

Research Grant Applications to the National Institutes of Health in the Area of Pediatric Nephrology—An Update

ANTONIA C. NOVELLO

National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland 20892

In 1980, the American Society of Pediatric Nephrology requested data from the Division of Research Grants (DRG) in order to evaluate the fate of pediatric nephrology grant applications submitted to the NIH. The Pediatric Nephrology Council was concerned that only a small number of pediatric nephrologists were actively engaged in research. This was thought to be due either to the absence of a pediatric study section or the lack of adequate pediatric representation in current study sections. The response to the request for data by the American Society of Pediatric Nephrology Council was published in *Pediatric Research* 1985. The data covering the period of May 1980 to January 1984 showed an increase in the number of approved pediatric nephrology applications. Although the numbers were too small to warrant statistical evaluation, the pediatric nephrologist applicants were as successful as their adult nephrologist counterparts. In contrast to the prevailing belief, the problem did not reside in the review process, but in the submission rate of applications by pediatric nephrologists. The latter was quite low, but the approval rate was comparable to that for grants in other disciplines. Thus, the data suggested that reorganization of existing study sections or creation of a new one would not remedy the problem addressed by the Pediatric Nephrology Council.

Since January 1984, when this analysis was completed, the number of competing research project grant applications¹ for all of NIH has risen from 16,798 in FY 1983 to 18,675 in FY 1985, with the number of approved applications matching this trend—14,479 in FY 1983 to 16,763 in FY 1985. In order to assess whether the pediatric nephrology community of investigators was part of this 5-yr trend, the previous data were examined, with the addition of FY 1984 and FY 1985 data through the January 1986 Council.

This 5-yr retrospective data analysis included all proposals related to pediatric nephrology submitted to the NIH as part of the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases (NIADDK), rather than only those reviewed by the 10 study sections most frequently involved in the review of pediatric nephrology applications, as was done in the 1985 report. The present approach was thought to yield a more comprehensive analysis of the fate of pediatric nephrology research at the NIH over the last 5 yr. We also looked at the M.D./Ph.D. ratios of the pediatric nephrology community and at five disciplinary categories within the field. All research project applications assigned to the DRG from May 1980 until January 1986 were

evaluated, including all those reviewed by special study sections. The review included traditional research projects (R01's), New Investigator Research Awards (R23's), and career development awards (K04). Training grants (T32's), fellowships (F32's), clinical investigator awards (K08's), and program projects (P01's) were not considered, nor were grants reviewed by the review section of NIADDK.

The time selected was 5 yr and included data from Council meetings from May 1980 through January 1986. As before, data on the applications were obtained from the open-pending files of the Information for Management, Planning, Analysis and Coordination (IMPAC) System, and the description of each application, the hospital and departmental identification, and special NIADDK renal coding were individually checked to ensure accuracy. All applications to the study sections of the DRG were assessed for the total number of nephrology applications, the total number of pediatric nephrology as a subdivision of the latter, grant mechanisms utilized, their approval and award rate, their revision and award rate, and the award rate of pediatric nephrology as compared to total NIH applications.

RESULTS

In this combined data analysis it can be seen that despite the increasing volume of competing research grant applications to the NIH in the last 5 yr, the DRG study sections have managed not to lose sight of small but important areas of biomedical research. The total number of competing research project applications in the area of nephrology in the last 5 yr has averaged more than 300 applications per year (Table 1). The data show that kidney-related applications make up less than 2% of all NIH applications, but constitute a significant portion (11% or more) of the application assigned to NIADDK's extramural programs (Table 1). Pediatric nephrology, as a subset of total nephrology, however, represents less than 1.7% of NIADDK's renal applications, less than 0.2% of all NIH applications, and less than 13% of the total number of nephrology applications.

