INTRODUCTION

• Recurrence of NMIBC after TURBT is observed in 40-80% of patients

• Intraoperative spillage of cells can lead to tumour cell re-implantation and local recurrence

• Intravesical chemotherapy is effective at reducing recurrence, but is underutilised due to high cost and toxicity

• Bladder irrigation with water as opposed to saline may be a comparable alternative to chemotherapy as it causes osmotic cytolysis in addition to mechanical dilution to remove remaining viable cells
AIMS
1. To determine the time course of osmotic effects of water on bladder cancer cells in vitro and in vivo
2. To determine whether water is able to lyse cancer cell lines other than bladder cancer in vitro
3. To determine what degree of contamination by urine or blood nullifies the effects of water’s osmolytic properties

RESULTS

IN VITRO (Figures 1 & 2)
• Water caused 100% cell lysis within 20 minutes
• Both saline- and glycine-irrigated samples had viable cells remaining at 5h
• Similar results were achieved on all 4 other cancer cell lines
• Gradation study showed that an increase to 0.045% NaCl would impact the osmotic functions of water

IN VIVO (Figure 3)
• 14 patients received water irrigation in vivo
  o Time 0 (median) = 14 x 10^3 cells
  o 1 hour onwards (median) = 0 cells
• 9 patients received saline irrigation in vivo
  o Time 0 (median) = 40 x 10^3 cells
  o 3 hours (median) = 20 x 10^3 cells
  o Median cell count never reached zero

METHOD

IN VITRO
• Two bladder cancer cell lines (HT1197, HT1376) were exposed to water, 0.9% saline or 1.5% glycine
• Cell counts were made at regular intervals for 5h
• Cell counts in triplicate were performed with trypan blue exclusion
• These experiments were repeated for colorectal (LIM2405, KM23), ovarian (COV434), and renal (SKRC52) cancer cell lines

IN VIVO
• 21 patients received 3h or saline or water irrigation post-TURBT
• Hourly 200mL washout samples were collected for cell counting at 0, 1, 2, and 3 hours post-TURBT
• Selected patient samples were sent for immunohistochemistry (IHC)
RESULTS CONT.

- IHC (Figures 4 & 5) on ex vivo samples showed significant numbers of bladder epithelial cells in saline-irrigated patients in contrast to water-irrigated patients.

- Cytokeratin 7 (CK7) showed bladder epithelial cells in brown.

**Figure 4. IHC for a saline-irrigated patient**

**Figure 5. IHC for a water-irrigated patient**
CONCLUSIONS

Water is able to rapidly lyse bladder cancer cells *in vitro* and *in vivo*. A short 3-hour period of water irrigation post-TURBT may be an effective intervention to reduce bladder cancer recurrence.

- Water is able to lyse viable cells in at least 4 other cancer cell lines
- An increase from 0% NaCl (pure water) to 0.045% NaCl was sufficient to alter the efficiency of cytolysis

ACKNOWLEDGEMENTS

The clinical part of this project is supported by an ANZUP Below-the-Belt grant. We would also like to thank Monash University for their generous scholarship awarded to Ms Nandurkar.
Lytic Effects Of Water On Bladder Cancer Cells – Implications For Continuous Bladder Irrigation After TURBT

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2. To determine whether water is able to lyse cancer cell lines other than bladder cancer in vitro
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IN VITRO

- Two bladder cancer cell lines (HT1197, HT1376) were exposed to water, 0.9% saline or 1.5% glycerol
- Cell counts were made at regular intervals for 5h
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