# In-patient:

The in-patient rotations occur at Children’s National Hospital. As a top 10 ranked pediatric hospital for the last 5 years, ranked 5 in the nation in 2022, and the top ranked NICU for the last 6 years, the learning experience on the in-patient rotation is unrivaled. From single patient rooms in the NICU where families and their babies heal and grow together to institution-wide patient-centered rounds, kids come first at Children’s. That means that our rare disease kids get care that is purposeful, meaningful, and family-centered.

Children’s National is a 323-bed facility houses physicians practicing over 42 pediatric subspecialties. The metabolic patients requiring admission are admitted to a hospitalist-led team with consultation from the genetics service. The hospitalist team consists of medical students, interns, residents, hospitalist fellows, and hospitalist attending. In addition, social work, case management, and child-life join patient-centered rounds each day.

Premature infants and children in need of acute metabolic management in the first 30 days are admitted to our NICU. <https://childrensnational.org/departments/neonatology/neonatal-intensive-care-unit-nicu>

Our CICU admits infants, children, and adults with congenital heart differences and acute or chronic cardiac disease. <https://childrensnational.org/departments/childrens-national-heart-institute/cardiac-intensive-care-unit-cicu>. https://childrensnational.org/news-and-events/video-gallery/tour-the-cardiac-icu

The pediatric intensive care unit (PICU) admits critically ill children with metabolic, genetic, and undiagnosed disorders.

**Highlights**

* **Multidisciplinary approach to each inpatient**: Daily morning rounds with: medical students, residents, the patient’s nurse and charge nurse with input from the metabolic dietician, social worker, case manager. Residents obtain comprehensive training in nutrition, medical, and psychosocial aspects of care.
* **In-patient teams:** Metabolic patients are admitted to a Hospitalist service. This team consists of a senior resident, interns and 3rd year senior residents. The residency program is one of the highest ranked in the nation.
* **Teaching:** One hour of dedicated didactic teaching sessions for resident team per month. Ample opportunities for teaching residents and medical students on inpatient rounds and consultative service.
* **Patient Diversity:** Largest pediatric genetic and metabolism care center in the DC, Virginia and Maryland region. Attracts a very diverse national and international patient population with a large variety of conditions. Trainees gain experience managing genetic and metabolic diagnoses throughout their training.
* **Genetics and Metabolism consultative service:** The combined genetics and metabolism consultative service provides all forms of acute metabolic care. Trainees actively manage all consult patients in the ICU’s and other services requiring genetics and metabolism team assistance.

**Out-patient**

Our out-patient clinic is housed within the Rare Disease Institute (<https://childrensnational.org/departments/rare-disease-institute#:~:text=Children%E2%80%99s%20National%20Rare%20Disease%20Institute%20%28CNRDI%29%20is%20a,remain%20largely%20unknown%20to%20the%20general%20medical%20community>.) . The team of geneticists, genetic counselors, dietitians, coordinators, nurse practitioners, and case managers work together to optimize patient care. We are in brand new space at the new Research and Innovation Campus, allowing trainees to see patients just feet from their dedicated work space.

* **Genetics continuity clinic:** Weekly continuity outpatient clinic at CNHS main hospital where fellows have their own continuity patients scheduled. Patients are scheduled specifically for each trainee who takes primary responsibility for the care of the patient and for communication with associated staff and family members.
* **Ambulatory pediatric rotation**: Month long rotation during 1st year of fellowship training to increase exposure to ambulatory pediatric genetics and metabolism
* **Ambulatory adult rotation**: Month long rotation during 1st year of fellowship training to increase exposure to ambulatory adult genetics and metabolism
* **Multispecialty rotation:** Two month long rotation during the 2nd year of training. Fellow gains experience caring for patient in disciplines germane to the practice of pediatric genetics including NF1, craniofacial, skeletal dysplasias, cancer genetics, neurogenetics, Down syndrome clinic, neurogenetics, white matter disorder clinic, and mitochondrial disorder clinic.
* **Faculty supervision:** Each outpatient clinic session is supervised by a genetics faculty member with special interest in education. Patient data and medical decision making are reviewed subsequently for each patient.
* **Metabolic clinic:** All metabolic patients are seen in metabolic clinic with full involvement of the metabolic dietician team if dietary management is involved in their care. In addition, a full time staff member serves as the metabolic clinic manager to help with insurance approval, medical foods, formula, and medication requests.

**Acting Attending**

During the Acting Attending Rotation, the trainee has the opportunity to completely “run the show”. As Acting for 2 weeks on in-patient and 2 weeks on out-patient, the trainee has the opportunity to create their own leadership style and build confidence in caring for simple and complex genetic and metabolic patients.