Looking at the original data (Table 2), it can be seen that when pediatric nephrology data on 10 Study Sections are incorporated into the total DRG submission rate (Table 3), there is only an increase of 12 pediatric nephrology proposals *versus* 293 total nephrology proposals, with nine of the former recommended for approval and four actually funded. The percentage of those recommended for approval for the same time period (Tables 4 and 5) increased from 70% in 1980 to 84% in 1983, with a peak in 1982 of 89%. Similarly, the percent of funded applications increased from 32% in 1980 to 38% in 1983, with a dip in the award rate to 26% in 1981. In the last 2 yr (FY 1984 and FY 1985), 66 pediatric nephrology proposals were submitted to NIH, of which 60 were approved, six disapproved, and 19 funded.

The approval rate of the last 2 FYs has increased from 85 to

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Reprints, Antonia C. Novello, M.D., M.P.H., Captain, U. S. Public Health Service, Clinical Professor, Pediatrics, Georgetown University Hospital, Deputy Director, National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD 20892.

¹R01, P01, R23, R43, R44, and U01 projects. R01 = Research Project (traditional); P01 = Research Program Projects; R23 = New Investigator Research Award; R43, R44 = Small Business Innovation Research Grants; U01 = Cooperative Agreements.

Table 1. No. of NIH competing research project applications* (May 1980–January 1986 Review Cycles)

Review cycle	NIH total	NIADDK total	Kidney and related diseases†		Kidney and related diseases* as a % of:	
			Total	Pediatrics	NIH total	NIADDK
May 1980–January 1981	16,286	2098	282	27	1.7	13.4
May 1981–January 1982	17,871	2339	310	24	1.7	13.3
May 1982–January 1983	17,839	2279	355	37	2.0	15.6
May 1983–January 1984	17,044	2314	301	38	1.8	13.0
May 1984–January 1985	18,825	2479	322	42	1.7	13.0
May 1985–January 1986	20,630	2760	311	24	1.5	11.2

* R01, R23, P01 activities.

† NIADDK.

Table 2. Pediatric nephrology grant applications

FY	No. of applications (10 DRG SS)	Nephrology applications		Pediatric nephrology applications		Pediatric nephrology applications				All NIH funded, average priority score	
		n	%*	n	%†	Recommended		Funded			Funded, average priority score
						n	%	n	%‡		
1980	2,449	229	9	22	0.9	15	68	6	40	187	176
1981	2,371	236	10	24	1.0	19	79	5	26	158	169
1982	2,259	269	12	31	1.0	28	90	12	43	162	160
1983	2,127	221	10	37	1.7	32	86	8	25	167	158

* Based on total number of applications reviewed by the 10 DRG study sections.

† Pediatric nephrology applications reviewed as a percent of all applications reviewed by 10 study sections.

‡ Based on the number of pediatric nephrology applications recommended for approval.

Table 3. Pediatric nephrology research project applications (May 1980–January 1984 Review Cycles)

Review cycles	Nephrology*	Pediatric nephrology†	Approved	Disapproved	Funded‡
May 1980–January 1981	282	27	19	7	6
May 1981–January 1982	310	24	19	5	5
May 1982–January 1983	355	37	33	4	12
May 1983–January 1984	301	38	32	5	12
Total	1248	126	103	21	35

* Based on total number of applications reviewed by DRG.

† Pediatric nephrology applications reviewed as a percent of all applications reviewed by DRG.

‡ Based on the number of pediatric nephrology applications recommended for approval.

Table 4. Pediatric nephrology grant applications

Review cycle	No. of applications DRG/NIH	Nephrology		Pediatric nephrology		Recommended for approval		Funded	
		n	%	n	%	n	%	n	%
May 1980–January 1981	16286	282	1.7	27	0.1	19	70	6	32
May 1981–January 1982	17,871	310	1.7	24	0.1	19	79	5	26
May 1982–January 1983	17,839	355	2.0	37	0.2	33	89	12	36
May 1983–January 1984	17,044	301	1.8	38	0.2	32	85	12	38
May 1984–January 1985	18,825	322	1.7	42	0.2	37	88	14	38
May 1985–January 1986	20,630	311	1.5	24	0.1	23	96	5*	22

* Preliminary FY 1986 data.

