The LRG and NIH Collaborate on Virtual Tumor Boards to Review Challenging Cases

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Within the landscape of Gastrointestinal Stromal Tumors (GIST), a rare sarcoma of the gastrointestinal tract, there is an even rarer subset termed pediatric, SDH-deficient, or wildtype GIST. Patients with these tumors comprise 5-10\% of all GIST diagnoses. For these patients, there are few effective treatments. This population lacks available resources, with a smaller pool of physicians and medical institutions that specialize in their treatment, and there is less research focused on these subtypes.

In order to serve this rare population, the Life Raft Group, a GIST patient advocacy organization, worked with the National Institutes of Health (NIH) to create a collaborative model to serve the needs of these patients. Collaborative models are vital for rare disease advocacy groups to be able to sustain services for their population.

To read more about how patient advocates and dedicated physicians created the NIH Pediatric and Wildtype GIST Clinic, please review this white paper which illustrates the creation, the history, and the value of this type of collaboration - a true partnership for survival. View this white paper: https://indd.adobe.com/view/d03161be-6a0e-4f4c-9d21-2d44c0f8a885

The challenge in the early days after the discovery of Pediatric and Wildtype GIST patients was to provide resources for the “rarest of the rare.” The initial attempt to address this challenge began as a twice a year clinic at the NIH to serve this population. When funding became scarce in 2014, the Life Raft Group and the NIH came up with a creative solution, utilizing technology to provide a Virtual Tumor Board to complement the yearly clinic.

Now fast forward during this current historic pandemic, creativity and collaboration have been paired once again to ensure that young GIST patients are not missing out on vital treatment. Since the in-person clinic had to be postponed, the NIH turned to the Life Raft Group to help them organize a series of two Virtual Tumor Boards to review cases that otherwise would have to wait until the clinic can safely be held.

The first clinic of the NIH Virtual Tumor Board was held in May 2020.
There were 29 in attendance. (See Appendix I, page 7)

This meeting consisted of three unique cases that were similar in nature because they were all GIST patients with complicated clinical issues. The cases were diverse but tied together by their rare nature. The dialogue was lively, with the experts weighing in, sharing both best practices and brainstorming potential clinical and diagnostic interventions.
Case #1

The first case was presented by Dr. Daniel Rushing. The key question for the group was whether or not to start his patient on imatinib given that she was pregnant.

Patient History:

- 31 y/o female presented in the fall of 2019 with loose stools and was subsequently diagnosed with KIT mutant GIST in spring 2020 when she was 29 weeks pregnant.
- She had her gallbladder and a small intestine tumor removed.
- Primary tumor: Small Intestine
  - 7.6 x 6.3 cm
  - IHC Stains show positive stains for CD117 and DOG1.
  - Mitotic rate: Unknown

Observations and suggested interventions from the team included:

- The team suggested that the tumor appears to be slow-growing. It would be important to work closely with a maternal fetal medicine physician. Studies show imatinib does not cross placenta when fetus is mature (after 1st trimester) and a rapid response to imatinib could lead to tumor breakdown. It would be an option to wait several weeks without any treatment to allow fetal lungs to mature and defer starting imatinib until after delivery.

Case #2

The second case was presented by Dr. David Hoogstra.

Patient History:

- Previously healthy 15 y/o female presented with fatigue, pallor, and palpitations
- Patient was found to have a hemoglobin of 3.7 and melanotic stool.
- EGD showed three mass-like gastric lesions with multiple ulcers on these lesions, and a polypoid-like mass on the duodenal bulb.
- A CT abdomen and pelvis with contrast demonstrated a lobular mass along the greater curvature of the stomach without evidence of metastatic disease.
- IHC stain studies showed positive results for KIT (CD117), DOG1 and CD34 and negative for SDHB (SDH-deficient).
- Tumor size was 3.0cm at greatest dimension, with a mitotic rate of 0 mitoses/5mm2.
- Mutational analysis completed at Mayo Clinic Laboratories show a mutation in KIT Exon 11 p.L576P.
- The patient had a partial gastrectomy with resection of her gastric tumor with a largely unremarkable post-operative recovery.
- Family Hx: No known NF-1, Carney Triad, Carney-Stratakis syndrome

