SCHOOL OF PHARMACY
UNIVERSITY of WASHINGTON
Biomedical Regulatory Affairs Master of Science Program

February 17, 2015

TO: David Canfield-Budde
Graduate School, Academic Programs

FROM: Tom Hazlet

COPIES: Sean Sullivan
Peggy Odegard
Chirstene James
Eric Irvin
Paul Detmer

Attached please find Program Review Response for the Biomedical Regulatory Affairs MS program and associated appendices.

Many thanks for your assistance, understanding, and patience throughout this process.

If you have any questions, please don't hesitate to let me know.

On behalf of the Biomedical Regulatory Affairs MS (BRAMS) program faculty, we would like to extend thanks to Drs. Traxler and Kessler for their thoughtful and helpful program review and to Dr. Canfield-Budde for his assistance an encouragement. BRAMS program faculty are sensitive to the issues raised in the review and we are working actively to resolve them.

Overall Comment

A dominant concern raised in the review is that of integrating the BRAMS enterprise with existing School of Pharmacy graduate activities. While we appreciate the sentiment of the concern, it should be remembered that UW's Professional & Continuing Education (PCE) is targeted to adult or non-traditional higher education, offering courses in the evening to students, many of whom are employed full-time. Also, many of the PCE faculty are similarly employed full time by local industry. Classes are offered largely in the evening, making coordination of activities with daytime programs nearly impossible. Nonetheless, a program enhancement, described below, may mitigate some of these differences and move closer to the recommended "increase [in] scholarship associated with the BRAMS program."

A parallel issue is that the Department of Pharmacy's Pharmaceutical Outcomes Research and Policy Program (PORPP), when established in 1998, consciously avoided inclusion of a Master's degree component through concerns about mission and resources. In consequence, blending of BRAMS and other Department of Pharmacy student scholarly activities is constrained. Of note, some BRAMS students have been attending the PORPP weekly "works in progress" research seminar and some PORPP students have attended or provided instructional assistance in BRAMS courses.

Succession planning has been a concern raised in both the School of Pharmacy review and the current Graduate School review. Following the School of Pharmacy review, BRAMS undertook to recruit an individual willing to attend all of the BRAMS courses and complete a program review as the practicum project. The intent was to develop faculty with regulatory affairs / clinical trials expertise, a thorough understanding of BRAMS courses, and to offer recommendations for program improvements. Such an individual would develop program depth and breadth and would be eligible should succession opportunities presented themselves. Dave Hammond was selected and was mentored in his review by Stephen Kerr (College of Education) and Mona Kunselman (PCE). While our "build your own" program has been very valuable, the importance of a "national search" raised in the Program Review is acknowledged.

Several aspects of the BRAMS succession scheme should be mentioned. First, the program director (Hazlet) serves several roles within the School of Pharmacy: his primary appointment in PORPP with teaching and administrative duties (pharmaceutical policy analysis, admissions chair), course master for a core course in the professional pharmacy program (pharmacy law and ethics), chair of the School's Curriculum Committee, and director of BRAMS. So succession will be multifactorial, and will likely involve individual program changes when succession activities become necessary.

Second, as became obvious when BRAMS conducted a national search for faculty when the program started, most regulatory affairs "experts" have developed their expertise through employment in the medical products industry and lack the academic pedigree (i.e., doctoral level degree) typically required for consideration. We anticipate that the Program Enhancement Proposal, below, will improve our options.

Finally, an issue facing the BRAMS program is its current status as a "part time" program (largely 8 credits per quarter) and the Graduate School's interpretation of Homeland Security "full time" (10 credits per quarter) requirements for international students, whether F1 visa holders, or students wishing to convert from H4 to F1 visa status. BRAMS has suspended international applications until the issue is resolved; as of mid-January 2015, 25 potential applicants have been turned away. The program enhancement described will likely eliminate the Graduate School's concern.