**Multi-Disciplinary Clinics**

During the Multi-Disciplinary and Specialty Genetics clinic rotation, participants have the opportunity to function as the geneticist in a mulit-disciplinary clinic setting. The resident should plan to attend each of the specialty clinics at least twice during their training. The list of regularly scheduled specialty clinics is listed below. The requirements and expectations for the resident in specialty clinic are the same as those in genetics clinic listed above, with the additional requirement that the resident read about the disorder(s) prior to the clinic, and attend any pre- or post-clinic conference (if one occurs).

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| **Clinic Title** | **Location** | **Attending Physician** | **Genetic Counselor** | **Time/Date** |
| Craniofacial | CNMC | Shur | Hain | Tues PM |
| Neurogenetics/ Fragile X | CNMC | Gropman/Uy | Meira | Varies |
| Muscular dystrophy clinic | CNMC | Varies | Simpson | Tues |
| Cardiovascular Genetics | CNMC | Chapman/Leon | Pomorski | Varies |
| Disorders of Sexual Differentiation | CNMC | Leon | Andrew | Varies |
| Turner syndrome | CNMC | Dauber | Hain | Varies |
| Down syndrome | CNMC | Rosenbaum/ Lewanda | Weston | Monday and Friday |
| Palliative Genetics | CNMC | Regier | Miller | Tuesday/Friday |
| Neurofibromatosis | CNMC | Rosenbaum | Schonberg | Tues AM |
| Vascular Clinic | CNMC | Shur | Hain | Tuesday am |
| Myelin Disorders (Leukodystrophy) Clinic | CNMC | Fraser | Andrew | Friday |
| Skeletal dysplasia | CNMC | Rosenbaum/Regier | Miller | Tues AM |
| Cancer Genetics | CNMC | Varies | Turner | Varies |
| Neurofibromatosis | CNMC | Boernhurst/Rosenbaum | Turner | Tuesday |
| Metabolic Clinic | CNMC | Many | Many | All Days |
| Newborn Screen | CNMC | Shaw | Varies | Varies |
| Mitochondrial (Adult) | CNMC | Chapman |  | Wednesday |
| Hypermobility Clinic | CNMC | Chapman/Regier | Varies | 5th Wednesday, Saturday |
| Bleeding Disorder Clinic | CNMC | Varies | Schonberg | Varies |
| Hemoglobinopathies Clinic | CNMC | Varies | Schonberg | Varies |
| Cystic Fibrosis | CNMC | Regier | Miller | prn |
| Lysosomal Storage Disorders | CNMC | Grant/Roshan Lal | Maccia | Mon, Tues, Thur, Fri |

**Electives**

Elective rotations can happen anywhere that Children’s National has a program agreement with that program. Thus, any rotation can be repeated for additional experience of any of the local facilities can be used for a rotation (i.e. NIH, JHU, Inova, etc). We want this opportunity to allow you to grow and experience new ideas and concepts.

**Example Electives**

-Metabolic Dietitian rotation

-NHGRI or NICD or NCATS, NIH

-Teaching elective (through Georgetown School of Medicine or George Washington University School of Medicine)

-Advocacy elective (through CNH or through NORD)

-Clinical Research Training (CTSI-CN or through NIH)

-CICU, NICU, or PICU intensive rotation

-Quality Improvement intensive time

-Clinical Trials Intensive time

**Cancer Genetics**

The cancer genetics rotation is a hybrid of “bread and butter” cancer genetics for adults referred with breast, colon, and other types of cancers and complex early-onset familial cancers followed through the Children’s National cancer genetics program. The cancer genetic team provides in-patient and out-patient evaluations of complex families and children with genetic cancer syndromes at Children’s National. This combination allows for the diversity of cancer counseling opportunities and the opportunity to work with both a geneticist and genetic counselor in two different experience locations.

