Diabetic nephropathy is still a major cause of end-stage renal failure (ESRF) in Israel. Successful pancreas or islet cell transplantation are currently the only therapies to achieve normoglycemia and exert favorable effect on secondary complications. Pancreas-kidney (PK) transplantation is an established treatment for type 1 insulin-dependent diabetes mellitus (IDDM) with ESRF. The aim of this study was to assess whether a geographically isolated center with a low patient volume can obtain the same results as a high-volume center. Inadequate results should raise the issue of perpetuating pancreas transplantation; the established alternative in Israel being kidney transplantation alone. We present our experience in PK transplantation in terms of patient and graft outcome and complications.

Patients and Methods
Since January 1995, 41 primary PK transplantation have been performed in our center; 40 simultaneous PK transplantations and 1 pancreas after kidney (PAK) transplantation. Mean duration of IDDM was 24 years. PK transplantations were performed in 25 male and 16 female patients, mean age 39 years. Thirty-eight patients were on dialysis (28 on hemodialysis, 10 on peritoneal dialysis) with a mean duration of 20 months. Mean donor age was 25 years (range: 12 to 50 years). Pancreas venous drainage was performed to the iliac vessels or to the inferior vena cava (3 cases). A donor iliac artery Y-graft was used for arterial extension. Enteric drainage with Roux-en-y duodeno-jejunostomy has been routinely performed since 1996. Bladder drainage was used previously and in PAK transplantation. All recipients received induction therapy with ATG-F. Maintenance treatment consisted of low-dose steroids, azathioprine (replaced by mycophenolate mofetil since 1997), and cyclosporine or tacrolimus. Twenty late patients, included in a European study, had steroids withdrawn within 6 months.

Results
One-year patient survival rate was 93%. Thirty-four (83%) patients are alive (mean follow-up, 36 months). Causes of death were intra-abdominal sepsis (day 49, day 160, and 55 months), cardiovascular (day 1 and 56 months), uremia (24 months), and CVA (74 months). One-year pancreas survival rate was 78%. Causes of loss were graft thrombosis (5), rejection (1), and patient death (3). During the last 3 years, no graft has been removed. Censoring death, the actual first-year pancreas survival rate is 84%. Mean Hb-A1C and C-peptide levels at 1 year were 5.4% and 3.2 pmol/mL, respectively. One patient with Hb-A1C of 8.6% and normal C-peptides was treated with oral hypoglycemic preparations. At 3 years, there are 28 (68%) functioning grafts.

One-year kidney graft survival rate was 88%. Causes of loss were patient death (3), renal artery pseudoaneurysm (1), and intra-graft sepsis (1). Censoring death, the actual first-year kidney survival rate is 95% with a mean creatinine level of 1.57 mg/dL (range: 0.8 to 2.9). Today there are 33 (80%) functioning grafts at 3 years. Mean first hospital stay was 29 days. Thirty-one patients were readmitted during the first year (mean, 1.7 re-hospitalizations). Re-laparotomies were performed in 23 patients (56%) during the first year for the procedures of graft pancreatectomy (5), graft nephrectomy (2), drainage of abscesses (9), enteral anastomotic leaks (2), ureterovesical anastomotic leak (1), small bowel obstruction (2), small bowel perforation (1), and exploratory laparotomy (3). Eight patients were operated on for acute bleeding. Thirty-three patients (80.5%) had severe infection episodes during the first year urinary tract infection, 20; cytomegalovirus infection, 8; wound infection, 6; percutaneously drained intraabdominal abscess, 5; pneumonia, 3; and antibiotic colitis, 4). Twenty-four episodes of kidney biopsy-proven acute rejection occurred in 17 (41%) patients.

Discussion
PK transplantation is demanding in terms of the surgical technique and postoperative management due to the high potential for complications. Analysis of our single-center experience in PK transplantation reported here demonstrates successful outcome in terms of patient and graft survival and graft function. Our 1-year results of 93% patient survival rate, 78% pancreas graft survival rate, and 88% kidney graft survival rate are actuarial, without censoring death or withdrawal for any reason. They are com-

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parable to results from larger series worldwide. Our com-

plication rate appears to be higher than reported in larger-

volume centers. However, it should be emphasized that are

posttransplantation complications occurring during the first

year were treated in our hospital. A worldwide decrease in

the incidence of complications, attributed to changes in

surgical techniques and new immunosuppressive protocols,

also is reflected in our series. Stricter donor selection

criteria and improved recipient status also have improved

outcome in our series.

Despite the fact that pancreas transplantation is plagued

by high morbidity, it has its “raison d'être” in isolated

low-volume centers on condition that they assume complete

responsibility for the entire postoperative care.