## Supplementary Table 2. Contrast Agent Effects on Cells and Tissues.

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| Author/Year | Injectate | Target Cells/Tissue | Study Design | Results/Conclusion |
| Oznam et al 2017 (22) | Iopromide (non-ionic)  Gadolinium based agent | Chondrocytes | In vitro study.  Human articular chondrocytes were exposed to iopromid, gadolinium, or non-drug control group.  Cell viability was measured at 0hr, 2h and 6hr. | Statistically significant cell viability was observed with iopromid and gadolinium at 2hr and 6hrs (p<0.05).  Gadolinium resulted in more cell death. |
| Iwasaki et al 2014 (11) | Iotrolan (non-ionic) | Nucleus pulposus | In vitro study.  Healthy human nucleus pulposus cells were exposed to iotrolan for 30, 60, and 120 minutes | No effect on nucleus pulposus viability or induce apoptosis. |
| Kim et al 2013 (19) | Ioxitalamate (ionic contrast)  Indigocarmine (ionic contrast) | Nucleus pulposus | In vitro study.  Healthy human nucleus pulposus cells were exposed to various concentrations of ioxitalamate and indiocarmine. Cell viability was measured at 1, 2, and 3 days. | Ioxitalamate and indigocarmine, induced statistically significant NP cell death that was both time- and dose dependent (p<.05). |
| Kim et al 2014 (20) | Ioxithalamate (ionic)  Ioxaglate (ionic contrast)  Iopromide (non-ionic contrast)  Iodixanol (non-ionic contrast) | Nucleus pulposus | In vitro study.  Healthy human nucleus pulposus cells were exposed to various concentrations of different contrast media. Cell viability was measured at 2 days. | Human disc cell death was time- and dose-dependent in response to contrast media.  Nonionic was least toxic on human disc cells. |
| Chee et al 2013 (21) | Iopamidol (non-ionic contrast)  Iohexol (non-ionic contrast) | Bovine Disc cells | In vitro study.  Bovine intervertebral disc cells were treated with varying concentrations of iopamidol and iohexol. Cell viability was measured at 6hrs and 16hrs. | Iopmidol was slightly cytotoxic at 1:2 concentration with saline. No effect when dilute to 1:4 with saline.  Iohexol demonstrated no effects at different concentrations and time points. |
| Midura et al 2016 (42) | Gadolinium based agent | Murine chondrocytes | In vitro study.  Rat chondrocytes were exposed to control group and varying concentrations of gadolinium.  Cell viability was measured after 48hrs. | Even at 3 times the typical arthrographic dose, gadopenetate demonstrate only minimal effect on cellular viability. |
| Greisberg et al 2000 (43) | Gadolinium based agent | Bovine chondrocytes | In vitro study.  Bovine chondrocytes were exposed to gadodiaimide for 16 h. | Chondrocyte apoptosis was induced in a dose-dependent manner after exposure to gadodiamide. |
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Note: Ionic agents generally demonstrated to be the most cytotoxic while non-ionic agents were demonstrated to be the least cytotoxic. These effects were shown on variable cell and tissue types.