Program Enhancement Proposal: Regulatory Affairs & Policy Scholarship

The BRAMS program in collaboration with the School of Pharmacy administration has developed a resource plan that will support establishment of an additional funded faculty position. With revenues from the funded faculty position, existing program revenues, and increased required credit revenues, BRAMS will:

1. Develop a regulatory affairs faculty Assistant-Director position to develop required curricular enhancements; recruit nationally; fund 50% using BRAMS "funded faculty" account, revenues from the additional credits and flexibility in the current budget. Position activities could coordinate with other School of Pharmacy instruction and scholarly activities.
2. Develop a BRAMS program course supplement, seminar format, 1 credit/quarter, 5+ quarters – permitting a regulatory affairs and policy scholarship emphasis
3. Satisfy the Graduate School/Homeland Security interpretation of "full time" (10 credits per quarter) status for F1 and H4→F1 visa students. We have developed a first draft revised schedule what will satisfy the "full time" criterion, and anticipate that it will be established in time to permit international student enrollment starting Autumn 2016. A proposed course schedule is presented in Appendix A.

Other "Key Issues" from the Program Review – "bulleted" items summarized from Program Review

- Broaden marketing of BRAMS

We met with the PCE marketing personnel and requested some refinements in their activities, largely related to PCE alumni contacts and refinement of Google advertising parameters. Changes to the program web site and to the Google-associated advertising parameters have been implemented.

- Connect to other faculty and programs in the department

BRAMS faculty regularly attend Department and School of Pharmacy faculty meetings; many have attended faculty development sessions provided by the Department and the Center for Teaching & Learning to the extent that daytime employment commitments permit.

- Strengthen the teaching quality in the program; improve student evaluations

Student course evaluations from the past several a years are provided in Appendix B for courses and Appendix C for the Practicum. As may be seen, all of the courses receive high student ratings, and improvements in the Practicum have yielded much better ratings. To further strengthen the Practicum, we have implemented two changes taking place Winter 2015: increase the coursemaster's FTE from 50 to 75%, and added a second faculty member at 25%.

- Quality of students

We opine that student quality may be assessed through application criteria, applicant/enrolled data, in-program student performance, and, to the extend data are available, employment following graduation.

The admissions requirements for BRAMS are as follows:

- Bachelor's degree in a science discipline, health sciences, engineering or law from an accredited college or university in the United States or its equivalent from a foreign institution
- A minimum 3.0 grade point average (on a 4.0 scale) for the last 60 graded semester credits or the last 90 graded quarter credits
- Demonstrated English language proficiency for applicants whose native language is not English
- At least one year of professional experience in the medical products industry and previous course work in basic statistics and/or technical writing.

We have found that the Graduate School Memo 8 criteria are insufficient and have implemented a minimum TOEFL iBT of 100 and a minimum of 25 for the "listening" skill for applicants not satisfying the Item 1 institutional instruction in English requirement.

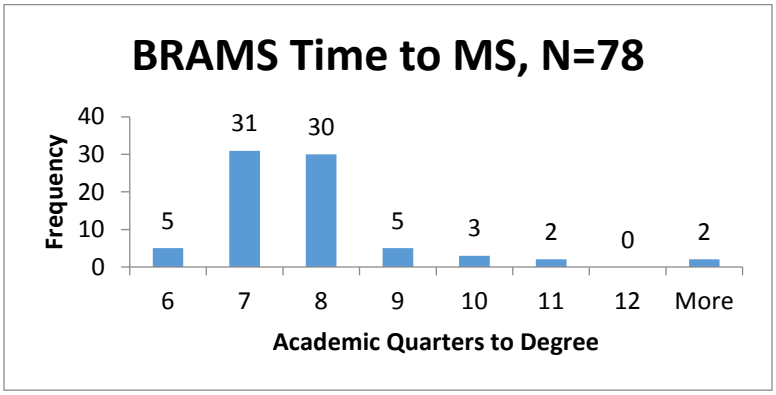
We actively interact with applicants and successfully eliminate many potential applicants who do not meet these requirements. Recent applications and admissions statistics are:

BRAMS Applications and Admissions, 2012-2014

Year	Total	GNM	Enrolled	Rejected	Declined
2012	20	1	18	1	0
2013	30	4	21	3	2
2014	46	9	21	8	7

GNM - Graduate Non-Matriculated Students

Time to degree, excluding students withdrawing/readmitted for personal reasons, averages 7.7 quarters:



Overall drop-out rate for the program is approximately 8.5%, with many of the students leaving for financial or other personal reasons. None of the students have been placed on academic probation.