Suggestions from the team:

- Repeat IHC and mutational testing
- Perform germline testing - L576P is often a germline driver. Also, look to see if patient is epimutant.
- NIH and Foundation Medicine can work together to do additional testing.
- Overall agreement is to repeat mutational testing and confirm KIT mutation.
- If KIT mutation is confirmed, imatinib should be considered.
Addendum:

After considering options suggested by the Tumor Board, Dr. Hoogstra joined the second tumor board in June, 2020, with an update.

- Repeat testing performed through Tempus demonstrated no pathogenic variants in the patient's germline. The exon 11 (L576P) somatic mutation was confirmed. SDH A, B, C, and D were not found to have somatic or germline mutations. However, RNA analysis demonstrated a significantly low SDHC expression suggestive for epigenetic SDH-deficiency.

Summary of suggestions:

- This could be SDHC epimutation which is common in Carney's Triad (so there is a possible risk of paraganglioma). Recommendation is to perform methylation testing.
- NIH can assist with the methylation testing.
- Overall agreement is to start with imatinib (for at least 3 years per NCCN guidelines).

Case #3

The third case was presented on behalf of the NIH by Chinelo Onyiah, Clinical Research Support Associate.

Patient History:

- 42 y/o male diagnosed who presented at age 30 with lightheadedness, dizziness, and pallor and was found to be anemic with a hemoglobin of 7 mg/dL. Imaging demonstrated a posterior gastric mass and three lesions in the liver.
- Primary tumor: Stomach (specifically stated to be on posterior wall of the stomach)
  - 7.5 cm
  - Pathology demonstrated GIST with KIT exon 11 p.L576P mutation, SDHA mutation.
  - Germline evaluation did not identify the SDHA mutation (however, there was some concern about low coverage at that location in the panel that was used).
  - Mitotic rate: Unknown
  - Metastases: Peri-gastric lymph nodes
  - Mixed histology, 7 mitosis/hpf

Current State of Disease: CT abdomen/pelvis showed improved peritoneal carcinomatosis, omental caking, and cardiophrenic lymphadenopathy. Multiple hypo-enhancing lesions within the liver, which have overall decreased in size, likely representing improved hepatic metastatic disease.

- Patient question: Continue on sunitinib or perform debulking surgery?

Suggestions from the team:

- Overall agreement: continue sunitinib as it is showing response.
- Once there is progression, perform resection to further test tumor for possible secondary mutations
- Obtain more current tissue and perform Tumor and ctDNA mutation testing to check if there is a KIT exon 17 mutation (if so, regorafenib may be an option).
- Perform diagnostic laparoscopy (and repeat over time) for better evaluation of peritoneal disease.
- Determine if the tumor is SDH-deficient by immunohistochemical staining.
The second clinic was held virtually on June 11, 2020. There were 33 attendees. (See Appendix II, page 8.)

Case #1

The first case was presented by Dr. Rishi Kotecha.

Patient History:

- 15 y/o male with Carney’s Dyad
- Primary Tumor: stomach
  - c-KIT and CD34 positive on IHC
  - Mitotic Rate: 28/50 hpf
  - Primary Tumor Measurement: 2.8 x 2.5 x3.0 cm
  - Tumor stained positive for SDHA and negative for SDHB
- Primary Mutation (somatic)
  - Homozygous deletion of exon 1 of SDHB. Absence of SDHA, SDHC, SDHD, KIT, PDGFRA, BRAF or NF-1 somatic mutations. Specifically, the tumor was negative for KIT mutations in exons 9, 11, 13 and 17 and BRAF mutation in exon 15.
- Germline Variants:
  - SOS1:c.1297G>A (p.Glu433Lys)
  - Consistent with Noonan Syndrome and previously diagnosed
- Both GIST and paraganglioma (aortocaval retroperitoneal at L2 level) were discovered at the same time. Initial resection of the primary tumor had clear surgical margins.
- Hepatic metastases first identified May 2016 approximately one year after resection of the primary tumor, two liver lesions (in segment 4a and segment 5) were treated using radio frequency ablation (RFA). Four months later RFA was again used to treat three new hepatic lesions (in segment 4a, segment 1/4a and segment 6) and one previously ablated lesion (in segment 5).
  - Homozygous deletion of exon 1 of SDHB (somatic and germline). Absence of SDHA, SDHC, SDHD, KIT, PDGFRA, BRAF, RAS or NF-1 somatic mutations from hepatic lesion sampled in April 2018.
- The patient was treated with several tyrosine kinase inhibitors. The patient received pazopanib for 14 months (March 2017-June 2018) and this was stopped due to disease progression. This was followed by regorafenib for 6 months (July 2018-January 2019) which was stopped due to side effects after a dose reduction.
  - Pulmonary metastases first identified March 2019
- The patient was then treated with venetoclax in March 2019. This was stopped in May 2020 due to progressive disease.

Suggestions and observations from the team included:

- Retry regorafenib but at half dosage to tolerate better.
- If no obstruction is imminent and the patient is asymptomatic, close observation without additional systemic therapy at this point could be considered.
- Local therapies of specific lesions could be considered including cyber knife treatment, surgical cyto-reduction, and hepatic arterial embolization of selected liver lesions. Also evaluation of circulating tumor DNA or biopsy of any tumors that grow rapidly could be worthwhile to identify new secondary mutations which may suggest additional treatment options (An additional team member agrees that embolization is better than resection.)
Team members suggested:

Some ongoing clinical trials for patients with progressive GIST such as DS-6157a (ClinicalTrials.gov Identifier NCT04276415), could be considered for patients with SDH-deficient GIST. There was some concern about this agent in the pediatric age group. The TKI dovitinib was also suggested as a possible treatment option.

Overall the team was in agreement that close observation without instituting a new systemic treatment made sense at this point, and that the possibility of reinstitution of regorafenib could be discussed with the patient and their parents. The team would also consider local therapy for specific tumors that may grow more rapidly or cause symptoms.

Case #2

The second case was presented by Sahibjeet Kaur, LRG Patient Registry Supervisor.

Patient History:

- 72 y/o male diagnosed with a single (21cm) tumor in small intestine in 2017
- Mitotic rate: 11/50 hpf
- IHC staining is positive for CD117 and DOG1 with additional biomarker expression of PD-L1 (SP142) positive 2+.90%.
- Mutational Testing: BRAF exon 15 P.v600E and PDGFRA exon 18 D842H
- 1995: resection of ruptured, lemon sized tumor in small intestine; pathology report is not available.
- 2017: partial hepatectomy-metastatic GIST, 21cm negative margins
- Imatinib 400mg then instituted and continued for approximately two years stopped d/t mutation.
- Mektovi & Braftovi then started and continued for approximately one year. Patient now has disease progression.

Suggestions from the team:

- It was discussed that PDGRFA could have a potential to be the main driver of tumor growth, but it is impossible to be certain of this. Other TKIs could be considered.
- Add Keytruda to current treatment regime (however it will be hard to distinguish which medication is working) OR do avapritinib and Keytruda together (overall agreement but will have these as backups if avapritinib does not show any response).
- Is there differential progression? If so, possibly resect the growing nodules and resume same treatment afterwards. Have Dr. Heinrich’s team perform a biopsy and study and have patient continue treatment.
- It is hard to predict that surgery is the best option without seeing the scan, but due to the peritoneal location of the tumors, it may be complicated to extract tumors. However, surgery shouldn’t be ruled out until a clear picture of the scan/location of the tumors is analyzed. These comments arose from another team member’s suggestion on extracting the tumors that are actively growing and proceed to test them to identify the driver.
- If the patient’s scans are showing mixed results, it could be from the response from the medication.
- Present both options of avapritinib or immunotherapy and MEK inhibitor to patient and base decision on toxicity.
- Depending on CT progression and if majority are controlled by MEK inhibitor, add Keytruda (pembrolizumab) to MEK inhibitor. This was seconded by another team member.
- Overall agreement: upon the two options (avapritinib or immunotherapy) and mentions that they needed to have a clearer view of latest scan.
Potential treatment options:

- Avapritinib (whether or not there is a response will be known fairly quickly, keep an eye on cognitive issues but response will be known before any cognitive issues arise.)
- Avapritinib + immunotherapy
- Immunotherapy + Mektovi and Braftovi
- Immunotherapy + MEK inhibitor- hepatic arterial embolization of largest tumor(s)
- Resection of tumors

The recommendation of the GIST Virtual Tumor Board was to do the small bowel resection at the same time that she had the C-section. Her surgeon disagreed and felt that in view of the slow growth of this tumor it would be less problematic for the patient to have the c-section through a Pfannenstiel incision, wait 4 weeks when her uterus would have decreased in size and the do the small bowel surgery through a smaller incision. She got a second opinion from another surgeon who agreed with the first surgeon and this is what she opted to do.

I found the GIST tumor board to be immensely helpful. First of all, that it brought piece of mind at a time when there is uncertainty and the anxiety level in doctors and the patient was high was immensely helpful. Secondly, there was an error in reporting the mutation that was pointed out by one of the board members. The correct mutation was KIT exon 11 (c.1676T>A, p.Val559 ASP)

The chance to run by a difficult case among peers is much appreciated.

Daniel Rushing, MD
Indiana University Medical Center
Indianapolis, IN, USA

This was such a great thing for our patient, thank you for your work facilitating the virtual tumor board.

David J. Hoogstra, MD
Helen DeVos Children’s Hospital
Grand Rapids, MI, USA
Appendix I - Participants, May Virtual Tumor Board

There were 29 in attendance, including the following GIST specialists, representatives from the NIH, and patient advocates:

1. Douglas Fair, MD, Primary Children’s Hospital, Utah
2. Andrew Blakely, MD, Center for Cancer Research, NIH/NCI
3. Jason Sicklick, MD, Moores Cancer Center, University of California San Diego
4. John Glod, M.D., PhD, Branch Clinical Director, Pediatric Oncology Branch Associate Research Physician, NIH/NCI
5. Jonathan Trent, MD, Sylvester Comprehensive Cancer Center, University of Miami
6. Jonathan Keith Killian, MD, PhD, Foundation Medicine
7. Lily Klug, PhD, Research Project Manager, Oregon Health and Science University
8. Naris Nilubol, MD, F.A.C.S., Assistant Clinical Investigator, Surgical Oncology Program, NIH/NCI
9. BJ Thomas, RN, Lead Research Nurse, MyPART, NIH/NCI
10. Lee J. Helman, MD
11. Mary Frances Wedekind Malone, MD, MyPART Doctor, NIH/NCI
12. Jaydira del Rivero, MD, MyPART Doctor, NIH/NCI
13. Chinelo Onyiah, BS, Clinical Research Support Associate, NIH/NCI (Third presenter)
14. Sang Hyoun Hong
15. Lindsay Boyke, MD, Helen DeVos Children’s Hospital
16. Sahibjeet Kaur, Patient Registry Supervisor, The Life Raft Group
17. Jim Hughes, Board Member and Science Team Member, The Life Raft Group
18. Jayne Bressington, Trustee and Vice Chair, GIST Support UK
19. Norman Scherzer, Executive Director, The Life Raft Group
21. Denisse Montoya, Patient Registry Director, The Life Raft Group
22. Pete Knox, Senior Director, Research, The Life Raft Group
23. Mary Garland, Communications Director, The Life Raft Group
25. Joanne O’Rourke, Outreach and Engagement Associate, The Life Raft Group
26. Carolyn Tordella, Assistant Director of Communications, The Life Raft Group
27. Sara Rothschild, Vice President, Program Services, The Life Raft Group
28. Daniel Rushing, MD, Indiana University Medical Center (First case presenter)
29. David Hoogstra, MD, Helen Devos Children’s Hospital, Grand Rapids Michigan (Second case presenter)
Appendix II - June Virtual Tumor Board Participants