96% and the award rate has remained stable at 38%, with a drop to 22% in January 1986 (the latter figure may represent an incomplete 1986 award rate). The approval and award rates for pediatric nephrology as a whole in the last 2 yr (38%) are comparable to those in adult nephrology (37%), all NIADDK (39%), and NIH (37%). In the last year (up to January 1985) the

award rate was better than for NIADDK (38 versus 35%), all of NIH, and for adult nephrology (Table 5). Thus, the fate of pediatric applications is certainly no worse than that of applications to NIADDK or to the NIH as a whole.

As might be expected in pediatric nephrology (as in adult renal and related diseases), applicants holding the M.D. degree pre-

dominate in all the years examined in this report (Table 6). This is in contrast to the NIH as a whole, where about 68% of the scientists hold the Ph.D. degree, and to other medically significant areas of research (e.g. bone and mineral metabolism) where

Ph.D. applicants have increased from 56 to 64% during the same period of time.

Looking at the updated data, it became apparent that pediatric nephrologists in recent years (January 1984—January 1986) were

Table 5. Recommended for approval and award rates for NIH competing research project applications (May 1980–January 1986 Review Cycles)*

Review cycles	Total kidney and related diseases†		Pediatric nephrology†		Fiscal Year	NIADDK total		NIH	
	Approval	Award‡	Approval	Award‡		Approval	Award‡	Approval	Award‡
	%	%	%	%		%	%	%	%
May 1980–January 1981	76	40	70	32	1981	85	41	82	39
May 1981–January 1982	79	34	79	26	1982	87	33	85	35
May 1982–January 1983	88	30	89	36	1983	90	39	86	37
May 1983–January 1984	89	36	84	38	1984	90	39	87	37
May 1984–January 1985	91	37§	88	38	1985	91	35	89	37
May 1985–January 1986					Not available				

* Review cycle groupings and fiscal year data are not comparable.

† NIADDK.

‡ Based on approved applications.

§ Not yet complete (data are as of November 1985).

Table 6. Degrees held by principal investigators with pediatric nephrology* research project applications recommended for approval (May 1980–January 1986 review cycles)

Review cycles	No. of applications†				% Distribution			All NIH research projects % distribution		
	Total	MDs	PhDs	Other‡	MDs	PhDs	Other	MDs	PhDs	Other
May 1980–January 1981	27	33	3	1	85	11	4	24.4	66.4	1.9
May 1981–January 1982	24	19	4	1	79	17	4	23.3	66.1	3.1
May 1982–January 1983	37	33	4	0	89	11	0	22.9	68.5	2.1
May 1983–January 1984	38	32	5	1	84	13	3	22.4	68.6	2.2
May 1984–January 1985	42	32	10	0	76	24	0	21.9	68.9	1.6
May 1985–January 1986	24	22	2	0	92	8	0		Not available	

* Includes NIADDK R01, R23, and P01 activities.

† Approvals only.

‡ Holders of MDs and PhDs and other degrees.

Table 7. Pediatric nephrology research project applications (May 1980–January 1986 review cycles)

Review cycles	Nephrology	Pediatric nephrology						
		Approved	Disapproved	Funded	Revised	Revised funded		
May 1980–January 1981	282	27	19	7	6	3	0	
May 1981–January 1982	310	24	19	5	5	3	1	
May 1982–January 1983	355	37	33	4	12	4	1	
May 1983–January 1984	301	38	32	5	12	7	4	
May 1984–January 1985	322	42	36	5	14	7	3	
May 1985–January 1986	311	24	23	1	5	7	3	
Total	1881	192	162	27	54	31	12	

Table 8. Pediatric nephrology* research project applications by activity (May 1980–January 1986 review cycles)

Review cycles	All activities		Traditional research project (R01)		Traditional research project (2R01)		New investigator research (R23)	
	n	%	n	%	n	%	n	%
	May 1980–January 1981	27	100.0	16	59	4	15	2
May 1981–January 1982	24	100.0	16	67	6	25	1	4
May 1982–January 1983	37	100.0	24	65	7	19	1	3
May 1983–January 1984	38	100.0	24	63	4	11	6	16
May 1984–January 1985	42	100.0	25	60	5	12	7	17
May 1985–January 1986	24	100.0	17	71	4	17	2	8

* NIADDK.

revising their applications and succeeding (at least by 50%) in getting funded (Table 7). Thus, the traditional NIH advice to applicants to respond to the comments in the critique and reapply seems to be well founded.