Number	Category	Percent
41	Currently enrolled Degree students	31.5%
78	Degrees Granted	60.0%
11	Dropped before Graduating	8.5%
130	Admitted Students	

Post-graduation employment information is presented in Appendix D.

- Quality of instruction

Some of the issues raised in the 2010 Graduate School Program Review were identified in the BRAMS Program Review conducted by David Hammond and program enhancements have already been implemented.

- Fiscal Sustainability

Our program "break-even" enrollment is 16 and as may be seen in the Applications and Admissions and Drop-Out tables above, we have remained well above this threshold in the recent past. Combined GNM and BRAMS enrolled students (2012-14 – 19, 24, 30) will bring the program to our 25/class capacity if all of the GNM students are admitted to the degree program.

Miscellaneous requests

- Reevaluate curriculum in comparison to professional organization exams

When developing the curriculum for BRAMS, we reviewed the competency statements for one of the Regulatory Affairs certification examinations. Our intent was never to teach to the exam, but to assure ourselves that important topics were covered. Dave Hammond extended this evaluation to include organizations providing certifications specifically for medical device and clinical trials professionals and has determined that our curriculum meets or exceeds the competency expectations for the certifications reviewed. A major revision of the Clinical Trials course has resolved the concerns raised in the Program Review.

- General questions about students
    - Mix of applicants, with analysis of geographic source

Country of Citizenship 2012-2014	Number
Canada	5
China	1
India	11
Iran	1
Japan	2
Saudi Arabia	1
Taiwan	1
United States	28
Viet Nam	1
Total	51

    - Consequences of blending BRAMS, graduate/professional, certificate, GNM students

When the Regulatory Affairs Certificate program was established in PCE, permission was sought to include a limited number of matriculated pharmacy or other graduate students. With BRAMS, the student mix has increased and in the Regulatory Affairs series, with numerous group activities, the mix of backgrounds is appreciated. Some faculty members in the Clinical Trials series have observed an opportunity for enhancing inter-professional integration using explicit mixing within student discussion groups that will build on differences in student experience.

    - Student competitiveness in comparison to competing programs

Currently, there are fewer than 30 programs in the country graduating students with a MS in regulatory affairs (or similar degree). Many of the other programs focus on only one of the "medical products" domains (biologics, drugs or medical devices) while BRAMS stresses understanding the differences between the three. These other programs are geographically scattered and most graduate less than 50 students per year, many of whom are currently employed in the field. In addition, there are, as of today, in excess of 50,000[1] open positions nationwide in regulatory affairs, clinical research, and quality assurance that students who graduate from these programs would be candidates to fill. Due to these factors, we rarely hear of competition between our graduates and those of competing programs. Given the growth of these programs and the employment opportunities in these fields, it is unlikely that this situation will change in the next decade, thus making it difficult to directly evaluate the competitiveness of our graduates against those of other programs.

As noted in a recent *Grey Sheet* (a medical device newsletter):

[1] A search of an aggregator site for jobs in the US using keywords FDA + Reg Affairs, FDA + clinical research and FDA + quality assurance found 70,000 jobs, reduced to 50,000 to account for duplicates.

> As baby boomers retire, device manufacturers are scrambling to fill quality and regulatory positions – particularly those in leadership roles, according to an industry survey. Yet many firms are discovering that a number of younger employees have not cultivated the necessary quality and regulatory skills demanded by today's complex global market.[i]

We believe that our students will be well positioned to fill this void.

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[i] Schmitt SM. Scarcity Of Quality/Regulatory Experts: A Call To Action For Educators. *The Grey Sheet*, Feb 2015

Appendix A
Draft Revised Curriculum

Credits would be increased to 50 over 5 quarters, and redistributed evenly over the quarters. There would be an option for students not needing to take 10 credits each quarter to extend the Practicum over an additional quarter.