There were 33 attendees, including the following GIST specialists, representatives from the NIH and patient advocates.

1. Becky Owens, Patient Advocate, SDH-RA Cancer Research Advocates
2. Andrew Blakely, MD, Center for Cancer Research, NIH/NCI
3. Carolyn Tordella, Assistant Director of Communications, The Life Raft Group
4. Sosipatros Boikos, MD, VCU Massey Cancer Center
5. Denisse Montoya, Patient Registry Director, The Life Raft Group
6. Diana Nieves, Senior Director of Outreach and Engagement, The Life Raft Group
7. Jason Sicklick MD, Moores Cancer Center, University of California San Diego
8. Jaydira Del Rivera MD, MyPART Doctor (NIH/NCI)
9. Jayne Bressington, Trustee and Vice Chair, GIST Support UK
10. Jennily Eshak, Patient Registry Associate, The Life Raft Group
11. Jess Nowak, Director of Outreach and Engagement, The Life Raft Group
12. Jim Hughes, Board Member and Science Team Member, The Life Raft Group
13. Joanna O’Rourke, Outreach and Engagement Associate, The Life Raft Group
14. John Glod, M.D., PhD, Branch Clinical Director, Pediatric Oncology Branch Associate Research Physician, NIH/NCI
15. Jonathan Trent, MD, Sylvester Comprehensive Cancer Center, University of Miami
17. Katherine Janeway, MD, Dana-Farber Cancer Institute
18. Laura Occhiuzzi, Senior Vice President, The Life Raft Group
19. Lee Helman, MD
20. Lilli Klug, PhD, Research Project Manager, Oregon Health and Science University
21. Mary Garland, Director of Communications, The Life Raft Group
22. Mary Wedekind Malone, MD, MyPART Doctor, NIH/NCI
23. Michael Heinrich, MD, Oregon Health and Science University
24. Naris Nilubol, MD, F.A.C.S., Assistant Clinical Investigator, Surgical Oncology Program, NIH/NCI
25. Norman Scherzer, Executive Director, The Life Raft Group
26. Pete Knox, Senior Director of Research, The Life Raft Group
27. Piga Fernández, Global Consultant, The Life Raft Group
28. Rishi Kotecha, MD, NHMRC Research Fellow, Telethon Kids Institute (First case presenter)
29. Sahibjeet Kaur, Patient Registry Supervisor, The Life Raft Group (Second case presenter)
30. Stephanie Gachette, Patient Registry Associate, The Life Raft Group
31. Christopher B. Weldon, MD, PhD, Boston Children’s Hospital
32. Douglas Fair, MD, Primary Children’s Hospital, Utah
33. Sara Rothschild, Vice President, Program Services, The Life Raft Group
The following commentary is in response to “Survival in advanced GIST has improved over time and correlates with increased access to post-imatinib tyrosine inhibitors: results from Life Raft Group Registry” which was featured in the April issue of LRG Science.