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| The Children's National [Rare Disease Institute](https://childrensnational.org/departments/rare-disease-institute) and the [Division of Oncology](https://childrensnational.org/departments/center-for-cancer-and-blood-disorders/programs-and-services/oncology) established the Cancer Genetics Clinic to help family members understand their personal risk of developing cancer.  Our mission is to identify individuals with a greater likelihood for certain types of cancer and provide early detection and treatment. Ultimately, our goal is to prevent the development of cancer or additional cancers altogether.   Children’s National: Experts in Pediatric Genetics and Oncology Our team is a leader in the recognition and care of patients with newly recognized cancer predisposition syndromes.   The Cancer Genetics Clinic sees many patients, including:   * Children with cancer * Children with a history of cancer * Children with early-onset cancer and rare forms of cancer * Children with a family history of cancer * Parents of a child with cancer * Couples who want to learn more about the risks to their other children or future children * Adults with early onset cancers * Adults at risk for cancer * Children and/or family members with a known cancer predisposition syndrome   Our dedicated clinical geneticists and oncologists are available for individuals and families evaluated through the clinic. The Cancer Genetics team includes:   * [Joyce Turner, MS, CGC](https://childrensnational.org/visit/staff/joyce-turner), director of Cancer Genetic Counseling Program * [Miriam Bornhorst, M.D.](https://childrensnational.org/visit/find-a-provider/miriam-bornhorst), pediatric oncologist   If you have a cancer predisposition syndrome, we will work with you to find the most appropriate treatment. We can provide long-term care and identify and treat cancers early. In certain cases, we may be able to remove the cancer in its entirety. |

**Prenatal Genetics**

Prenatal Genetics offers the trainee the opportunity to experience the variety in this field. From the routine care to NIPS to complex congenital imaging, the Prenatal Pediatrics center at Children’s National, offers the breadth and depth trainees need. In addition, the fetal medicine center offers prenatal ultrasound, MRI, echocardiogram, and consults with all pediatric sub-specialties.

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| **Children’s National Prenatal Pediatrics Institute** |
| The Prenatal Pediatrics Institute at Children’s National Hospital provides the most advanced and comprehensive prenatal pediatric care for unborn babies. We offer pregnant families state-of-the-art prenatal diagnostics and treatment in a compassionate and supportive environment.  The Fetal Imaging Program is the backbone of our fetal program, evaluating 600 ultrasounds and 500 fetal MRI scans. Our Prenatal Pediatrics Institute is one of a few centers in the world to have a fetal neuroradiology team. This team uses fetal MRI to make early diagnoses of fetal brain development anomalies. Imaging modalities include:   * Fetal ultrasound. If a routine ultrasound identifies a potential medical condition, our prenatal pediatrics specialists can perform a more detailed ultrasound to confirm or rule out the findings. We use the most advanced imaging technology to evaluate and diagnose any abnormality. * Fetal MRI. Fetal MRI provides very detailed images of the mother and baby. This helps our team confirm a diagnosis and plan treatment. Images are reviewed by the multi-disciplinary team with our board-certified radiologists and neuroradiologists. * Fetal echocardiography. We use this procedure to obtain images of a baby’s heart. We can detect heart defects by 18 weeks gestation (during the pregnancy), and see the major structures of the heart as early as 12 weeks.   Your rotation will be spent with Dr. Jamie Fraser, Director of Fetal Genetics, and our prenatal genetic counselors, Anne Lawrence, CGC, and Kate Cilli, CGC, in addition to our multi-disciplinary team of physicians, including neurologists, endocrinologists, general and subspecialty surgeons.  In addition to fetal diagnostic consultations, Dr. Fraser and the team also counsel expectant families on prenatally-identified genetic diagnoses identified by NIPT, prenatal microarray, and prenatal gene panels. We also facilitate advanced genetic testing in cases of pregnancy loss with appropriate pre- and post-test counseling of results.  Finally, Dr. Fraser follows infants evaluated prenatally at our institution once they are delivered to ensure that these infants have timely postnatal follow-up evaluation. Our trainees are welcome to see these infants with Dr. Fraser as well. |

**Molecular Lab**

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| **Week 1** | | | | | |
| **Time** | **Mon (12/9)** | **Tues (12/10)** | **Wed**  **(12/11)** | **Thurs (12/12)** | **Fri (12/13)** |
| **9am-12pm** | Introduction to molecular lab | Lab: Purifying DNA | Project (no CNMC activity) | GCs: CMA analysis | Lab: Next Gen Sequencing |
| **12-3pm** | 1-2 pm:  Lab tour | Lab: Chromosomal Microarray (CMA) processing | Project (no CNMC activity) | Directors: CMA analysis | Directors: NGS analysis |
| **Week 2** | | | | | |
| **Time** | **Mon (12/16)** | **Tues (12/17)** | **Wed**  **(12/18)** | **Thurs (12/19)** | **Fri (12/20)** |
| **9am-12pm** | GC: NGS report writing | Director: Genome analysis | Project (no CNMC activity) | Director: The right test in the right way | Lab: Fragile X testing and analysis |
| **1-3pm** | Lab: Genome | GC: Genome Analysis Reports | Project (no CNMC activity) | Lab/Director: non-NGS evaluations | Lab: Case presentation to lab team |
| **Week 3, 4** | | | | | |
| **Time** | **Mon (12/16)** | **Tues (12/17)** | **Wed**  **(12/18)** | **Thurs (12/19)** | **Fri (12/20)** |
| **FOLLOW THE SAMPLE** | | | | | Continuity Clinic (1 full day in week 3 to obtain samples to follow, if needed) |