CURRENT		COURSE	Credits		PROPOSED	CREDITS	COURSE	CHANGE?
YEAR 1					YEAR 1			
	QTR 1	PHARM 516	3			3	PHARM 516	SAME
		PHRMRA 524	3			3	PHRMRA 524	SAME
		PHRMRA 536	2			3	PHRMRA 536	ADD 1 CR
						1	SEMINAR	NEW
					TOTAL	10		
	QTR 2	PHARM 517	3			3	PHARM 517	SAME
		PHRMRA 525	3			3	PHRMRA 525	SAME
		PHRMRA 546	3			3	PHRMRA 546	SAME
						1	SEMINAR	NEW
			9		TOTAL	10		
	QTR 3	PHARM 518	3			3	PHARM 518	SAME
		PHRMRA 526	3			3	PHRMRA 526	SAME
		PHRMRA 550	2			3	PHRMRA 550	ADD 1 CR
						1	SEMINAR	NEW
			8		TOTAL	10		
YEAR 2					YEAR 2			
	QTR 1	PHRMRA 527	3			3	PHRMRA 527	SAME
		PHRMRA 554	2			2	PHRMRA 554	SAME
						1	SEMINAR	NEW
		PHRMRA 548	6			4	PHRMRA 548	DECR 2 CR
			11		TOTAL	10		
	QTR 2	PHRMRA 528	3			3	PHRMRA 528	SAME
		PHRMRA 545	3			3	PHRMRA 545	SAME
						1	SEMINAR	NEW
		PHRMRA 548	3			3	PHRMRA 548	MANDATORY
			9		TOTAL	10		
			45		Grand total	50		

Current (Autumn 2014) Schedule
Year One -- Credits: 25 to 30
Autumn
PHARM 516: Introduction to Biomedical Regulatory Affairs (3)
PHRMRA 524: Introduction to Clinical Trials (3)
PHRMRA 536: Skills for the Regulatory Affairs Professional (2)
Winter
PHARM 517: Product Development and Manufacturing Systems (3)
PHRMRA 525: Implementation and Conduct of Clinical Trials (3)
PHRMRA 546: Technical Writing for Biomedical Regulatory Affairs (3)
Spring
PHARM 518: Product Testing, Evaluation and Post-Market Issues (3)
PHRMRA 526: Project Management and the Business of Clinical Trials (3)
PHRMRA 550: Advanced Technical Writing for Biomedical Regulatory Affairs (2)
Summer (Optional)
PHRMRA 548: Practicum (2–5)
Year Two -- Credits: 17-26
Autumn
PHRMRA 527: International Regulatory Affairs (3)
PHRMRA 548: Practicum (2–5)
PHRMRA 554: Advanced Medical Products Regulation I (2)
Winter
PHRMRA 528: Medical Risk Analysis and Management (3)
PHRMRA 545: Data Essentials and Analysis for Regulatory Professionals (3)
PHRMRA 548: Practicum (2–5)
Spring
PHRMRA 548: Practicum (2–5)