**COMMENTARY**

**Survival Benefit with newer TKI’s in advanced GIST- Hope or Hype?**

The management of advanced gastrointestinal tumor (GIST) has undergone rapid advancement in the past two decades with emergence of multiple new tyrosine kinase inhibitors (TKI). Four TKI’s namely imatinib, sunitinib, regorafenib and avapritinib (for PDGFR D842V mutation) are currently approved for advanced GIST. Only imatinib (approved in 2002) has shown survival benefit and is the recommended first line TKI for KIT/non D842V PDGFR mutated GIST.\(^1,2\)

Sunitinib, which improved progression free survival (PFS) compared to placebo was approved for 2nd line treatment after imatinib failure in 2006\(^3\). However, no survival benefit was seen at long term follow-up. In 2013, regorafenib was approved based on PFS benefit in the GRID study\(^4\), though there was no OS benefit. High cross over (85% in GRID and 50% in sunitinib trial) likely prevented an OS benefit from becoming apparent. Also, evidence suggests that continuous dosing of sunitinib is better tolerated and provides more benefit than intermittent dosing used in the randomized trial\(^5\). A recent meta-analysis found excellent correlation between trial level PFS and OS in metastatic GIST for second and later line setting making above results more clinically meaningful\(^6\).

The present study retrospectively analyzed data from a large cohort of patients (N=1716) registered on Life Raft Group (LRG) and tried to answer whether newer TKI’s provide survival benefit in second and third line. They concluded that sunitinib in 2nd line and regorafenib in 3rd line significantly improved overall survival compared to other drugs or no treatment.

OS was 32.4 months in patients receiving sunitinib vs. 27.1 months in receiving other 2nd line treatment.\(^n = 74, p = 0.023, HR \text{ 1.377}, 95 \text{ CI 1.044-1.816}\). Since, the outcome of GIST has been influenced by drug approvals over time (sunitinib in 2006 and regorafenib in 2013), it was essential to factor in this variable as done by the authors. For 2nd line OS, treatment start year was significant for OS with sunitinib (<2006- 22.1 months, after 2006-2016-34.9 months \(p=0.0015\) till regorafenib got approval.

After progression on 2nd line therapy, regorafenib improved OS compared to patients who never received regorafenib in 3rd line (26.2 months vs. 14.3 months, respectively, \(p = 0.0002, HR \text{ 2.231}, \text{ CI 1.45-3.43}\)). However, only 6% patients got sunitinib in 3rd line and almost 30% received imatinib again (mainly 2002-2006) with nilotinib (21%) and sorafenib (21%) other commonly used drugs (2007-2013) suggesting heterogeneity in third line treatment pre-regorafenib approval. Similar trend was also apparent in GRID study\(^4\) in which 44% patients received regorafenib post 3rd line (48% in this analysis). To correct for this, the authors calculated OS from a common time point of starting third line therapy and divided it in three eras based on drug approvals, i.e. 2002-2006, 2007-2013, and after 2013. The results showed clear improvement in 3rd line OS after approval of regorafenib (12.8 vs 22.4 vs. 29.3 months).

“...there is little doubt that approval of new TKI’s especially sunitinib and regorafenib has greatly enhanced our therapeutic armamentarium and has contributed to better quality of care for patients with GIST. Since it is unlikely that a clinical trial will be done with these drugs again to specifically answer the question of overall survival, we have to rely on post hoc analysis and retrospective data for the same. This study presents an unique way of looking at data from these TKI’s in real world setting and provides reasonably good evidence for survival benefit. Though this data needs to be interpreted with its caveats in mind, this is still the best evidence we have of survival benefit with newer TKI’s in GIST.”

- Dr. Mittal and Dr. Rastogi
Although this data is thought provoking, there are certain limitations which need to be kept in mind. First, PFS reported in the registry is self-reported by the patient, and as mentioned by the authors, written reports are seldom submitted. Patients select appropriate options which include terms like shrink, stable, NED, mixed which do not correlate strictly with RECIST criteria. Furthermore, interpretation of scans in GIST requires expert radiology as RECIST criteria may not always be appropriate. Pseudoprogression is an important caveat when dealing with TKI therapy. Hence, validity of self-reported PFS is questionable. Also higher PFS in this study (two months more than randomised trial with sunitinib and regorafenib) is surprising and can partly be explained by less frequent imaging in routine practice as compared to prospective trials.

