherapeutic agents were not considered severe. | [81] |