University of Washington School of Pharmacy													
Course Evaluation Report													
BRAMS First Year Courses													
Quarter	**Aut 2012**	**Win 2013**	**Spr 2013**	**Aut 2013**	**Win 2014**	**Spr 2014**	**Aut 2012**	**Win 2013**	**Spr 2013**	**Aut 2013**	**Win 2014**	**Spr 2014**	**Aut 2012**
Course	**PHARM 516**	**PHARM 517**	**PHARM 518**	**PHARM 516**	**PHARM 517**	**PHARM 518**	**PHRMRA 524**	**PHRMRA 525**	**PHRMRA 526**	**PHRMRA 524**	**PHRMRA 525**	**PHRMRA 526**	**PHRMRA 536**
Coursemaster	**Tom Hazlet**	**Tom Hazlet**	**Tom Hazlet**	**Hazlet Graham**	**Hazlet Graham**	**Hazlet Graham**	**Erica Jonlin**	**Dave Hammond**	**Hammond Hayashi**	**Erica Jonlin**	**Dave Hammond**	**Hammond Hayashi**	**Jean Feagin**
1. The course as a whole was:	3.46	3.70	4.03	3.55	3.59	3.65	4.23	4.04	4.47	4.60	4.17	4.06	3.11
2. The course content was:	3.54	3.61	4.03	3.80	3.65	3.79	4.31	3.96	4.21	4.42	4.06	4.10	3.06
3. The course organization was:	3.23	3.70	3.83	3.17	3.17	3.13	4.33	3.76	4.13	4.30	4.06	3.97	3.28
4. Availability of extra help when needed was:	3.29	3.36	3.47	3.21	3.83	3.54	4.20	3.75	3.73	4.20	3.91	3.84	3.26
5. Use of class time was:	3.40	3.52	3.77	3.53	3.70	3.50	4.33	3.42	4.20	4.25	3.72	3.56	3.05
6. Amount you learned in the course was:	3.57	3.55	3.80	3.50	3.43	3.46	4.28	3.76	4.20	4.20	3.83	3.81	2.89
7. Evaluative and grading techniques (tests, papers, projects, etc.) were:	3.09	3.63	3.57	3.57	3.52	3.39	3.71	3.71	3.53	3.85	3.80	3.63	2.53
8. Reasonableness of assigned work was:	3.47	3.58	3.77	3.33	3.83	3.65	4.03	3.96	3.93	4.40	4.03	3.94	3.05
9. Clarity of student assignments and responsibilities was:	2.68	3.06	3.43	2.79	3.30	3.00	3.70	3.58	3.87	4.00	3.94	3.59	3.05
BRAMS Second Year Courses													
Quarter	**Aut 2012**	**Win 2013**	**Spr 2013**	**Aut 2013**	**Win 2014**	**Aut 2012**	**Win 2013**	**Aut 2013**	**Win 2014**				
Course	**PHRMRA 527**	**PHRMRA 528**	**PHRMRA 545**	**PHRMRA 527**	**PHRMRA 528**	**PHRMRA 554**	**PHRMRA 555**	**PHRMRA 554**	**PHRMRA 545**				
Coursemaster	**Dave Hammond**	**Raisa Loboda**	**Sara Magee**	**Dave Hammond**	**Floyd Karp**	**Jean Feagin**	**Jean Feagin**	**Dave Hammond**	**Sara Magee**				
1. The course as a whole was:	4.40	3.70	2.92	4.36	4.00	2.14	2.36	3.85	4.00				
2. The course content was:	4.20	4.00	3.17	4.50	4.17	2.71	2.54	3.64	4.25				
3. The course organization was:	4.40	4.20	2.67	4.21	3.79	2.21	2.14	3.71	3.93				
4. Availability of extra help when needed was:	4.40	4.20	3.17	4.14	3.71	1.86	2.46	4.00	4.00				
5. Use of class time was:	4.40	4.00	3.27	4.36	3.93	2.54	2.38	3.79	4.00				
6. Amount you learned in the course was:	4.30	3.90	2.92	4.29	4.07	2.14	2.08	3.93	3.69				
7. Evaluative and grading techniques (tests, papers, projects, etc.) were:	4.50	4.00	2.92	4.07	3.57	2.07	2.23	3.86	4.14				
8. Reasonableness of assigned work was:	4.40	3.60	3.08	4.14	3.69	2.23	2.79	3.64	3.71				
9. Clarity of student assignments and responsibilities was:	4.70	3.70	2.50	4.36	3.62	2.00	2.64	4.07	3.86				
BRAMS PRACTICUM EVALUATIONS													
Quarter	**Aut 12**	**Win 13**	**Spr 13**	**Aut 13**	**Win 14**	**Spr 14**							
Course	**PHRMRA 548**	**PHRMRA 548**	**PHRMRA 548**	**PHRMRA 548**	**PHRMRA 548**	**PHRMRA 548**							
Coursemaster	**Jean Feagin**	**Jean Feagin**	**Jean Feagin**	**Jean Feagin**	**Jean Feagin**	**Jean Feagin**							
1. Practicum as a whole was:	2.20	3.36	2.75	3.20	3.80	3.57							
2. Clarity of expectations was:	2.20	3.25	2.75	3.00	3.33	3.29							
3. Procedures/skills taught were:	2.00	3.17	2.75	3.00	3.50	3.57							
4. Instructor's contribution to the practicum was:	1.80	2.67	2.20	3.50	4.00	3.71							
5. Instructor's effectiveness in teaching was:	1.40	2.33	2.20	3.50	4.00	3.83							