Secondly, the median OS with sunitinib after correcting for cross over in phase 3 trial was 18 months with 9 months in placebo arm. However, in this study it was 32 months for sunitinib (almost double) vs. 27 months for alternative 2nd line treatment and 16 months for those who never received sunitinib (N=42). Further details regarding these 42 patients are not provided. Overall survival for these patients equal to sunitinib arm of randomized trial is also difficult to explain. Similarly, for regorafenib, long-term follow up of GRID study showed median OS of 17 months after correcting for cross over whereas it was 26 months in this analysis. Even in 48% of patients who received regorafenib in later line, OS was still higher in this population (22 months). In a recent analysis published in Cancer by Philips et al, where they compared real world effectiveness of cancer therapies versus trial setting, they found that real world OS was inferior to trial OS by median of 5.2 months over a broad range of indications. This is generally attributable to better patient selection in clinical trials, closer monitoring and timely response assessment. Hence, higher survival in this real world analysis compared to RCT is difficult to explain.

Thirdly, there is inherent discordance in the groups between which comparisons have been done. In analysis of 2nd line therapy, 436 patients received sunitinib which are compared with 72 patients who received other 2nd line TKI (sunitinib in later line) and 42 patients who never received sunitinib. Similar heterogeneity exists while analyzing data for regorafenib in 3rd line with great discordance in numbers (N=56 for regorafenib and 285 for not receiving regorafenib). Although this is partially compensated by analysis of OS from a common time point, the baseline characteristics in these three groups are not evenly matched in terms of number of patients, age and gender. This kind of discordance is inherent in a retrospective analysis which could have been minimized by propensity matching. This was not attempted in this study and detailed exploratory subgroup analysis from observational cohort is likely to yield a biased result.

Fourth, there is inherent selection bias in LRG as patients who were younger, more tech savvy, better performance status, more educated and hence likely more compliant ones were likely to enroll in the registry. This could have partially accounted for better outcomes seen in this study.

In conclusion, there is little doubt that approval of new TKI’s especially sunitinib and regorafenib has greatly enhanced our therapeutic armamentarium and has contributed to better quality of care for patients with GIST. Since it is unlikely that a clinical trial will be done with these drugs again to specifically answer the question of overall survival, we have to rely on post hoc analysis and retrospective data for the same. This study presents an unique way of looking at data from these TKI’s in real world setting and provides reasonably good evidence for survival benefit. Though this data needs to be interpreted with its caveats in mind, this is still the best evidence we have of survival benefit with newer TKI’s in GIST.

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References

Invitation to Collaborate
In our Life Raft Group GIST Patient Registry we have identified over 700 examples of patients being prescribed off-label treatment, with over 400 patients being prescribed an off-label drug at least once, with many of these patients receiving significant benefit (six months or greater PFS).

We would like to expand this data in order to see if further insights can be found, and invite physicians and researchers to collaborate with us on a project examining this in more detail. If you would like to collaborate or learn more, please contact lrgscience@liferaftgroup.org
Interested in Submitting an Article to LRG Science?

LRG Science is based on a foundation of Real World Evidence and Real World Data collected from: The LRG Patient Registry, Global Surveillance Team, and our collaborative efforts such as the Pediatric & SDH-Deficient GIST Consortium.

We welcome content from other sources of Real World Evidence, and invite submissions of articles, editorials, case studies or breaking news for future issues, most especially, although not limited to gastrointestinal stromal tumor, SDH-deficiency and sarcoma.

To inquire about authoring an LRG SCIENCE article, providing commentary on an article, or to subscribe to our LRG SCIENCE mailing list, please contact Mary Garland, Director of Communications at mgarland@liferaftgroup.org.