**Biochemical Lab**

The biochemical lab rotation is unique for Children’s National trainees. While other rotators come to the CNH lab for a two week intensive, the Children’s trainees then spend two additional weeks “following the sample” of their own patients from continuity clinic as it progresses through the lab. For example, they would run the sample in tandem with a lab technician for a PKU blood spot, an MSUD sample, and a personalized sequencing panel to identify the causative change in the OTC gene. This opportunity allows them to “get to know the lab” at a much deeper level and improve patient care during the process.

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| **Week 1** | | | | | | | |
| **Time** | **Mon (12/9)** | **Tues (12/10)** | | **Wed**  **(12/11)** | **Thurs (12/12)** | | **Fri (12/13)** |
| **9am-12pm** | Floor 3.5/ID Conference Rm  10am-12pm: Introduction to lab rotation (Dr. Regier and Dr. Michael)  **Pre-test\*** | Floor 3.5/ID Conference Rm  9-10:30am: Plasma Amino Acid Analytes (Dr. Albert) | | Project (no CNMC activity) | Lab  10am: Urine organic acids (in lab) | | Floor 3.5/ID Conference Rm  10am: UOA analytes (Dr. Albert)  \*Watch recording prior to meeting\* |
| **12-3pm** | 1-2 pm:  Lab tour and Plasma Amino Acids (in lab) | Floor 3.5/ID Conference Rm  12-2pm: Aminoacidopathies review (Dr. Regier)  \*Watch recording prior to meeting\* | | Project (no CNMC activity) | Floor 3.5/ID Conference Rm  1pm: Urea Cycle Disorders (Dr. Ah Mew)  \*Watch recording prior to meeting\* | | Floor 3.5/ID Conference Rm  1pm: Fatty Acid Oxidation Disorders (Dr. Bosfield) |
| ASSIGMENTS | Plasma amino acids | |  | | | Urine organic acids | |
| **Week 2** | | | | | | | |
| **Time** | **Mon (12/16)** | **Tues (12/17)** | | **Wed**  **(12/18)** | **Thurs (12/19)** | | **Fri (12/20)** |
| **9am-12pm** | Lab  10am: Acylcarnitine profile (in lab) | Floor 3.5/ID Conference Rm  9am: Acylcarntine profile Analytes (Dr. Albert) | | Project (no CNMC activity) | Floor 3.5/ID Conference  10am-12pm: Case Presentations (Dr. Albert, Summar, Regier) | | Floor 5/East Conference Rm  11am: Is it an IEM?(Dr. Summar)  \*Watch recording prior to meeting\* |
| **1-3pm** | Floor 5/West Conference Rm  1pm: Organic Acidemias (Dr Chapman)  \*Read slides before lecture\* | Floor 3.5/ID Conference Rm  1pm: Newborn screening: how the whole system works (S. Viall)  \*Watch recording prior to meeting\* | | Project (no CNMC activity) | Floor 3.5/ID Conference Rm  Watch Recording- Lysosomal and Peroxisomal Disorders | | Floor 5/East Conference Rm  **Post-test\***  2PM- CAP/CLIA/QC (Dr. Michael) |
| ASSIGMENTS | Acylcarnitine Profile | | | | | | |
| **Week 3, 4** | | | | | | | |
| **Time** | **Mon (12/16)** | **Tues (12/17)** | | **Wed**  **(12/18)** | **Thurs (12/19)** | | **Fri (12/20)** |
| **FOLLOW THE SAMPLE** | | | | | | | Continuity Clinic (1 full day in week 3 to obtain samples to follow, if needed) |

**Cytogenetics Lab**

Quest diagnostics is a world-class facility for cytogenetics evaluations. Led by Dr. Steve Schonberg, the two week rotation allows the trainee to experience the full breadth and depth of cytogenetics. From performing one’s own karyotype to observing and analyzing FISH analysis cases to chromosomal microarray analysis, the experience at Quest diagnostics is routinely ranked among rotators as “excellent”. Additional time is spent during the molecular rotation at Children’s National on chromosomal microarray analysis.