University of Washington School of Pharmacy					
Course Evaluation Report					
BRAMS First Year Courses					
Quarter	**Win 2013**	**Spr 2013**	**Aut 2013**	**Win 2014**	**Spr 2014**
Course	**PHRMRA 546**	**PHRMRA 550**	**PHRMRA 536**	**PHRMRA 546**	**PHRMRA 550**
Coursemaster	**Karen Teal**	**Karen Teal**	**Lynn Rose**	**Karen Teal**	**Karen Teal**
1. The course as a whole was:	4.24	4.53	3.61	4.06	4.00
2. The course content was:	4.00	4.13	3.05	4.13	3.79
3. The course organization was:	4.06	4.00	3.79	3.75	3.60
4. Availability of extra help when needed was:	4.29	4.38	3.74	4.44	4.33
5. Use of class time was:	3.65	3.88	3.68	3.63	3.27
6. Amount you learned in the course was:	4.18	4.00	3.37	3.63	3.33
7. Evaluative and grading techniques (tests, papers, projects, etc.) were:	4.35	4.53	3.74	3.69	4.00
8. Reasonableness of assigned work was:	3.59	3.88	2.58	2.93	4.00
9. Clarity of student assignments and responsibilities was:	3.94	4.24	3.78	3.33	3.40
BRAMS Second Year Courses					
Quarter					
Course					
Coursemaster					
1. The course as a whole was:					
2. The course content was:					
3. The course organization was:					
4. Availability of extra help when needed was:					
5. Use of class time was:					
6. Amount you learned in the course was:					
7. Evaluative and grading techniques (tests, papers, projects, etc.) were:					
8. Reasonableness of assigned work was:					
9. Clarity of student assignments and responsibilities was:					
BRAMS PRACTICUM EVALUATIONS					
Quarter					
Course					
Coursemaster					
1. Practicum as a whole was:					
2. Clarity of expectations was:					
3. Procedures/skills taught were:					
4. Instructor's contribution to the practicum was:					
5. Instructor's effectiveness in teaching was:					

University of Washington School of Pharmacy
Course Evaluation Report

Designation of Course: **PHRMRA 548**
Course Number: **PHRMRA 548**
Name of Course Master **Jean Feagin**
Course Title: **BRAMS Practicum**

E=Excellent(5), VG=Very Good(4), G=Good(3), F=Fair(2), P=Poor(1), VP=Very Poor(0)

	N=	**14**	**12**	**12**	**12**
		Aut 12	**Win 13**	**Aut 13**	**Win 14**
Please rate your practicum experience for this quarter, not the entire practicum.					
1. Practicum as a whole was:		2.20	3.36	3.20	3.80
2. Clarity of expectations was:		2.20	3.25	3.00	3.33
3. Procedures/skills taught were:		2.00	3.17	3.00	3.50
4. Instructor's contribution to the practicum was:		1.80	2.67	3.50	4.00
5. Instructor's effectiveness in teaching was:		1.40	2.33	3.50	4.00
Average Score		**1.92**	**2.96**	**3.24**	**3.73**
Rate your instructor on each of the following.					
1.Knowledgeable and analytical		1.80	2.42	3.50	4.50
2. Clear and organized		1.20	2.42	3.17	3.80
3. Enthusiastic and stimulating		1.00	2.25	3.33	3.80
4. Challenging		2.80	2.92	3.33	4.40
5. Established rapport		1.40	2.50	3.50	3.80
6. Provided direction and feedback		1.25	2.75	3.67	3.83
7. Provided timely feedback		0.80	2.17	2.67	4.17
8. Accessible		1.80	3.00	3.33	4.20
Average Score		**1.51**	**2.55**	**3.31**	**4.06**