As previously described, most of the applications processed and reviewed in pediatric nephrology from 1980–1985 have been traditional ROIs and their competitive renewals (Table 8). The second most common mechanism utilized has been the New Investigator Research Award. This new finding indicates a positive trend, showing an increased interest by the pediatric nephrology community. Similarly, the competitive renewals, although

fewer in number than the original applications, continue to have the highest award rate (39 versus 28%) of the pediatric nephrology applications, indicating a sustained interest and vigor in pediatric nephrology research. All other activities, (e.g. K04, K08) continue to be submitted. However, neither their award rate nor their submission rate is comparable to the other two mechanisms of support, except for supplements which fare rather well.

In this current data analysis, an additional parameter was evaluated. Applications were analyzed by subject matter and further classified into five disciplinary categories (Table 9): 1) elements of normal renal function, 2) pathogenesis, 3) pathophysiology, 4) pharmacology, drugs, and 5) management of patient. As shown in Table 10, the first category was by far the largest and fared better than the other four, followed by pathogenesis. Submissions of clinically related proposals have somewhat increased in the last 5 yr, although less so than categories 1 and 2. Since it has not been possible to make precise distinctions between clinical and basic research from the available data and all categories probably contain a number of clinically related proposals, an attempt at identifying clinical versus basic research was made by examining application abstracts, human subject consent forms, aims, and titles. This yielded a further categorical subset labeled "Management of Patient." The results indicate that although the number of clinically related proposals submitted was far smaller than basic research proposals, in most of the last 5 yr the proportion of awards was as large, on the average, as in the previous disciplinary categories. Also, clinically oriented applications in this group had a somewhat greater disapproval rate. The results do indicate, however, in contrast to speculation, that more specialized or basic studies do not necessarily fare better in the NIH peer review process than clinical ones.

In summary, despite an increase in the rate of submission in the field of kidney and related diseases when all DRG study section data are included, the increased number of NIH applications for research in pediatric nephrology observed between 1980 and 1983 has remained stable in the last 2 FYs. Although the numbers as a whole seem larger, the true increase has not been significant enough to warrant statistical evaluation. Several significant trends are clear, however; a steady, albeit small, increase in the submission rate of pediatric nephrology applications in recent years, the simultaneous increase in approval and award rates, and the observation that senior investigators and new investigators alike are applying, competing, and succeeding. The small numbers do not detract from the more important finding that scientists in pediatric nephrology, by becoming aware of their scientific standing at the NIH, have responded by applying, and are succeeding in obtaining biomedical research funds.

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Table 9. Pediatric nephrology scientific disciplines, renal research projects (May 1980–January 1986)

Elements of normal renal function	
Anatomy	
Body fluids, volume, composition, and physical chemistry	
Solvent and solute transport	
Renal metabolism and biochemistry	
Renal circulation	
Glomerular filtration	
Renal handling of sodium, potassium, phosphate, calcium, magnesium, urate	
Acid base balance, ammonia	
Pathogenesis	
Acute renal failure	
Immunology	
Response to infection	
Glomerulopathies	
Renal response to vascular injury	
Diabetes and related subjects	
Disorders of stone formation	
Neoplasia	
Pathophysiology	
Hematology	
Osteodystrophies	
Hypertension renin-angiotensin, aldosterone	
Neurological	
Pharmacology and others	
Monoclonal antibodies	
Mathematical modeling	
Electrophysiology	
Molecular biology	
Urology topics	
Patient management	
Hemodialysis	
Transplant	
Conservative treatment	
Clinical trials	
Treatment of hypertension	

Table 10. Action on pediatric nephrology research project applications by discipline (May 1980–January 1986 review cycles)

	No. of grant applications	Recommended for approval		No. of approved applications funded	
		<i>n</i>	%	<i>n</i>	%
Renal function	101	95	94	28	30
Pathogenesis	94	84	89	16	19
Pathophysiology	9	8	89	1	13
Pharmacology, drugs	10	7	70	1	14
Patient management	31	24	77	8	33