

# بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ





# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



# جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Ain Shams University  
Faculty of Medicine  
Histology & Cell Biology Department

# **Histological Evaluation of Adipose MSCs Seeded Intestinal Submucosa versus Unseeded Submucosa in Reconstruction of Urinary Bladder Defect**

***Thesis***

***Submitted for Partial Fulfillment of M.D Degree  
in Histology and cell biology***

***By***

**Eman Gomaa El Saeed**

***Assistant Lecturer of Histology and cell biology  
Faculty of Medicine- Ain Shams University*** □

***Under Supervision of***

**Dr. Manal Hassan Moussa**

***Professor of Histology and cell biology  
Faculty of Medicine, Ain Shams University***

**Dr. Gehad Ahmed Hammouda**

***Professor of Histology and cell biology  
Faculty of Medicine, Ain Shams University***

**Dr. Sahar M. M. Omar**

***Professor of Histology and cell biology  
Faculty of Medicine, Ain Shams University***

**Faculty of Medicine  
Ain Shams University  
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# قالوا

سببناك لا تعلم لنا  
إلا ما علمتنا إنك أنت  
العليم العظيم

صدق الله العظيم

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## *Dedication*

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A decorative green vine graphic with small leaves and curls, positioned in the bottom right corner of the text area.

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## List of Abbreviations

<b>Abb.</b>	<b>Meaning</b>
<b>ANOVA</b>	One way analysis of variance test
<b>BA</b>	Bladder augmentation
<b>BAM</b>	Bladder acellular matrix
<b>BSM</b>	Bladder submucosa
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>DMEM</b>	Dulbecco's modified Eagles medium
<b>ECM</b>	Extra Cellular Matrix
<b>EDTA</b>	Ethylene diaminetetraacetic acid
<b>EGF</b>	Epidermal growth factor
<b>ESCs</b>	Embryonic stem cells
<b>FBS</b>	Fetal bovine serum
<b>FGF</b>	Fibroblast growth factor
<b>HCL</b>	Hydrochloric acid
<b>HPF</b>	High power field
<b>mL</b>	Millilitre
<b>MSCs</b>	Mesenchymal Stem Cells
<b>PAS</b>	Mac Manus Periodic acid Schiff's reaction
<b>PBS</b>	Phosphate buffer saline
<b>PGA</b>	Polyglycolic acid
<b>PLA</b>	Polylactic acid
<b>PLGA</b>	Polylactic-co-glycolic acid
<b>RPM</b>	Rate per minute
<b>SD</b>	Standard deviation
<b>SIS</b>	Small-intestinal submucosa
<b>SMCs</b>	Smooth muscle cells
<b>TGF<math>\alpha</math></b>	Transforming growth factor $\alpha$
<b>TGF<math>\beta</math>1</b>	Transforming growth factor $\beta$ 1
<b>UCs</b>	Urothelial cell
<b>VEGF</b>	Vascular endothelial growth factors
<b><math>\alpha</math> SMS</b>	Alpha smooth muscle actin

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## Abstract

**Background:** Repairing urinary bladder (UB) defect by enterocystoplasty remains the gold standard surgical bladder reconstruction procedure to increase the capacity and compliance of dysfunctional bladders. However, many complications were recorded.

**Aim of the work:** This work aimed to compare the consequences of reconstruction of urinary bladder defect using untreated small intestinal submucosal (SIS) matrix versus seeded and unseeded decellularized SIS matrix.

**Material and Methods:** Fifty female albino rats were used in this study. The animals were divided into three groups: Group I (Control) included ten adult rats from which ileal tissue was obtained. Group II included ten adult rats in which their UB defect was repaired by untreated cellular SIS. Group III included twenty adult rats that were subdivided into two subgroups, 10 rats each; Subgroup IIIA where rats had their UB defect repaired by acellular SIS and subgroup IIIb where rats had their UB defect repaired by acellular SIS seeded with adipose mesenchymal stem cells (AMSCs). Ten young rats were used for preparation of AMSCs. Morphometric and statistical analysis were also performed.

**Results:** In rats where UB defect was repaired by untreated cellular SIS, the graft area showed loss of epithelial polarity, presence of intraepithelial cysts and occasional extension of urothelium to the outer surface forming fistula. There were areas of metaplasia with the appearance PAS positive cells. In the lamina propria, there was areas of lymphocytic infiltration together with significant increase in the collagen fiber deposition ( $p < 0.05$ ). There was a significant decrease thickness of muscle layer as compared to control ( $p < 0.05$ ). In rats where UB defect was repaired by acellular SIS, urothelium in the graft area showed occasional squamous metaplasia and often the urothelium extended to the deeper layers forming Brunns's nest. There was minimal muscle regeneration in the graft area. However, in rats where UB defect was repaired by acellular SIS seeded with AMSCs, the urothelium in the graft area was of the transitional type but with loss of polarity with uniform thickness. Mucosa showed minimal collagen fibers deposition and muscle layer was thick showing no significant difference from the control ( $p > 0.05$ ).

**Conclusion:** Acellular SIS seeded with AMSCs showed better results compared to non-seeded and cellular SIS in reconstructing urinary bladder defects.

**Key words:** small intestinal submucosa, urinary bladder defect, urothelium, rat.