Appendix D

AMS Post-Graduate Employment 0215

entered	graduated	post-graduation employment	same company as during BRAMS	
2008	2010	Mycenax Biotech, Inc., Taiwan	no	
2008	2010	got MBA, now at Microsoft	no	
2008	2010	Amgen (but has left, no current knowled	yes	
2008	2010	Physio-Control	yes	
2008	2010	Philips	no	
2008	2010	Metagenics	yes	
2008	2010	Amgen	yes	
2008	2011	UW/Seattle Cancer Care Alliance	no	
2008	2010	Dendreon	yes	
2008	2010	Fred Hutchinson	yes	
2008	2010	Sarepta Therapeutics	no	
2008	2010	UW School of Pharmacy	yes	
2008	2010	IDRI	no	
2008	2010	Seattle Genetics	yes	
2008	2011	hospital pharmacy on eastside	no	
2008	2010			no info
2008	2013			no listing
2008	2010	OligoCo, Inc.	no	
2008	2010	Amgen	yes	
2008	2010	UW	yes	
2009	2011	Genentech	no	
2009	2011	Stanford University	no	
2009	2011	Seattle Children's Hospital	no	
2009	2011	EKOS Corporation	no	
2009	didn't finish	Amgen	yes	
2009	2011	SonoSite, now Health Canada	SS during, HC after	
2009	2011	The Medicines Company	no	
2009	2011	Amgen	yes	
2009	2011	UW, Harborview	yes	
2009	2011	Children's Hospital	no	
2009	2011	Seattle Genetics	yes	
2009	didn't finish	RJS Biologics	yes	
2009	2011	Gilead Sciences, San Francisco	no	
2009	2011	IPSEN	no	
2009	2011	FDA	hired during BRAMS	
2009	2011	Puget Sound Blood Center	yes	
2009	2012	NanoString Technologies	no	
2010	didn't finish	Fred Hutchinson	hired during BRAMS	
2010	2012	Natus Medical Inc.	no	
2010	2012	SonoSite	no	
2010	2012	Pharmacy intern, Multi-Care Health Sys	no	
2010	2012	CTI	no	
2010	2012	CTI	yes	

2010	2012	SonoSite	hired during BRAMS	
2010	2012	Kona Medical Inc.	no	
2010	2012	ValGenesis, Inc. India	no	
2010	2012	Gilead Sciences	no	
2010	2012	L'Oreal Research and Innovation	no	
2010	2012	Gilead Sciences	no	
2010	2012	Bio-Rad Laboratories	no	
2010	2012	Eurofins Lancaster Laboratories	no	
2010	2012	Paccar	yes	
2010	didn't finish	Philips, now consultant	no	
2011	2013	Coulter Program (has moved on)	hired during BRAMS	
2011	2013	Swedish Medical Center	no	
2011	2013	Coulter Program	yes	
2011	2013	self-employed	yes	
2011	in progress	Immune Design Inc.	yes	
2011	2013	Heron Botanicals and Bastyr	yes	
2011	in progress	PATH	yes	
2011	2013			no info
2011	2013	KLS Martin	no	
2011	2013	Stephens and Associates	no	
2011	2013	Swedish Medical Center	no	
2011	2013	Genoa Healthcare	no	
2011	2013	Quorum Review	no	
2011	2013	bioMerieux	no	
2011	2013			no info
2011	2013	Applied Precision, Inc.	yes	
2011	2013	Luye Pharma Group (Beijing)	no	
2012	2014			no info
2012	2014	Fred Hutchinson	hired during BRAMS	
2012	2014	NorConsult, LLc	no	
2012	2014	Kimberley-Clark	no	
2012	2014	Group Health Research Institute	yes	
2012	2014			no info
2012	2014	Seattle Genetics	yes	
2012	2014	Puget Sound Blood Center	hired as temp just afte	looking for work
2012	2014			no info
2012	in progress	SightLife	yes	
2012	2014	Drug and Device Development, Inc.	no	
2012	2014	UW, Otolaryngology	yes	
2012	2014	Spacelabs Healthcare	no	
2012	2014	Philips Oral Healthcare	hired during BRAMS	
2012	2014			looking for work